DRAFT BASIC ASSESSMENT FOR THE PROPOSED UPGRADE OF NATIONAL ROAD (N1) SECTION 4 BETWEEN DOORNFONTEIN (KM 63.0) AND LAINGSBURG (KM 81.7) WITHIN LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT MUNICIPALITY, WESTERN CAPE PROVINCE

Applicant:	EAP:	Consulting Engineer:
South African National Roads Agency SOC Ltd Western Region 1 Havenga Street Oakdale, Belville 7530	**Earthlink Environmental Services (Pty) Ltd** 572 24th Withok Estates Brakpan 1451	**V3 Consulting Engineers** Suite 189 Private Bag X 04 0102

DOCUMENT CONTROL

DOCUMENT REVISION NUMBER: 2			
Details	**Compiler**	**Reviewer**	**Approver**
Name	Mr Caiphus Mukwevho Ms Vigilancee Sadiki	Ms Kgakile Mapoulo	
Designation	Environmental Assessment Practitioner - Earthlink Environmental Services (Pty)Ltd	Environmental Assessment Practitioner - Earthlink Environmental Services (Pty)Ltd	
Date	April 2025	April 2025	

PROJECT DETAILS

Project Name: Upgrade of National Road (N1) Section 4 Between Doornfontein (Km 63.0) And Laingsburg (Km 81.7) Under Laingsburg Local Municipality Within Central Karoo District Municipality, Western Cape Province

Applicant: SANRAL Western Region

SANRAL Contract No.: N001-040-2020/2F

Consulting Engineer: V3 Consulting Engineers

Environmental Consultant: Earthlink Environmental Services

EAP DECLARATION:

I **CAIPHUS MUKWEVHO**; herewith undertake that:

- I act as an independent specialist consultant in the field of Environmental Sciences;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- Have and will not have any vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity;
- Undertake to disclose, to the competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report; and
- Will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not.

_____

Signature of EAP:

April 2025

Date:

EXECUTIVE SUMMARY

The South African National Roads Agency SOC Ltd (SANRAL) proposes to upgrade the National Road (N1) Section 4 between Doornfontein (KM 63.0) and Laingsburg (KM 81.7). The National Road (N1) Section 4 is situated within Laingsburg Local Municipality located within the Central Karoo District Municipality, Western Cape Province. The proposed upgrade starts at Doornfontein bridge (KM 63.0) and ends at Laingsburg town at R33 (KM 81.7). The road will start at coordinates Start Point: 33˚13'6.87"S and 20˚36'19.31"E and will end at coordinates 33˚11'35.05"S and 20˚51'44.74"E. This project aims to improve road safety, reduce travel time, and enhance economic activities in the region. The project involves upgrading two bridges, eighty-six minor culverts, and eight major culverts.

Earthlink Environmental Services (Pty) Ltd has been appointed by V3 Consulting Engineers on behalf of SANRAL as the Independent Environmental Consultants to undertake the Environmental Authorization (EA) and Water Use Authorization (WULA) processes for the proposed upgrade of Section 4 of the National Road N1, following the requirements of the National Environmental Management Act (NEMA) and the Environmental Impact Assessment (EIA) Regulations, 2014 as amended. As a result, an environmental screening report was created outlining the authorization or permit requirements before the project's construction phase.

This report's objective is to provide the findings of the environmental assessment conducted for the proposed upgrade of National Road N1 between Doornfontein and Laingsburg Town.

- The legal structure that oversees the location;
- The current state of the site's environmental conditions and any relevant environmental studies, licenses, and permits;
- Proposed designs and alternatives;
- Public participation process;
- Impact assessment methodology and impact assessment;

Overall findings to indicate the sensitivity of the site, potential fatal flaws, and issues that require the attention of the SANRAL.

This report has been compiled in compliance with Appendix 1 of the Environmental Impact Assessment (EIA) Regulations 2014 and summarises the legal and policy framework; approach to the Basic Assessment and process followed; proposed project activities; key characteristics of the receiving environment; and potential impacts associated with the proposed upgrade of Section 4 of the N1.

The Basic Assessment Process for the proposed project has been undertaken per 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 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".

The following key conditions would be required to be included within an authorisation issued for the upgrade of N1 Section 4 and associated infrastructure:

- Conditions that may be set by DFFE in terms of the EA must be adhered to. If it is found that it will not be possible to adhere to certain conditions, this must be communicated to DFFE ahead of time to prevent a non-compliant situation.

- Should any additional activities listed in terms of the EIA Regulations be planned on the site, the appropriate application(s) for authorisation must be lodged with the relevant authority.
- All mitigation strategies described in this BA Report, must be put into practice.
- A project-specific draft EMPr (legally binding) has been compiled according to (but not limited to) the impacts and mitigation measures included in this assessment.
- Obtain the relevant permits for any protected plant species or specimens that will be lost during project construction.
- A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYM	DESCRIPTION
BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
CK	Central Karoo District Municipality
DEFF	Department of Environmental, Forestry & Fisheries
DWS	Department of Water and Sanitation
DMR	Department of Mineral Resources
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
ESA	Ecological Support Area
GA	General Authorisation
HIA	Heritage Impact Assessment
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
LLM	Laingsburg Local Municipality
MPRDA	Mineral and Petroleum Resources Development Act
N1	National Route 1
NEM: AQA	National Environmental Management: Air Quality Act
NEMA	National Environmental Management Act
NFEPA	National Freshwater Priority Areas
NHRA	National Heritage Resources Act
NWA	National Water Act
S&EIR	Scoping & Environmental Impact Report
SACNASP	South African Council of National Science Professions
SAMRAD	South African Mineral Resources Administration
SANBI	South African National Biodiversity Institute

SANRAL	South African National Roads Agency SOC Limited
SDF	Spatial Development Framework
WMA	Water Management Area

1. PROJECT INTRODUCTION AND BACKROUND

1.1 Introduction

The South African National Roads Agency Soc Ltd (SANRAL) proposes to upgrade the National Road (N1) Section 4 between Doornfontein (Km 63.0) And Laingsburg (Km 81.7). The project commences at Doornfontein stream at km 63.0. Up to km 76.7 the road traverses an easy rolling to flat terrain. From km 76.7 to km 79.6 the speed is reduced due to the very sharp horizontal curves. This section is hilly (commonly referred to as the "pass" section). From Km 79.6 the road enters the town of Laingsburg and ends at Km 81.7.

In terms of the EIA regulations of 2014 (as amended), activities associated with the proposed upgrading of road are listed under Listing Notice 1 (GN R327) and Listing Notice 3 (GN R.324), which requires a BA process to be undertaken. As such, a BA Process is been followed.

V3 Consulting Engineers on behalf of SANRAL has appointed Earthlink Environmental Services as independent Environmental Assessment Practitioner (EAP) to undertake the required Basic Assessment Process in order to obtain Environmental Authorisation (EA) for the proposed project.

1.2 Details of Proponent

The proponent for this project is **SANRAL Western Region** and the details are listed in table below.

Table 1: Details of Proponent

Proponent	
Company/Organisation	**South African National Roads Agency SOC Ltd**
Contact Person	Mr Gcobani Socenywa
Designation	Project Manager
Telephone Number	021 957 4627
Physical Address	8 Havenga Street, BO Oakdale, Cape Town

1.3 Details of EAP and Expertise

In accordance with Regulation 12 of the 2014 EIA Regulations; GN R326 (as amended), the applicant has appointed Earthlink Environmental Services (Pty) Ltd as an independent environmental consultant to undertake the required EIA process in order to obtain EA for the proposed project. The application for EA will be managed in accordance with the requirements of NEMA, 2014 EIA Regulations and all other relevant and applicable legislation.

Earthlink Environmental Services (Pty) Ltd does not have any interests in secondary developments that may arise out of the authorisation of this project. Neither the EAP nor any specialist are subsidiaries or are affiliated to the applicant.

The Lead Environmental Assessment Practitioner for this project is Mr Caiphus Mukwevho:

Mr. Caiphus Mukwevho is a Senior Environmental Assessment Practitioner and he holds a Bachelor of Environmental Sciences and an Honours of Environmental Sciences in the field of Ecology both at the University of Venda, his honours dissertation was aimed at “assessing the environmental compliance of a landfill site” the study was conducted at Makhado Vondeling landfill site.

Mr Mukwevho has attended various training courses to enhance his knowledge and understanding in the Environmental Field, the courses includes; Geographic Information System (GIS), Environmental Management Systems (ISO 14001:2004), Environmental Law & Compliance. He is a registered Environmental Assessment Practitioner under the Environmental Assessment Practitioners Association of South Africa (EAPASA), and he has applied as Professional Natural Scientist under the South African Council of Natural Science Professions (SACNASP), he is a member of the International Association of Impact Assessment South Africa (IAIASA).

Below are the details of the EAP, For the expertise of the EAP, please refer to Appendix H for a CV.

Table 2: Details of EAP

Environmental Impact Assessment Practitioner	
Company	Earthlink Environmental Services (Pty) Ltd)
Project Team	Mr. Caiphus Mukwevho -EAP
Email	caiphus@earthlinkenvironmental.co.za
Cell	082 269 4524
Physical Address	572th, Withok Estates, Brakpan, 1541

1.4 Details of Specialist Appointed for the BA Process

Based on the Environmental Screening undertaken, the EAP has recommended appointment of the following specialist (listed in table below). The specialist report are attached as appendix D of this EIA Report.

Table 3: List of Specialist

No	Specialist Field	Company/Person Appointed
1	Agriculture Impact Assessment	Matavha Environmental (Pty) Ltd
2	Heritage Impact Assessment	Cedar Tower Services (Pty) Ltd
3	Archaeological Impact Assessment	
4	Palaeontological Impact Assessment	
5	Biodiversity Impact Assessment	Ntumbuluko Consulting (Pty) Ltd
6	Aquatic and wetland Delineation	
7	Visual impact assessment	DesignNode

1.5 Purpose of this Report

In accordance with the National Environmental Management Act, No. 107 of 1998 (Act No. 107 of 1998) (NEMA) and the EIA Regulations of 4 December 2014 (Government Notice Regulation (GN R.982) (as amended), the issuing of an EA requires the undertaking of a BA process, with the associated Public Participation Process (PPP) and required the Specialist Studies. This will enable the Competent Authority (CA) to decide whether or not, to issue an EA for the proposed development.

The EIA Regulations of 2014 (as amended) allows for a BA process to be undertaken for activities with environmental impacts as listed in Listing Notice 1 (GN R.327) and Listing Notice 3 (GN R324).

A Basic Assessment (BA) process is the environmental assessment level used for activities outlined in Listing Notices 1 and 3. This assessment applies to activities deemed less likely to cause significant environmental impacts and, therefore, typically do not require a comprehensive Environmental Impact Assessment (EIA). The Basic Assessment Report (BAR) provides a more streamlined analysis of the environmental impacts of the proposed activity or development compared to a Scoping and EIA Report. The BAR is designed to accomplish the following objectives:

- 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 primary focus is on assessing the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the project, as well as evaluating the potential risk of the proposed activity's impact on these factors. This assessment aims to determine the nature, significance, consequences, extent, duration, and likelihood of these impacts occurring, along with the degree to which they might affect the environment and surrounding areas:

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

This BAR has been compiled per 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.

1.6 Pre-Application Consultation

A pre-application meeting was not held with the Department of Environment, Forestry and Fisheries (DFFE).

1.7 Structure of BA 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; 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 4: Structure of this BA Report in an accordance with Appendix 1 of (GN R326) EIA Regulations

Section	Content	Reference in the report
3 (1) (a)	details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	**Section 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;	**Section 2**
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;	**Section 2**
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	**Section 1**
3 (1) (e)	a description of the policy and legislative context within which the development is proposed including-	**Section 2**

	(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 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	**Section 1**
3 (1) (g)	a motivation for the preferred site, activity and technology alternative	**Section 3**
3 (1) (h)	a full description of the process followed to reach the proposed preferred alternative within the site, 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.	**Section 3**

	(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; (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	**Section 9**
3 (1) (j)	(j) an assessment of each identified potentially significant impact and risk, including-	**Section 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;	**Section 8**

	(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	**Section 9**
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.	**Section 8**
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 E**
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	**Section 9**
3 (1) (o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed	**Section 8**
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	**Section 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 which the activity will be concluded, and the post construction monitoring requirements finalised	**Section 9**
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 l&APs; (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.	**Page iii**
3 (1) (s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	**Not applicable**
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	**-**

2. PROJECT LOCATION AND DESSCRIPTION

2.1 Project Location

The table 5 below provides the details of the location on which the proposed road upgrading project traverse. Refer to figure 1 for the locality map showing the proposed road upgrading

Table 5: Details of project location

Province/s	Western Province
District Municipality	Central Karoo
Local Municipality	Laingsburg Local Municipality
Nearest town/s	Laingsburg
Ward Number/s	1, 2 and 3
Farm name/s and number/s	Baviaan Krants 104
21-digit Surveyor General code	C04300000000010400006 C04300000000027800000 C04300000000027700000 C04300000000002930000 C04300000000029200000 C04300000000028200000 C04300010000259000000 C04300010000258700000 C04300010000258800000 C04300010000259000000 C04300010000258600000 C04300010000258400000 C04300010000258500000 C04300010000256500000 C04300010000257400000 C04300010000261100000 C04300010000257300000 C04300010000257200000

The table 6 providing the coordinates of starting point, middle point and the end point of the road.

Table 6: Activity geographic coordinates

	Latitude	**Longitude**
Starting Point	33˚13'6.87"S	20˚36'19.31"E
Middle Point	33˚11'38.96"S	20˚50'39.29"E
End Point	33˚11'35.05"S	20˚51'44.74"E

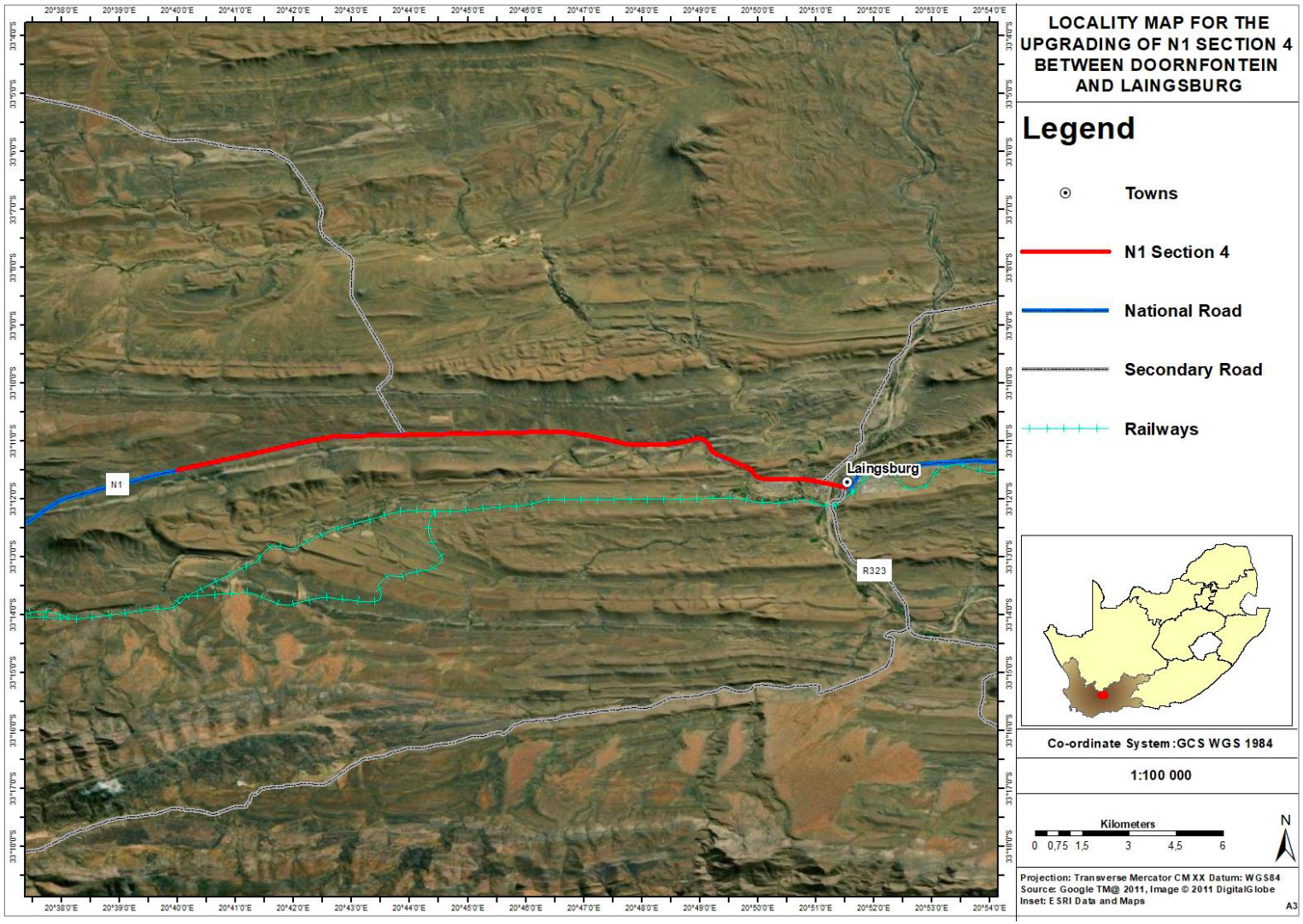


Figure 1: Locality Map of the proposed N1 road to be upgraded.

2.2 Project Description

The South African National Roads Agency SOC Ltd (SANRAL) proposes to upgrade the National Road (N1) Section 4 between Doornfontein (Km 63.0) And Laingsburg (Km 81.7). SANRAL is planning to upgrade the road section and widen the current road reserve. This proposed road upgrade is necessary due to the anticipated impact of freight vehicles (including abnormal loads) and increased traffic volumes on the design and operation of the existing road, as well as considerations of road safety. Given these considerations, the following is suggested:

- Widening the existing standard two lane single carriageway to a dual-lane carriageway, consisting of two lanes per direction, with a paved shoulder, and separated by a median and/or concrete barrier where required.
- provision for shared turning and passing lanes at intersections, and/or where required.

Upgrade of bridges including the Buffels, Wilgerhout and Doornfontein river bridges, and major and minor culverts:

- Widening the existing road reserve by 20 - 30 m to a total of 60 m to 80m along the route.
- Traffic accommodation/temporary deviation, if necessary, to allow for two-way traffic during construction;

Managing direct access by closing certain minor and major farm entrances and providing safer access points connected to internal farm service roads

Table 7: Coordinates of bridges

Coordinates of the Project	Latitude (South)	Longitude (East)
Start (Doornfontein stream/river) bridge	33^0 13’ 6.87”	20^0 36’ 19.31”
Wilgers river bridge	33^0 11’ 38.96”	20^0 50’ 39.29”
Buffels River bridge	33^0 11’ 44.76”	20^0 51’ 16.63”
End (Laingsburg)	33^0 11’ 35.05”	20^0 51’ 44.74”

Proposed upgrades:

- Doornfontein River bridge: New bridge for the new left carriageway;

- Wilgerhout River bridge: Raise the deck and widening; and
- Buffels River bridge: New bridge for the right carriageway, new raised deck on existing carriageway.

Table 8: Details of bridge upgrades

Km Distance	Bridge No.	Bridge Name	Width Between Parapets	Bridge Spans	Deck Area (m^2)
63.22	B5082	Doornfontein River	12.60	3 x 5.2 = 15.6	200
80.35	B1893	Wilgerhout River	12.60	6 x 6.63 + 2 x 10.70 = 61.2	771
81.34	B1894	Buffels River	13.15	6 x 16.08 = 96.5	1269

Major culverts:

Existing culverts are generally in good condition and can be retained in most instances. Implementing the 4-lane dual carriageway, will however require the extension of the existing culverts.

As a result, the following is proposed with regard to major culverts:

- From the hydraulic analysis of the culverts, only two (2) of the eight (8) major culverts is envisaged to be upgraded hydraulically to meet the current design standards and guidelines.
- Two (2) of the major culverts to be completely demolished and replaced with new cast in-situ box culverts of suitable size to pass the 1 in 50-year design flood.
- Six (6) culverts will be extended using cast in-situ concrete box culverts, matching the existing size, to cater for the new road lane configurations

Minor culverts:

- Multiple minor culverts with pipe diameters with diameters between 600mm and 750mm, and precast box culverts (total = 84no.)
- Proposed minimum upgrade to 900mm diameter pipes or 900 x 600 box culverts.
- Hydraulic requirements call for upgrade of most of the structures.

2.2.1 Road geometry Proposed new geometry:

The following cross-section options were evaluated and considered:

a) Rural section

- + 1 configuration
- Single carriageway with climbing/passing lanes
- 4-lane configuration with 2.8m median with concrete barrier
- Dual carriageway with 2.5m outside surfaced shoulders
- Dual carriageway with 1m outside surfaced shoulders

b) "Pass" section

- + 1 configuration
- Single carriageway with passing lanes
- 4-lane configuration with 2.8m median with concrete barrier

c) Town section:

- Single carriageway with passing lanes
- 4-lane configuration 2m kerbed median
- Dual carriageway last 300m

2.2.2 Proposed cross-sections

Section 1: Rural (km 63.0 – km 76.7): Divided dual carriageway road.

- The divided dual carriageway option tie-in with the adjacent contract.
- Dual carriageway with reduced outside shoulders (1m) not considered due to serious safety concerns.

Section 2: “Pass” (km 76.7 – km 79.9). 4-lane configuration

- With limited space between mountains on the left-hand side and river on the right-hand side a 4-lane configuration with a 2.8m median and concrete barrier is proposed for the “Pass” section.

Section 3: Laingsburg Town

- (km 80.2 – km 81.4): 4-lane configuration (2m kerbed median)
- (km 81.4 – km 81.7): Existing divided dual carriageway with 5.5m kerbed median.

2.2.3 Horizontal alignment:

- **With the proposed dual carriageway in the rural section:** the new carriageway is proposed to be constructed on the left-hand side due to river streams next to the existing right-hand side carriageway.

- **With the proposed 4 lane configuration through the "Pass":** possible horizontal re-alignment option is proposed to the LHS to prevent the fill batter going into the river on the RHS or to construct a fill retaining wall on the river side.

- The proposed horizontal re-alignment options in the "Pass" section with road widening only to the LHS due to river on the right-hand side, will create a deep cuttings(30m high). This can be mitigated by constructing cut retaining walls.

- **With the proposed Buffels River bridge:** there will be a horizontal re-alignment between km 81.160 to km 81.480 to tie-in opposite sides of the bridge from a 4-lane configuration with 2.0m kerbed median to a dual carriageway with 5.5m kerbed median.

2.2.4 Vertical alignment final recommendation:

- The K-values (for crests) can be lower than the prescribed standard for a 120km/h design speed if the required stopping sight distance (SSD) is longer than the vertical curve length. All K-values (for sags) conform to 120km/h with K-values that ranges between headlight distance and comfort distance.

  - km 63.00 – km 63.50 (500m): 100km/h existing design speed for crest.
  - SSD= 200m, curve length 150m.
  - With the added safety of no oncoming traffic due to proposed dual carriageway, vertical alignment to be retained, N1 will be signposted to 120km/h.

- The new LHS carriageway to match the RHS

- km 63.60 – km 64.60 (1000m): 110km/h existing design speed for crest.
- Very long curve length, 600m with SSD of 235m (sufficient).
- With the added safety of no oncoming traffic due to proposed dual carriageway, vertical alignment to be retained, N1 will be signposted to 120km/h.
- The new LHS carriageway to match the RHS

- km 66.90 – km 67.65 (750m): 110km/h existing design speed for crest.

- Curve length 280m, with SSD of 235m (sufficient).

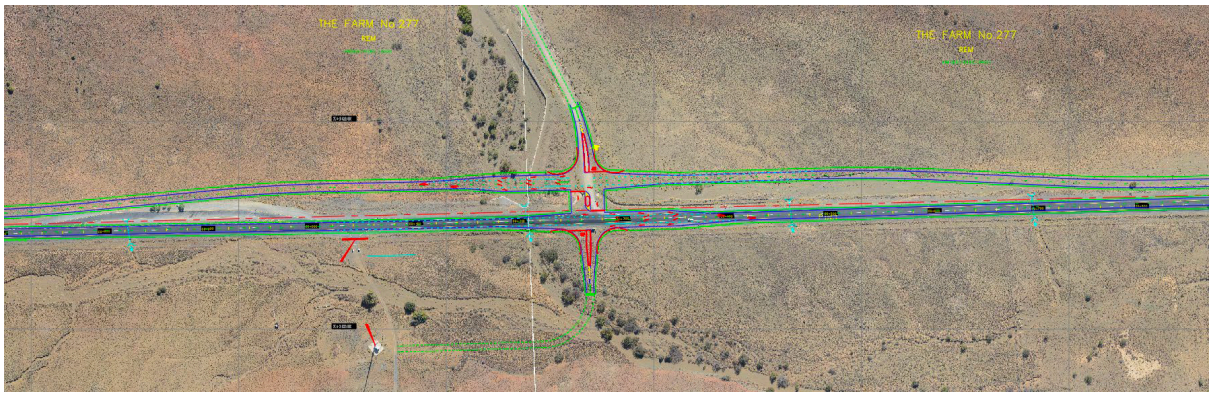
- With the added safety of no oncoming traffic due to proposed dual carriageway, vertical alignment to be retained, N1 will be signposted to 120km/h.

- The new LHS carriageway to match the RHS

2.2.5 Intersection Upgrades

Staggered intersection between km 69.0 (Baviaans station) and km 69.3 (Sutherland).

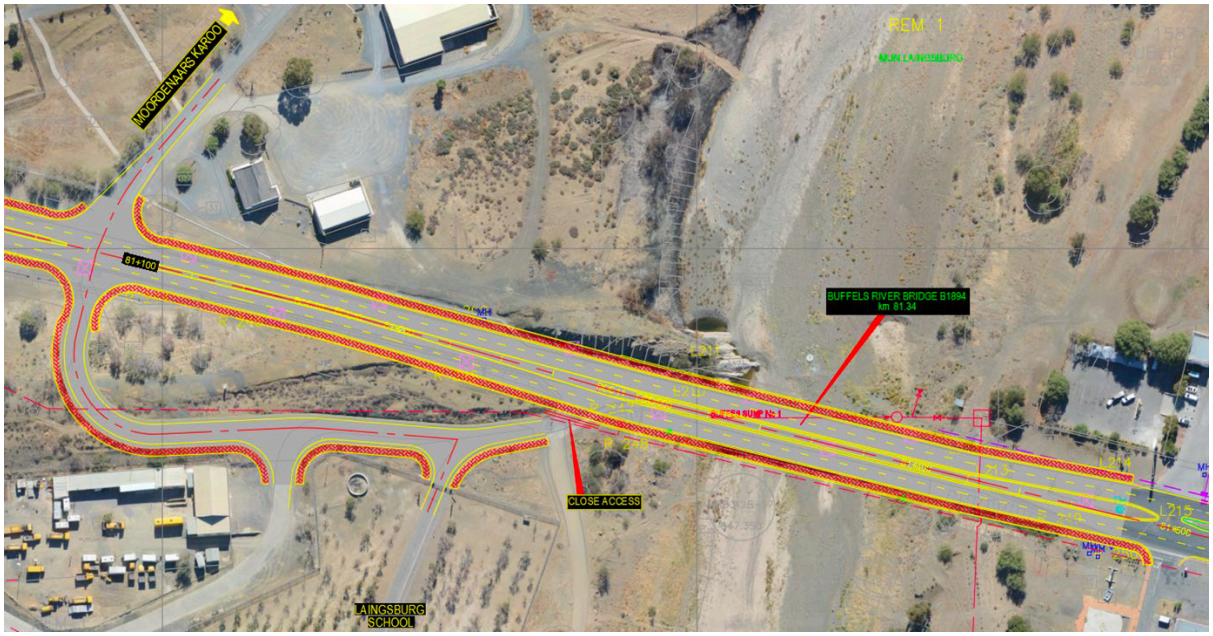
High order at-grade intersection making provision for a stop/refuge area in the middle (in between the two carriageways) as well as dedicated right-turn lanes together with tapers.



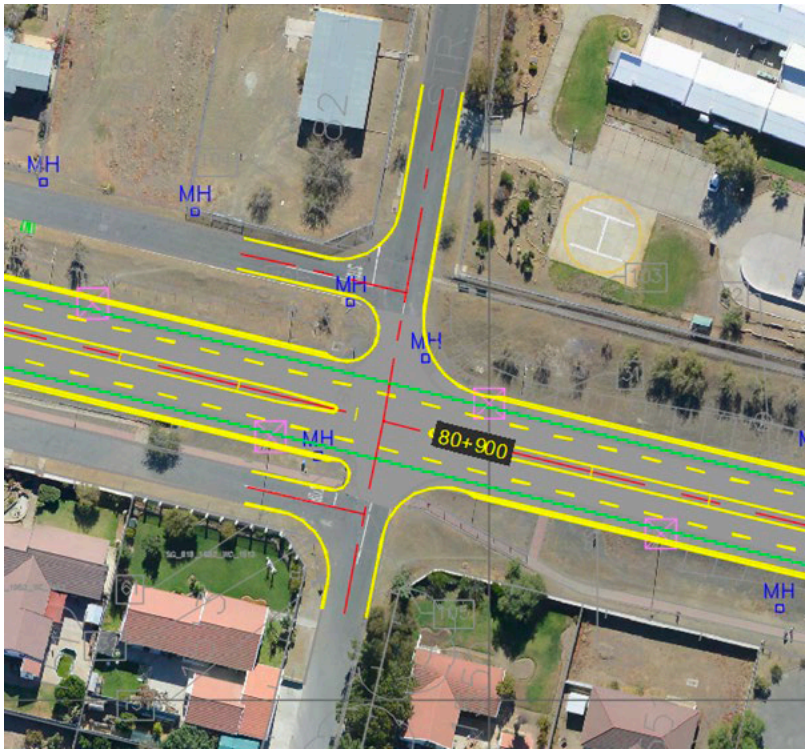
Proposed improvement for staggered intersection: Option 2 (Butterfly intersection with deceleration and acceleration lanes for right turn movements on and off the N1).

T-junction at km 80.18 RHS

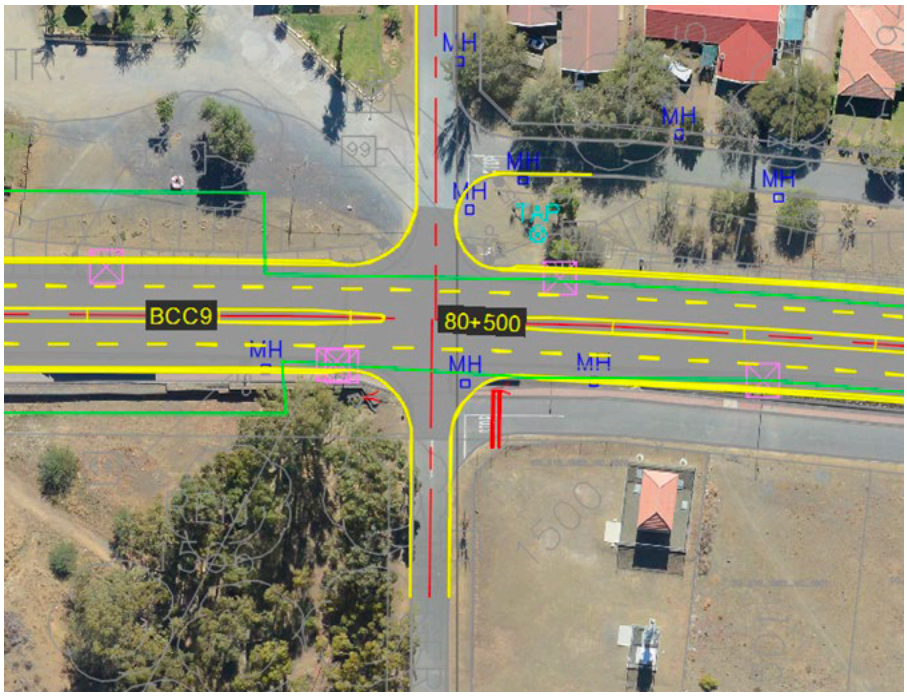
Proposed upgrade of the Access road to Moordenaars Karoo and school to a single point intersection.



Intersection upgrade at km 80.488 (Hospital Street LHS and Doringboom Street RHS)



Intersection upgrade at km 80.488 (Labour Street)



3. LEGISLATIVE FRAMEWORKS

This section provides a general overview of the policy and legal framework governing the proposed upgrade to the N1 Section 4 and related infrastructure. It outlines the environmental laws and regulations relevant to this activity that must be considered

during the assessment process. These laws and regulations may also influence or affect the proposed project.

3.1 The Constitution of South Africa (Act No. 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.

3.2 National Environmental Management Act (Act 107 of 1998)

The National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), as amended, and its Chapter 5 allow for the control of specific listed activities, which are regulated by the EIA Regulations 2014 (as amended). Until written authorization is received from the appropriate authority—in this case, the national DEFF—such activities are not allowed to begin. A Basic Assessment procedure is required for DEFF to evaluate the application for Environmental Authorization in light of the proposed road upgrade.

With that said the present document encompasses all legal provisions and the legal context for the proposed development. It also includes a review of laws, rules, policies, and guidelines that are pertinent to or have an impact on the proposed project. When drafting the report for the proposed development, the following national, provincial, and local government laws were taken into consideration:

- Constitution of the Republic of South Africa, 1996 (Act No 108 of 1996);
- National Environmental Management Act, 1998 (Act 107 of 1998);
- NEMA EIA Regulations 2014 (as amended);
- National Environmental Management Waste Act, 2008 (Act 59 of 2008);

- National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004);
- National Heritage Resources Act, 1999 (Act 25 of 1999);
- National Environmental Management Protected Areas Act, 2003 (Act 57 of 2003);
- The South African National Roads Agency Limited and National Roads Act, 1998 (Act 7 of 1998);
- Central Karoo District Spatial Development Framework;
- Western Cape Environmental Management Act, 2003 (Act No. 7 Of 2003)
- The Western Cape Biodiversity Spatial Plan (WCBSP)

3.3 Listed and specified activities for the N1 Road upgrade project

In terms of section 24(2) of NEMA, the Minister and or any MEC in concurrence with the Minister may identify activities that require authorisation as these activities may negatively affect the environment. Environmental Impact Assessment (EIA) Regulations were promulgated in December 2014 (as amended) in terms of Section 24(5) and Section 44 of the National Environmental Management Act (NEMA), Act 107 of 1998. In terms of the 2014, EIA Regulations the triggered listed activities fall under Listing Notices 1, 2 and 3 which are further discussed as follows:

- *Listing Notice 1 (Regulation 983) define activities which will trigger the need for a **Basic Assessment process;***
- *Listing Notice 2 (Regulation 984) define activities which trigger a **Scoping and Environmental Impact Assessment (EIA) process**.*
- *Listing Notice 3 (Regulations 985) refers to certain listed activities located in specifically defined geographical areas for which a **Basic Assessment process** would be required.*

The listed activities below will be triggered for the project and a Basic Assessment process will need to be undertaken:

Table 9: Triggered activity listed under GNR.327 and GNR 324

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.
12	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	The road construction will necessitate developing of infrastructure with a combined footprint greater than 100m^2 within watercourse along the route. This includes widening existing bridges and culverts
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 rock of more than 10 cubic metres from watercourse	The proposed upgrading of the existing bridges and culverts, will include excavation of material from watercourse of more than 10 cubic meters
48	The expansion of – (i) Infrastructure or structures where the physical footprint is expanded by 100 square metres or more:	Existing bridges and culverts would need to be upgraded to fit the new road design, resulting in

	Where such expansion occurs – (a) Within a watercourse; (b) in front of a development setback; or (c) (c) if no development setback exists, within 32 metres of a watercourse, measured (d) from the edge of a watercourse;	a combined footprint exceeding 100m^2 outside the road reserve.
56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres;	The proposed project involves widening the existing surfaced road width from 10.8 meters to approximately 21.8 meters along the entire length of the road section, which spans roughly 20 kilometers.
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.**
18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre **i. Western Cape** i. Areas zoned for use as public open space or equivalent zoning; ii. All areas outside urban areas: (aa) Areas containing indigenous vegetation;	The proposed project involves widening the existing surfaced road width from 10.8 meters to 21.8 meters over a road section of about 20 kilometres. the project will involve the clearance of indigenous vegetation for the purpose of widening the road.

	(bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or iii. Inside urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.	
23	] The expansion of— (i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such 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; **i. Western Cape** i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites;	The proposed road upgrade will involve the upgrade of bridges, the Wilgerhout River Bridge; and Doornfontein River Bridge are situated outside urban area and within water course (wilgerhout river and Doornfontein river respectively).

	(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas listed in terms of an international convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; or (hh) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined.	

3.4 Environmental Management Principle

It is crucial for effective environmental management that the Applicant understands and incorporates the fundamental principles of sound environmental practices in all aspects of the prospecting operation. NEMA provides a general framework for environmental law, including national environmental management principles that must be considered when making decisions with potentially significant environmental impacts. A brief overview of these principles is provided in the following sections.

3.5 Holistic principle

The holistic principle in environmental management emphasizes the interconnectedness of all environmental components, recognizing that actions impacting one part of the environment can have wide-reaching effects on others. This principle advocates for a comprehensive approach that considers the entire ecosystem, including the interrelationships between air, water, land, flora, fauna, and human activities. By adopting a holistic perspective, environmental management seeks to maintain ecological balance, promote sustainability, and ensure that all environmental, social, and economic factors are integrated into decision-making processes.

The Holistic principle, as defined by NEMA (Section 2(4)(b) requires that environmental management must be integrated, acknowledging that all elements of the environment are linked and inter-related and it must take into account the effect of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option (defined below). Holistic evaluation does not mean that a project must be looked at as a whole. It rather means that it must be accepted that there is a whole into which a project introduced. If the indications are that the project could have major adverse effects, the project must be reconsidered and where appropriate replanned or relocated to avoid an adverse impact or to ensure a beneficial impact.

3.5.1 Best practicable environmental option

When undertaking any action with environmental impacts, it is essential to identify and define the different options available for consideration. The Best Practicable Environmental Option (BPEO) is described in NEMA as "the option that offers the most benefit or causes the least harm to the environment overall, at a cost that is acceptable to society in both the long term and short term." Additionally, other guidelines commonly used for environmental management under various legislation include BPM, which stands for Best Practicable Means, and BAT, which refers to Best Available Technology.

3.5.2 Preventative principles

The precautionary principle is crucial to sustainable development, requiring that disruptions to ecosystems, as well as pollution, environmental degradation, and other negative impacts, be avoided. If complete avoidance is not possible, these impacts should be minimized and addressed.

3.5.3 The precautionary principles

The precautionary principle dictates that when there is uncertainty about whether an impact could be harmful to the environment, it is assumed to be harmful as a precaution until proven otherwise. This principle requires that decisions made by the private sector, governments, institutions, and individuals take into account and recognize conditions of uncertainty, especially regarding potential environmental consequences. In South Africa, the Department of Water and Sanitation (DWA, previously DWAF, now DWS) adopted the Best Practicable Environmental Option (BPEO) guideline for water quality management in 1991 and included it in the 1994 Minimum Requirements document for waste management.

According to the 1994 DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, the precautionary principle is defined as "assuming the worst-case scenario when a risk is unknown and making provisions for such a situation." In this context, the precautionary principle presumes that a waste or an identified contaminant is "highly hazardous and toxic until proven otherwise."

Within the EIA process in South Africa, the precautionary principle entails the need to supply sound, scientifically based information that enables the decision-making authority to reasonably understand the potential environmental impacts, their scope, and how they might be mitigated. If the information provided is insufficient for this purpose, the authority cannot be satisfactorily informed and should then require the collection and submission of additional information.

3.5.4 Duty of care and cradle to grave principle

According to Section 28 of NEMA, "Any person who causes, has caused, or may cause significant pollution or environmental degradation must take reasonable steps to prevent such pollution or degradation from occurring, continuing, or recurring. If such harm to the environment is legally authorized or cannot be reasonably avoided or stopped, they must minimize and rectify the pollution or degradation."

For example, the "duty of care" principle in waste management underscores the responsibility to ensure that waste is properly stored and transported throughout the entire custody chain to its final disposal point. This means that waste must always be stored securely, and the company responsible for removing and disposing of it must hold the necessary licenses and ensure that the waste is transported with the required documentation. The "Cradle to Grave" concept refers to a company's responsibility for the entire life cycle of a product, service, or program, from design to disposal.

According to the 1994 DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, "any person who generates, transports, treats, or disposes of waste must ensure that no unauthorized transfer or escape of waste occurs under their control. Such a person must retain documentation describing the waste and any related transactions." This places the responsibility for waste on the generator, following the "Cradle to Grave" principle, where a "manifest" must accompany each load of hazardous waste until it is legally and responsibly disposed of. This manifest is passed from one transporter to the next, if multiple transporters are involved, and once the waste is properly disposed of at a suitable, permitted facility, a copy of the manifest must be returned to the point of origin. The "duty of care" provides a strategy for implementing sustainable development.

3.5.5 Polluter pays principle

The "polluter pays principle" asserts that the individual or organization responsible for causing pollution is accountable for the costs of cleaning it up or rehabilitating the environment. However, the polluter is not always necessarily the waste generator, as the responsibility for the safe handling, treatment, or disposal of waste can be transferred from one competent party to another. Therefore, the polluter could be a disposal site operator or a transporter. Nevertheless, under the "duty of care" principle, the generator remains one of the parties held accountable for any pollution caused by the waste. As such, the generator must be able to demonstrate that the transfer of waste management was done responsibly. According to NEMA, the polluter pays principle dictates that "the cost of remedying pollution, environmental degradation, and any resulting adverse effects, as well as the cost of preventing, controlling, or minimizing further pollution, environmental damage, or adverse health effects, must be borne by those responsible for harming the environment."

3.5.6 Sustainable Development

The principle of Sustainable Development is enshrined in the Constitution of the Republic of South Africa (Act No. 108 of 1996) and is implemented through NEMA. According to Section 1(29) of NEMA, sustainable development involves integrating social, economic, and environmental factors into the planning, implementation, and decision-making processes to ensure that development benefits both present and future generations. Therefore, Sustainable Development requires that:

- Pollution and environmental degradation should be prevented, or if not entirely avoidable, minimized and addressed.
- Disruption to landscapes and sites of cultural heritage should be avoided, or if unavoidable, minimized and addressed.
- Waste generation should be avoided, or if not entirely avoidable, minimized, reused, or recycled where possible, and otherwise disposed of responsibly.
- Disturbance to ecosystems and loss of biological diversity should be avoided, or if not entirely avoidable, minimized and addressed.
-

-

3.5.7 Climate Change Consideration

The proposed project will incorporate energy-efficient technologies and adhere to international best practices in construction methods and resource management. Given the uncertainties and extreme weather conditions associated with climate change, ensuring the provision of essential human needs, such as a reliable fresh water supply, is considered crucial.

4. PROJECT MOTIVATION, NEED AND DESIRABILITY

The need and desirability to upgrade the N1 between Doornfontein and Laingsburg, as detailed in the Integrated Development Plan (IDP) and Spatial Development Framework (SDF), are driven by several key factors:

Improvement of Western Cape Settlement Development and Functionality:

- The IDP emphasizes the importance of facilitating improvements in settlement development and functionality within the Western Cape, which includes enhancing transportation infrastructure.

Alignment with Provincial and Municipal Spatial Development Frameworks:

- The Laingsburg SDF, aligned with the Provincial Spatial Development Framework (PSDF), aims to balance community growth and environmental preservation. This alignment ensures that road upgrades like the N1 are part of a broader strategy to support sustainable development and address socio-economic issues within the region.

Strategic Objectives:

- The Western Cape Spatial Development Framework includes strategic objectives that are reflected in municipal plans. These objectives support infrastructure projects that enhance economic opportunities, connectivity, and overall quality of life for residents.

Road Improvements:

- Specific road improvements are outlined in the IDP and SDF, indicating the necessity of upgrading the N1 to meet future traffic demands and improve safety. This includes better road geometry, upgraded intersections, and new safety measures such as dual carriageways.

These factors collectively underline the critical need and desirability for upgrading the N1 between Doornfontein and Laingsburg, ensuring the region's development aligns with strategic planning objectives and addresses both current and future transportation needs

In terms of the NEMA EIA Regulations (2014, as amended), when considering an application, the competent authority must consider several aspects including "the need and desirability of the activity". In terms of the *Department of Environmental Affairs' Integrated Environmental Management Guideline: Guideline on Need and Desirability (2017*), the need and desirability for a project must be addressed by taking into account the "questions to be engaged with when considering need and desirability" included in the abovementioned guideline. These questions, together with answers relating to the proposed project, are provided in the table below.

Table 10: Integrated Environmental Management Guideline: Guideline on Need and Desirability (2017),

NO	QUESTIONS	ANSWERS
Securing ecological sustainable development and use of natural resources		
1	How will this development (and its separate elements/ aspects) impact on the ecological integrity of the area?	Identified impacts associated with the proposed development have been assessed and are summarised in Section 8 of the Draft BAR. The above measures have been incorporated into the Draft EMPr.
1.1	How were the following ecological integrity considerations taken into account: Threatened Ecosystems; Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure; Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"); Conservation Targets; Ecological drivers of the ecosystem; Environmental Management Framework; Spatial Development Framework; and Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	Refer to Response 1 above. The relevant ecological integrity considerations were considered by the specialists in their respective specialist studies. The potential impacts of the proposed development on environmental sensitivities have been considered. Refer to Appendix D for the relevant Specialist Studies.

1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Refer to Responses 1 and 1.1 above. The potential impacts of the proposed development on terrestrial vegetation and freshwater systems have been con sidered. The impact assessment tables, which summarised the proposed mitigation measures, are discussed in Section 8 of the Draft BAR. The application of the mitigation hierarchy is described in more detail in Section 8.2 of the BAR.
1.3	How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Please refer to Responses 1, 1.1, and 1.2 above. The proposed development is not expected to cause significant pollution or degradation of the biophysical environment, provided that the recommended mitigation and monitoring measures are implemented. Localized degradation may occur during construction, as areas are cleared and leveled for road upgrades and infrastructure installation. However, these impacts are generally temporary and confined to specific areas and will be managed per the EMPr, under the supervision of an ECO and/or relevant specialist consultant(s). Additionally, regular surface water monitoring for pollution will be necessary.

1.4	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	During the construction phase, builders' rubble and small quantities of hazardous waste, such as used oil, will be produced. General non-hazardous waste from the proposed development will be managed within the municipal waste system. Hazardous waste must be handled by a private contractor for appropriate disposal or recycling. Recyclable materials should be sorted at the source and either integrated into the municipal recycling program or collected by a private contractor. Green waste should be composted on-site for reuse within the project.
1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimize and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The development of the N1 Section 4 between Doornfontein and Laingsburg may disturb landscapes or sites of cultural heritage significance. To avoid such impacts, the project explored alternative alignments and construction methods, while areas of unavoidable impact will be subject to mitigation measures, such as documentation and relocation of heritage resources. Additionally, opportunities to enhance positive impacts include preserving and integrating cultural heritage

		elements into the upgraded infrastructure, where feasible.
1.6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the nonrenewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Non-renewable resources will be used during the construction phase (e.g. sand for concrete and steel, precast material), but such raw materials will be sourced from licensed facilities. The impact assessment tables, which summarises the impacts and proposed mitigation measures, are attached in Section 7.3 of the Draft BAR.
1.7	How will this development use and/or impact on renewable resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimize the use of resources? What	The proposed development may have impacts on the environment in which it is located. To avoid or minimise the impacts on the biophysical environment, specialist assessments have been undertaken to investigate and assess these impacts and recommend mitigation measures to avoid or minimise the impacts of the activity. The EMPr for the project includes measures that should be taken to protect and limit the use of resources, such

	measures were taken to ensure responsible and equitable use of the resources?	as potable water, and measures to protect the natural resources of the site.
	What measures were explored to enhance positive impacts? (1) Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (2) Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources?) (3) Do the proposed location, type and scale of development promote a reduced dependency on resources?	Section 8 of the BAR provides a summary of potential impacts identified to date as well as proposed mitigation measures.
1.8	How were risk-averse and cautious approach applied in terms of ecological impacts? What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? What is the level of risk associated with the limits of current knowledge? Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development.	The precautionary approach (in which the absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures) was applied. When considering impacts, Earthlink Environmental Services and the specialist practitioners must consider the limits of current knowledge about the consequence of decisions and actions. Gaps in knowledge, limitations, assumptions and

		uncertainties are outlines in Section 8 of the BAR, as well as the respective Specialist Studies (Appendix C).
1.9	How will the ecological impacts be resulting from this development impact on people's environmental right in terms of the following: (1) Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? (2) Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	The proposed development is situated on an existing road, so no loss of access to resources or amenities is expected. The development is unlikely to significantly affect people's environmental rights due to its nature and location, with any potential nuisance impacts, such as noise or dust, expected to be temporary and localized. For further details on potential negative and positive impacts, please refer to Section 8 of the Draft BAR, with Appendix E addressing proposed mitigation measures to keep impacts within acceptable limits. Interested and Affected Parties (I&APs) will have the opportunity to raise any comments or concerns about the Basic Assessment Process if they feel their environmental rights are being adversely affected.
1.10	Describe the linkages and dependencies between human well-being, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	The development site is an existing road and as such is making little direct contribution to livelihoods at present. It is not anticipated that the proposed development will impact adversely on the environment and the Benefits

		that will accrue to the local community as a results of the project are summarised in Section 9 of the BAR. i. Various type of skills required related to road construction Contractor will finalise e.g. Concrete work, Stone pitching, Gabions ii 30% work will be outsourced to local construction companies ii 10% work will be performed by local labourers iii bylaws not applicable to this project iv Specialists will be used contractor will submit for approval not known now Labourers will be sourced from the Laingsburg area.
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/ targets/ considerations of the area?	The regional ecological overview and baseline data indicate that the project area has been somewhat altered both historically and currently, mainly due to extensive agriculture, secondary roads, and the proximity of an existing anthropogenic environment with associated human activities such as rubble dumping, general littering, and encroachment into natural areas via footpaths and roads. Despite these alterations, the semi-natural terrestrial areas still maintain ecological integrity

		and provide various beneficial services, particularly the maintenance of biodiversity. These systems are crucial as they offer refuges, food, and corridors for species dispersal in and through the surrounding area. Preserving these systems is the most critical consideration for the proposed project. Based on the findings of the studies, no fatal flaws were identified for the project. If the recommended avoidance and mitigation measures are implemented, the significance of the impacts is expected to be low. Therefore, specialists believe the project can proceed, provided that the suggested mitigation measures and recommendations are followed.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Please refer to Response 1.11 above. Alternatives are detailed in Section 4 of the BAR. Following input from the engineering team, a preferred layout has been developed for the site, which involves upgrading the existing section of the N1- Section 4 to a four-lane divided dual carriageway road to accommodate future traffic capacity.
1.13	Describe the positive and negative cumulative ecological/ biophysical impacts bearing in mind the size, scale, scope and	Refer to the specialist reports (Appendix E) for a description of the cumulative impacts identified.

	nature of the project in relation to its location and existing and other planned developments in the area?	Impacts are summarized in Section 8 of the BAR.
Promoting justifiable economic and social development		
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations: (1) The IDP; (2) Spatial priorities and desired spatial patterns; (3) Spatial characteristics; and (4) Municipal Economic Development Strategy?	The socio-economic context of the area is summarised in Section 5.9 of the BAR. Section 2 of the BAR provides a description of applicable planning documents considered for this application, including the IDP and SDF.
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? Will the development complement the local socioeconomic initiatives (such as local economic development (LED) initiatives), or skills development programs?	Benefits: • Enhances regional connectivity. • Reduces travel times and improves road safety. • Boosts tourism and supports local businesses by facilitating easier access. • Creates temporary employment opportunities during the construction phase. • Provides a financial injection into the local economy. • Improves livelihoods for local residents. Disadvantages:

		• Potential disruption to local communities during construction (e.g., noise, dust, and increased traffic). • Temporary decrease in the quality of life for residents due to construction activities. • Environmental concerns, including habitat disturbance and water flow alterations. • Potential impact on local biodiversity, requiring careful mitigation measure
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	During the PPP, Earthlink will consider the concerns raised by stakeholders regarding the proposed development and will address these concerns in the Draft BAR.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short and long-term? Will the impacts be socially and economically sustainable in the short- and long-term?	The upgrade of N1 Section 4 is likely to result in an equitable distribution of impacts across different generations, both in the short and long term, as it aims to improve accessibility and safety for all users. In the short term, there may be temporary disruptions, but the long-term benefits could lead to enhanced economic opportunities and social equity. Overall, the impacts are expected to be socially and economically sustainable,

		contributing to the well-being of both current and future communities.
2.5	In terms of location, describe how the placement of the proposed development will: (1) result in the creation of residential and employment opportunities in close proximity to or integrated with each other; (2) reduce the need for transport of people and goods; (3) result in access to public transport or enable non motorised and pedestrian transport; (4) compliment other uses in the area; (5) be in line with the planning for the area; (6) for urban related development, make use of underutilized land available with the urban edge; (7) optimise the use of existing resources and infrastructure; (8) opportunity costs in terms of bulk infrastructure expansions in non-priority areas; (9) discourage "urban sprawl" and contribute to compaction/densification;	1. The placement of the proposed upgrade of N1 Section 4 will likely result in the creation of residential and employment opportunities that are in close proximity or integrated with each other by improving accessibility to areas suitable for mixed-use development. 2. By enhancing the connectivity of the N1, the need for transport of people and goods may be reduced, particularly through more efficient routes and closer proximity of residential and employment hubs. 3. The upgrade is expected to improve access to public transport options and support non-motorized and pedestrian transport by integrating these considerations into the road design and planning. 4. The placement of the upgrade is likely to complement other uses in the area, such as commercial, residential, and industrial activities, by improving infrastructure that supports these functions. 5. The proposed upgrade aligns with the planning for the area by supporting regional development frameworks and

	(10) contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs; (11) encourage environmentally sustainable land development practices and processes; (12) take into account special locational factors that might favour the specific location; (13) the investment in the settlement or area in question will generate the highest socioeconomic returns; (14) impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area; and (15) in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	adhering to local Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs). 6. For urban-related development, the upgrade could facilitate the use of underutilized land within the urban edge by making these areas more accessible and desirable for development. 7. The upgrade will optimize the use of existing resources and infrastructure by improving a key transportation route, thereby enhancing the efficiency and capacity of the existing road network. 8. Opportunity costs related to bulk infrastructure expansions in non-priority areas are minimized as the upgrade focuses on an existing critical route, ensuring that resources are directed to high-priority areas. 9. The project will discourage urban sprawl by promoting compaction and densification, particularly in areas adjacent to the N1 where development can be concentrated. 10. The upgrade contributes to correcting historically distorted spatial settlement patterns by improving access

		to infrastructure and services in previously underserved areas, promoting more balanced regional development. 11. The placement encourages environmentally sustainable land development practices by supporting development within the existing urban framework and reducing the environmental impact of transportation. 12. Special locational factors, such as the strategic importance of the N1 as a major transportation corridor, favor the specific location for this upgrade. 13. Investment in the N1 upgrade is expected to generate high socioeconomic returns by improving regional connectivity, reducing travel times, and enhancing economic activities along the corridor. 14. The impact on the sense of history, sense of place, and heritage of the area will be carefully considered, ensuring that any upgrades respect and integrate with the socio-cultural and cultural-historic characteristics of the region. 15. The nature, scale, and location of the N1 upgrade are likely to promote or act as a catalyst for creating a more

		integrated settlement by enhancing connectivity, encouraging mixed-use development, and improving access to services and employment.
2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts? (1) What are the limits of current knowledge? (2) What is the level of risk associated with the limits of current knowledge? (3) Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	Refer to the Specialist Studies included in Appendix C for the respective gaps in knowledge and assumptions and limitations for each study.
2.7	How will the socio-economic impacts be resulting from this development impacts on people's environmental right in terms of the following: (1) Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? (2) Positive impacts: What measures were taken to enhance positive impacts?	The BAR has identified impacts generally associated with development of this nature. It is not anticipated that a development of this nature or scale will unduly impact on people's environmental right. Refer to Section 8 of the BAR for the identified impacts and the EMPr (Appendix E). Apart from localised dust and noise impacts during the construction phase, the influx of job seekers and the increased crime are potential negative socioeconomic

		impacts expected from the proposed development during the construction phase. Job creation opportunities and economic income are positive impacts expected from the construction phase of the proposed development. I&APs will be provided with an opportunity to raise any concerns relating to the proposed development, should they feel their environmental right is being negatively impacted.
2.8	Considering the linkages and dependencies between human well-being, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts?	Refer to Response 1 and 1.10 above. The development site has largely been altered by agriculture over many years, so the ecological impact of the proposed development is expected to be minimal. Additionally, the socio-economic impacts mentioned in Response 2.2 are not anticipated to cause any significant ecological effects.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	For the upgrade of N1 Section 4, the selection of the "best practicable environmental option" involved evaluating various alternatives to maximize socio-economic benefits, such as improving access to employment opportunities and enhancing regional economic growth.

		Stakeholder consultations were conducted to incorporate local needs and concerns into the decision-making process. The chosen option was also aligned with local planning frameworks to ensure long-term socio-economic sustainability and minimize negative impacts.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	It is not expected that negative environmental impacts will be distributed in a way that unfairly discriminates against anyone. The local community is set to benefit from the project, as outlined in Section I(4) of the BAR. Based on feedback from the public and relevant authorities, additional adjustments to the site layout may be necessary to achieve the best practicable environmental option (BPEO).
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	It is not anticipated that the proposed development will impact adversely on the environment, and the benefits that will accrue to the local community as a result of the project are summarised in Section 8 of the BAR. i. Various type of skills required related to road construction Contractor will finalise e.g. Concrete work, Stone pitching, Gabions

		ii 30% work will be outsourced to local construction companies ii 10% work will be performed by local labourers iii bylaws not applicable to this project iv Specialists will be used contractor will submit for approval not known now Labourers will be sourced from Laingsburg area
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	An EMPr has been prepared for both the construction and operational phases of the development to ensure environmental safety during construction and the protection of staff on site. See Appendix E for details. Additionally, the Proponent must ensure that working conditions throughout the project comply with the minimum standards set by the Occupational Health and Safety Act (Act No. 85 of 1993).
2.13	What measures were taken to: (1) ensure the participation of all interested and affected parties; (2) provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation;	The public participation process is detailed in Section 7 and Appendix D of this report, outlining the steps taken to reach and engage a wide range of Interested and Affected Parties (I&APs) and provide them with an opportunity to offer feedback. All received comments will

	(3) ensure participation by vulnerable and disadvantaged persons; (4) promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means; (5) ensure openness and transparency, and access to information in terms of the process; (6) ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge; and (7) ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were promoted.	be reviewed and addressed in a Comments and Response Table.
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments	It is not anticipated that the proposed development will impact adversely on the environment, and the benefits

	of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	that will accrue to the local community as a result of the project are summarised in Section 8 of the BAR. i. Various type of skills required related to road construction Contractor will finalise e.g. Concrete work, Stone pitching, Gabions ii 30% work will be outsourced to local construction companies ii 10% work will be performed by local labourers iii bylaws not applicable to this project iv Specialists will be used contractor will submit for approval not known now Labourers will be sourced from Laingsburg area
2.15	What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or dangers of associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	The EMPr includes provisions for conducting "Tool Box Talks" with all on-site workers, where they will be informed about job-related hazards and their right to refuse tasks that could harm human health or the environment. Additionally, the applicant must ensure that on-site working conditions meet the minimum standards set by the Occupational Health and Safety Act (Act No. 85 of 1993).

2.16	Describe how the development will impact on job creation in terms of, amongst other aspects: (1) the number of temporary versus permanent jobs that will be created; (2) whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area); (3) the distance from where the labourers will have to travel; (4) the location of job opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits; and (5) the opportunity costs in terms of job creation.	Various type of skills required related to road construction Contractor will finalise e.g. Concrete work, Stone pitching, Gabions ii 30% work will be outsourced to local construction companies ii 10% work will be performed by local labourers iii bylaws not applicable to this project iv Specialists will be used contractor will submit for approval not known now Labourers will be sourced from Laingsburg area
2.17	What measures were taken to ensure: (1) that there were intergovernmental coordination and harmonization of policies, legislation and actions relating to the environment, and (2) that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	(1) Section 2 of the BAR summarises the legal and policy context applicable to the Proposed development. (2) A list of organs of state that have been notified and provided with an opportunity to comment on the Draft BAR. Earthlink is not aware of any current conflicts of interest between organs of state that are required to be resolved.
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest,	To inform the initial site layout of the development on the properties, several specialist studies were commissioned. These studies assessed factors such as

	and that the environment will be protected as the people's common heritage?	agricultural potential, vegetation condition, and the presence or absence of surface water resources to guide the preferred site layout, with realistic mitigation measures proposed to address or enhance impacts. Consequently, the "measures" will involve incorporating various specialist inputs to ensure that the best practicable environmental option (BPEO) is evaluated and submitted to the DEFF for approval.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	The proposed mitigation measures must be practical and feasible for the impact assessment results to be dependable. Earthlink believes that the mitigation and monitoring measures recommended by specialist practitioners are realistic given the nature and scale of the proposed development.
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	Section 28 of NEMA (Duty of Care) holds anyone who causes, has caused, or may cause significant pollution or environmental degradation accountable. The mechanisms outlined in NEMA allow for any individual or relevant authority to hold those responsible for such pollution and degradation accountable. The EMPr includes necessary rehabilitation measures, making the applicant

		responsible for covering the costs associated with addressing environmental degradation, such as topsoil erosion or groundwater pollution, that may occur during the construction phase.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The socio-economic considerations, including aspects like sense of place, cultural landscape impact, scenic routes, and effects on farming operations, are detailed in the BAR. The pre-application public participation phase, along with input from engineers and specialists, will help ensure that the "best practicable environmental option" in terms of both environmental and socio-economic factors is proposed for approval. Potential impacts are assessed in the relevant section.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Influx of Job Seekers: Development projects often lead to an influx of people into the area, particularly with road upgrades that create temporary employment opportunities. While there may be an increase in job-seekers, especially from labor-sending areas like Kroonstad, the impact is expected to be low due to the local advertisement of job openings and adherence to HR policies prioritizing local youth.

		Additionally, since no labor accommodation will be provided, the likelihood of people moving to the area in search of jobs will be reduced. Concerns about increased competition for jobs, potential risky behaviors, and social conflicts may arise but are considered unlikely due to the project's management strategies and focus on local employment. Unrestricted Access of Construction Vehicles/Workers onto Farm Land and Adjacent Areas: The SIA highlights that adjacent privately-owned farms could face health and safety risks due to the continuous presence of workers and vehicles along the road. Farmers are concerned about potential unauthorized access and security issues, which could be exacerbated if not properly managed. The impact is expected to be most significant during construction, with reduced concerns once the road is completed and fewer construction vehicles are needed. Potential Increase in Crime: The potential for increased crime, including livestock theft and farmer attacks, is a concern due to the influx

		of workers and vehicles. Farm owners worry that new job-seekers or outsiders could lead to higher crime rates or introduce criminal behavior to the local community. The rural nature of the area makes police surveillance difficult, potentially affecting farm owners, workers, and local residents. Fire Hazards: Given the area's grassland and flammable crops, fire hazards are a significant concern during the construction phase. Fires could have serious health, safety, and economic impacts, affecting crops, livestock, and housing around the N1. Employing Local Labour: While exact job numbers are not yet available, most employment opportunities are anticipated during construction. Employing local residents is crucial as it provides income and can help reduce crime, substance abuse, and domestic violence. Prioritizing local employment will have broad social benefits. Skills Training and Further Training Opportunities:

		Local residents may lack the necessary skills for the work required. It is recommended that the proponent implement training programs to provide local residents with the skills needed for the job and future opportunities, which will benefit both the current project and future local employment. Contributing to Local and Regional Businesses: SANRAL is encouraged to support labor-sending communities and stimulate local small businesses. The construction phase will benefit local suppliers and retailers, increasing local economic activity and purchasing power. Provision of Basic Social Services: Road Upgrade The road upgrade is crucial due to high traffic volumes and increasing accidents on the current three-lane carriageway. Upgrading the N1 will improve safety and traffic flow, which is vital both nationally and locally. Without the upgrade, the negative impact would be significant, with higher traffic and accident rates expected.

5. PROJECT ALTERNATIVES

According to the EIA Regulations 2014 (as amended in 2017), evaluating feasible alternatives is a necessary part of the environmental investigation process. This requirement is also stipulated by Section 24(4) of NEMA (Act No. 107 of 1998) (as amended). In the context of a proposed activity, an alternative refers to different methods of achieving the general objectives and requirements of the activity. This may include considering alternatives related to:

- The property or location where the activity is proposed;
- The type of activity to be undertaken;
- The design or layout of the activity;
- The technology to be used;
- The operational aspects of the activity; and
- The option of not carrying out the activity at all.

5.1 Site Alternatives

The project involves the upgrade the National Road (N1) Section 4 between Doornfontein (Km 63.0) And Laingsburg (Km 81.7) therefore, no off-site or other site-specific alternatives have been investigated.

5.2 Layout/Route Alignment Alternatives

As the project proposes to upgrade the National Road (N1) Section 4 between Doornfontein (Km 63.0) And Laingsburg (Km 81.7), the existing layout or alignment will be followed.

5.3 Design Alternatives

- Single carriageway with passing lanes
- 4-lane configuration 2m kerbed median
- Dual carriageway last 300m
- It was recommended that this option be further developed in the preliminary and detailed design phases of the project.
-

5.4 NO-GO Alternative

The "no-go" alternative refers to the potential outcome where the proposed improvement of N1 and the related bridges and culverts is not implemented. The impacts that can be expected to result from the proposed road and related infrastructure upgrade would not materialize if this option is chosen, and the conditions and trends on the road and in the affected properties can be expected to continue as is.

If the No-Go Option was to be implemented; the site would remain as it is at present. The site would remain in its current state. Furthermore, investment in the area by the applicant and other potential investors, which could uplift and be of benefit to the area, would not occur. The road infrastructure (National Road) would not be improved to accommodate the increasing population and motorist driving along the proposed road for upgrade.

Advantages of no-go alternative

- There will be no loss of biodiversity
- No vegetation clearance or disturbances of ecosystems
- No waste generation
- No visual impacts associated with the development of permanent infrastructure related to the proposed road upgrading project.
- No risk of soil and underground water contamination through leakage
- Reduced risk of fire hazards associated with the with the handling of fuel.

Disadvantages of no-go alternative

- Potential to attract investors in the area will not be established
- There will be no indirect employment opportunities
- Temporary job opportunities will be not be achieved
- Associated benefits such as improved road infrastructure will be not be realized to assist in the upkeep and maintenance of the local and district area.

6. DESCRIPTION OF THE BASELINE ENVIRONMENT

6.1 Geology & Soils

6.1.1 Geology of the project area

The area consists of mainly mudstone, shale and sandstone of the Adelaide Subgroup (Beaufort Group), accompanied by sandstone, shale and mudstone of the Permian Waterford Formation (Ecca Group) and sandstone and shale of other Ecca Group Formations as well as Dwyka Group diamictites (all of the Karoo Supergroup). This geology gives rise to shallow, skeletal soils. The region is classified as Fc land type (to a large extent), with Ib land type playing a subordinate role.

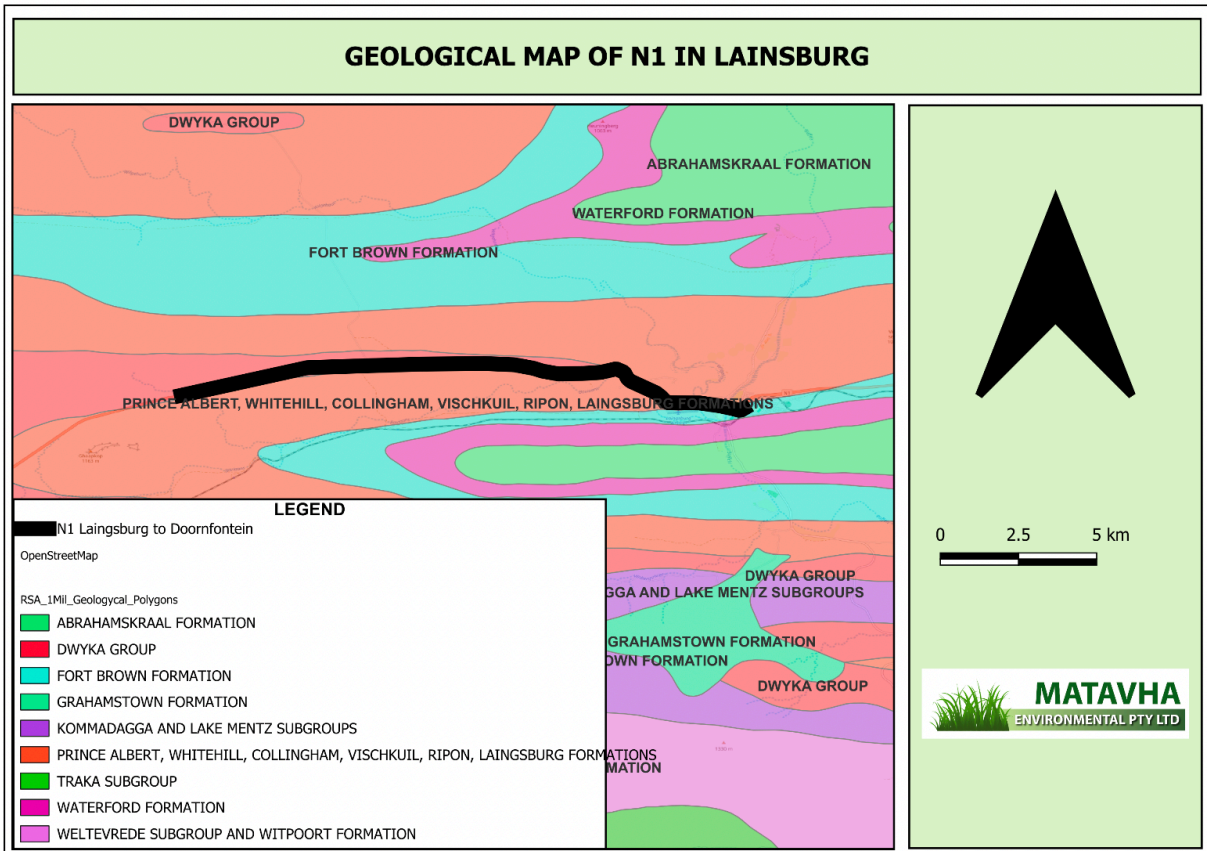


Figure 2: Geological Map

The geology changes along Klipwerf farm from Dwyka group to Prince Albert, Whitehill, Collingham, Vischkuil, Ripon, and Lainsburg Formations of the Ecca group. A small portion towards the Laingsburg town is underlain by the Fort Brown Formation (refer to the geological map above).

6.1.2 Soils of the project area

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

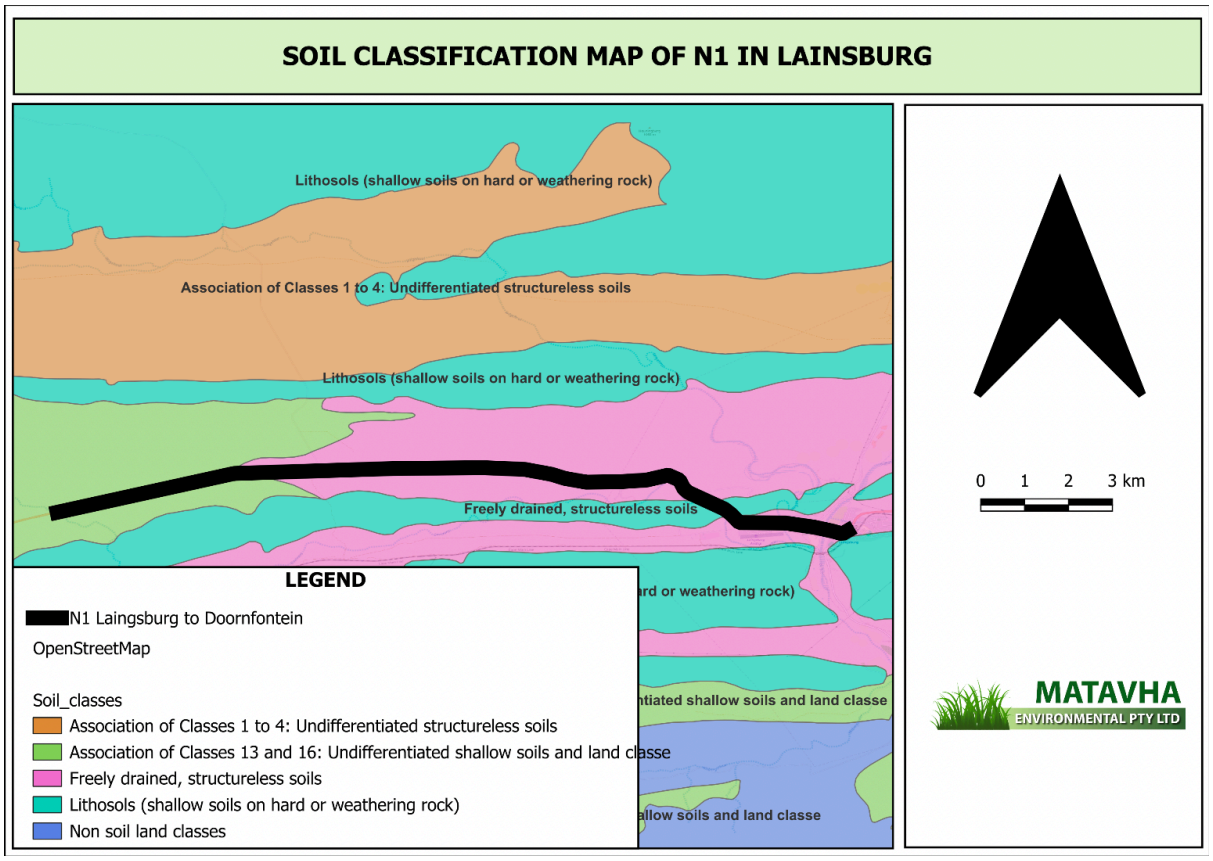


Figure 3: Soil classification Map

These soils are less than 450 mm deep, have clay contents between 15 % and 35 % , and are freely drained and structureless. Subsequently, they have excessive drainage and low natural fertility. Surface rock and rocky outcrops cover relatively large

areas, and these soils have a low potential for arable agriculture. The dominating soil type is accounted for by the steep-hilly terrain along the study area.

6.2 Climate

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

The summer commences towards the conclusion of January and culminates by December. The months that constitute this season are referred to as December, January, February, March.

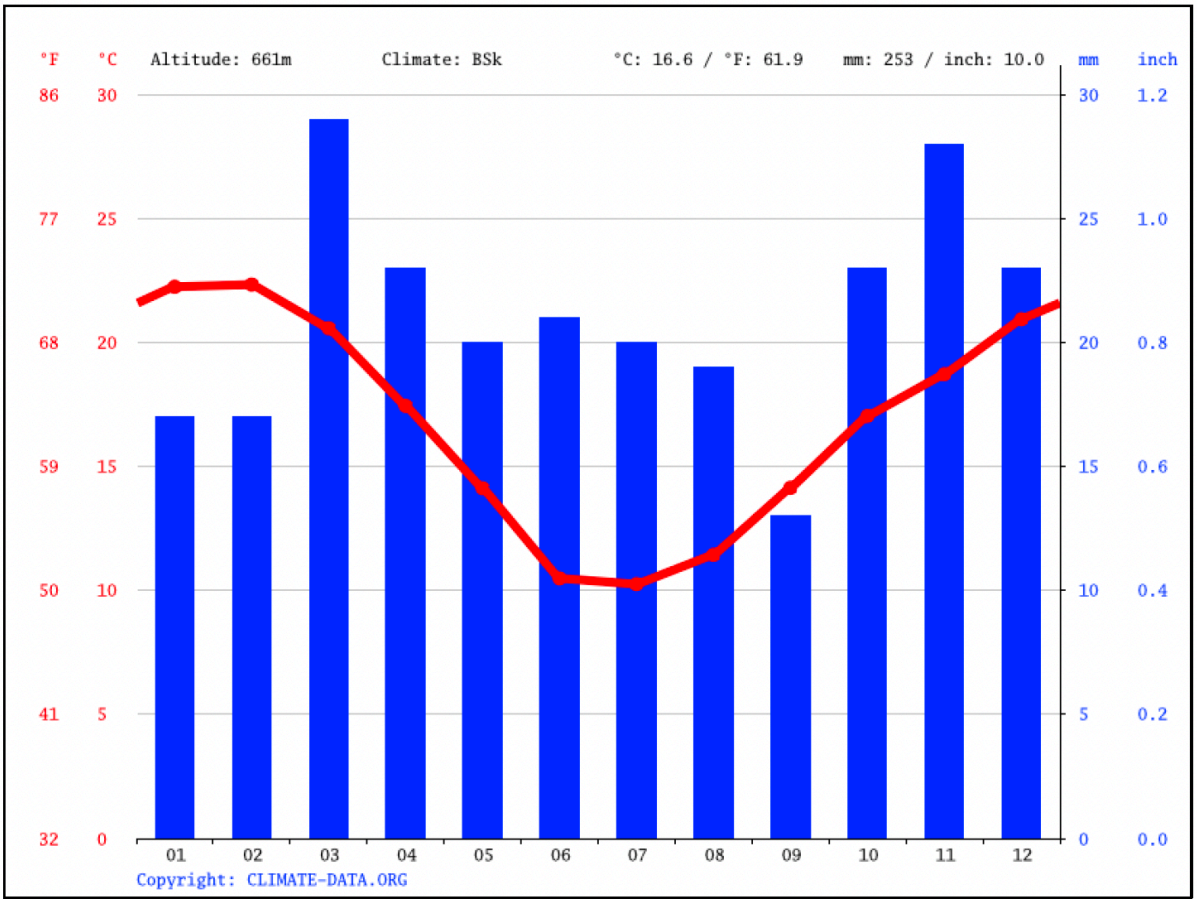


Figure 4: Climate Graph

The driest month is September, with 13 mm of rainfall. On average, the highest amount of rainfall occurs during March with a mean value of 29 mm. The warmest

month of the year is February, with an average temperature of 22.3 °C. On average, the month of July is considered to be the coldest time of year with temperatures averaging around 10.3 °C. The difference in precipitation between the driest month and the wettest month is 16 mm.

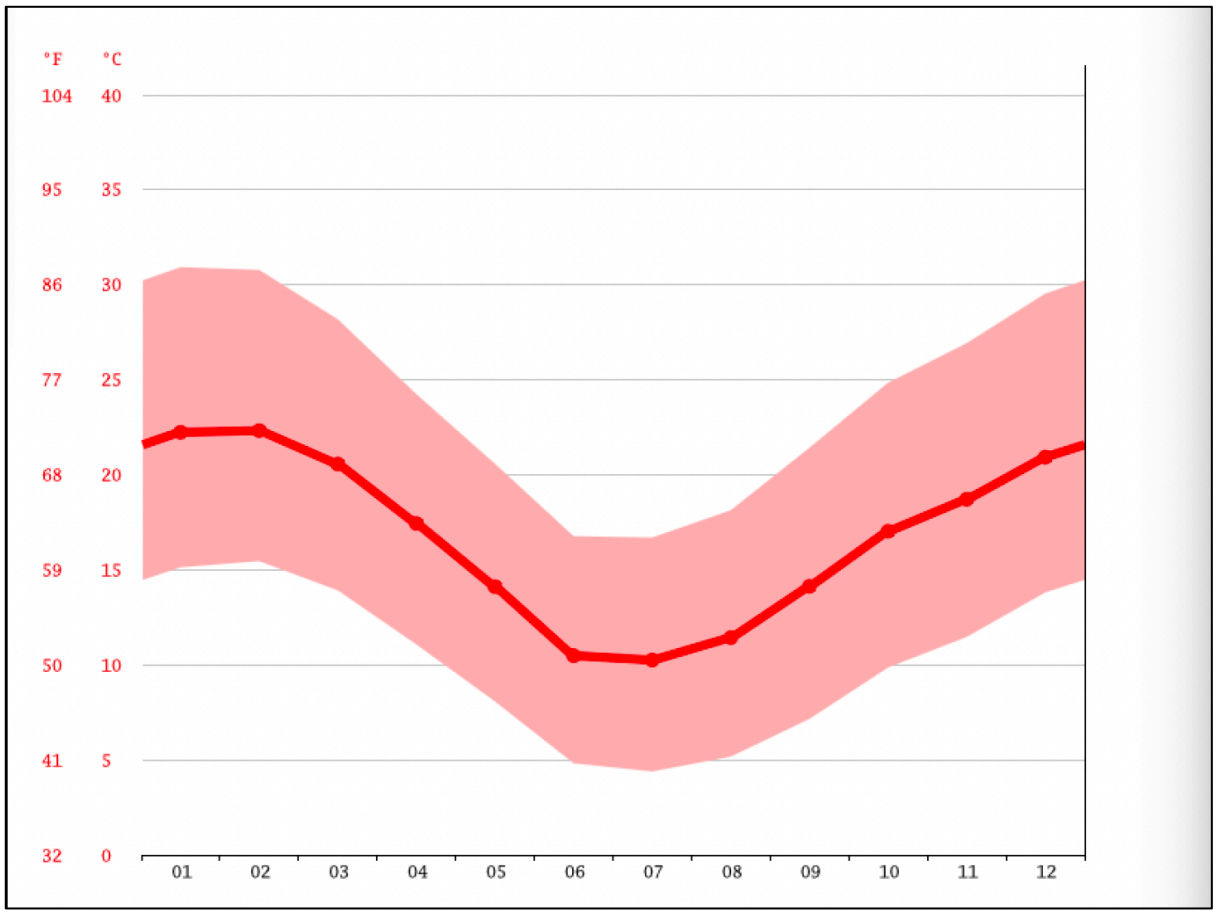


Figure 5: Temperature graph

The average temperature across the seasons is 12.1 °C. The month with the most relative humidity is June (44.79 %). The month with the lowest amount of relative humidity is November (44.79 %). The month with the highest amount of rainfall is June (4.43 days), whereas the one with the lowest precipitation level is September (2.97). In the region of Laingsburg, it has been observed that December is the month which experiences maximum daily sunshine hours, with an average duration of approximately 11.35. The total number of sunlit hours during this period amounts to a staggering sum of about 351.79.

6.3 Hydrology

The study site is located within the Gouritz Water Management Area (WMA=27), Groot Subwater Management Area (WMA=17). The National Freshwater Ecosystems Priority Areas (NFEPA) identifies important wetlands in South Africa. The proposed development is located within a number of watercourses.

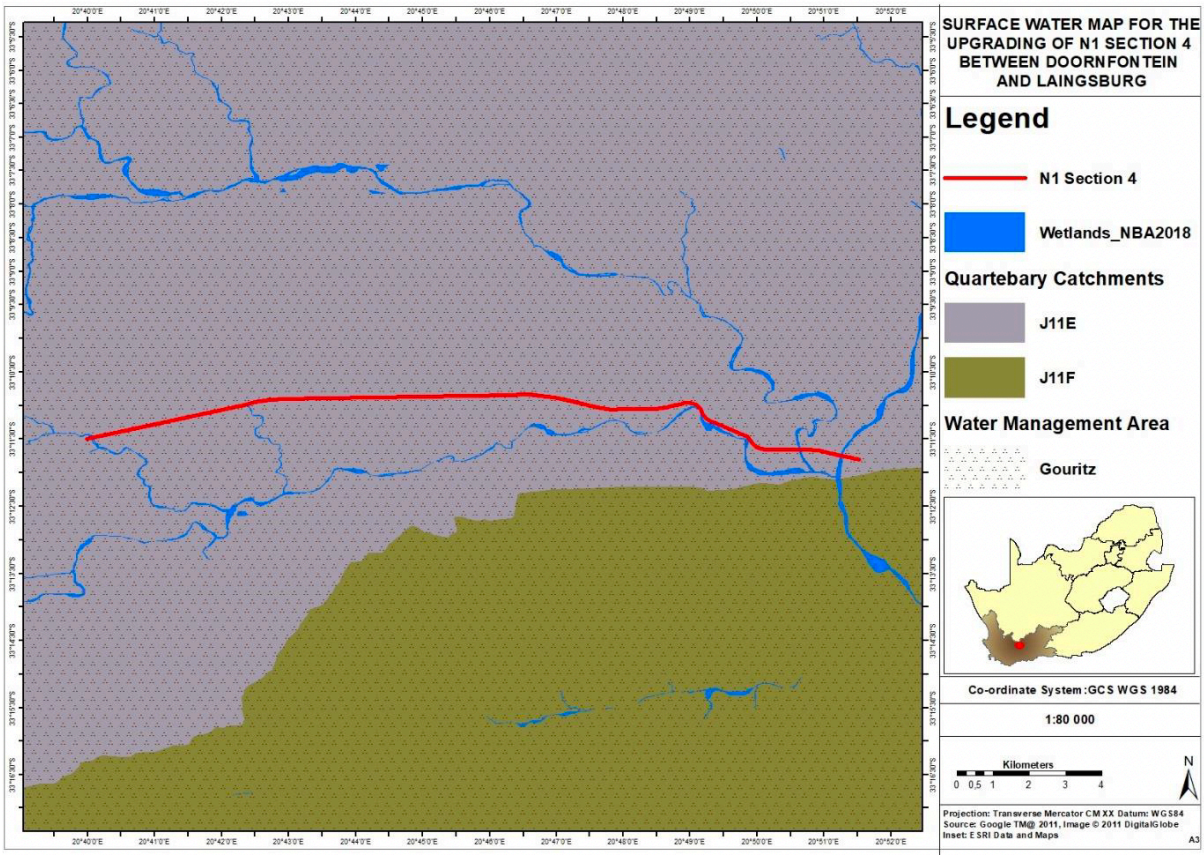


Figure 6: Surface water Map

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.

6.3 Biodiversity

6.3.1 Vegetation

The proposed road upgrade is situated within 2 (two) vegetation units which includes Koedoesberge-Moordenaars Karoo (SKv 6) and Southern Karoo Riviere (AZi 6) refer to figure below showing vegetation types that occur within the project footprint.

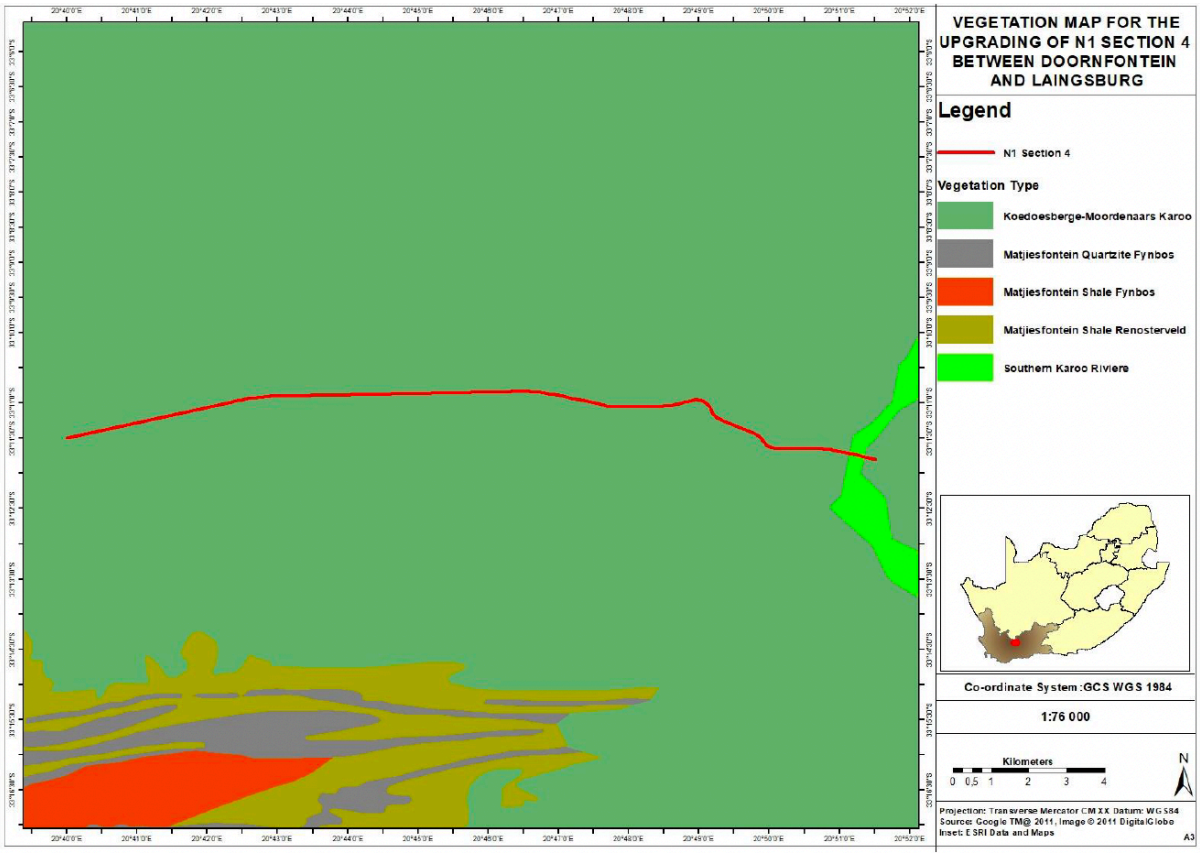


Figure 7: Vegetation Map

The Koedoesberge-Moordenaars Karoo (SKv 6) is the dominant vegetation type that traverse the site covering over 90% of the project footprint. The Southern Karoo Riviere (AZi 6) covers a small portion of the project footprint which traverse the Buffels River Bridge.

6.3.1.1 Description of Vegetation units

Koedoesberge-Moordenaars Karoo (SKv 6):

The bulk (~98%) of the National Route 1 Section 4 between Doornfontein (KM 63.0) and Laingsburg (KM 81.7) traverses through the Koedoesberge-Moordenaars Karoo

(SKv6) vegetation unit. This vegetation unit is typically found in slightly undulating to hilly landscape which is dominated by low succulent scrub and dotted by scattered tall shrubs, patches of 'white' grass visible on plains, the most conspicuous dominants being dwarf shrubs of *Pteronia, Drosanthemum and Galenia*.

Southern Karoo Riviere (AZi 6):

A small section (<2%) of the road is found within the Southern Karoo Riviere (AZi 6). This vegetation unit is found in narrow riverine flats supporting a complex of Acacia karroo or Tamarix usneoides thickets (up to 5 m tall) and fringed by tall Salsola-dominated shrubland (up to 1.5 m high), especially on heavier (and salt-laden) soils on very broad alluvia. In sandy drainage lines Stipagrostis namaquensis may occasionally also dominate. Mesic thicket forms in the far eastern part of this region may also contain Leucosidea sericea, Rhamnus prinoides and Ehrharta erecta.

6.3.1.2 Distribution of the vegetation units

Distribution of the Koedoesberge-Moordenaars Karoo (SKv 6):

The Koedoesberge-Moordenaars Karoo vegetation unit is distributed in the Western Cape and Northern Cape (smaller portion) Provinces, Koedoesberge and Pienaarse Berg low mountain ranges bordering on southern Tanqua Karoo and separated by the Klein Roggeveld Mountains from the Moordenaars Karoo in the broad area of Laingsburg and Merweville. The unit also includes the Doesberg region east of Laingsburg and piedmonts of the Elandsberg as far as beyond the Gamkapoort Dam at Excelsior (west of Prince Albert). This vegetation unit thrives in altitudes ranging between 500–1 250 m (most of the area at 680–1 120 m).

Distribution of the Southern Karoo Riviere (AZi 6):

The Southern Karoo Riviere (AZi 6) is distributed in the Western and Eastern Cape Provinces, Alluvia of the Buffels, Bloed, Dwyka, Gamka, Sout, Kariega, and Sundays Rivers and their tributaries), east of Laingsburg as far west as Graaff-Reinet and Jansenville. This vegetation unit is embedded within the Koedoesberge-Moordenaars Karoo, Prince Albert Succulent Karoo, Gamka Karoo, Eastern Lower Karoo, and southern parts of the Eastern Upper Karoo as well as some parts of the Albany

Thicket Biome south of Cradock. This vegetation unit thrives in altitudes ranging between Altitude ranging from 250–1 550 m.

6.3.1.3 Conservation status of the vegetation units

Conservation status of the Koedoesberge-Moordenaars Karoo (SKv 6):

The Koedoesberge-Moordenaars Karoo vegetation unit is classified as Least threatened. A conservation target 19% has been set, with a very small portion enjoying statutory conservation in the Gamkapoort Nature Reserve. The vegetation unit is transformed only to a very small extent. There are no serious alien plant invasions recorded. Erosion is moderate (88%) and only to lesser extent high or very low.

Conservation status of the Southern Karoo Riviere (AZi 6):

The Southern Karoo Riviere (AZi 6) is classified as Least threatened. A conservation target 24%, with only an estimated 1.5% statutorily conserved in the Karoo National Park as well as in the Aberdeen, Bosberg, Commando Drift, Gamkapoort and Karoo Nature Reserves and in about 10 private reserves, mainly set up for game farming. Some 12% transformed for cultivation and building of dams, including Beaufort West, Beervlei, De Hoop, Floriskraal, Kommandodrift, Lake Arthur, Leeu-Gamka, Mentz and Vanryneveldspas Dams. The frequent disturbance includes floods, concentrated grazing pressure, and associated input of nutrients, increase vulnerability of these habitats to invasion of alien woody species such as *Agave americana, Opuntia species, Prosopis species, Salix babylonica and Schinus molle, and forbs including Atriplex eardleyae, A. lindleyi subsp. inflata, Cirsium vulgare, Salsola kali and Schkuhria pinnata.*

6.3.2 Fauna

According to the desktop study conducted, forty-eight species of mammal are known to occur or likely to occur within the region (Friedmann & Daly 2004, Skinner & Chimimba 2005, Monadjem et al. 2010), and the majority of these can be expected to occur within the study area, given the habitats available and the relatively untransformed nature of much of the study area. The species listed in table below

were identified as being possible to occur within the study area or the immediate vicinity of the study site. It must be noted that some of these species are very sensitive to habitat and in some instances; the likeliness for them to occur is minimal.

Table 11: List of mammal species that occur in the project area as well as their global and regional conservation statuses (IUCN, 2018; SANBI, 2016)

#	Scientific name	Common name	Red list category
1	ORDER Rodentia	Unidentified Rodentia	
2	*Raphicerus campestris*	Steenbok	Least Concern (2016)
3	*Sylvicapra grimmia*	Bush Duiker	Least Concern (2016)
4	*Canis mesomelas*	Black-backed Jackal	Least Concern (2016)
5	*Otocyon megalotis*	Bat-eared Fox	Least Concern (2016)
6	*Chlorocebus pygerythrus*	Vervet Monkey	Least Concern (2016)
7	*Papio ursinus*	Chacma Baboon	LC (IUCN, 2016)
8	*Caracal caracal*	Caracal	Least Concern (2016)
9	*Felis silvestris*	Wildcat	Least Concern (2016)
10	*Panthera pardus*	Leopard	Vulnerable (2016)
11	*Cynictis penicillata*	Yellow Mongoose	Least Concern (2016)
12	*Herpestes pulverulentus*	Cape Gray Mongoose	Least Concern (2016)
13	*Hyaena sp.*	Striped and Brown Hyaenas	
14	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern
15	*Lepus capensis*	Cape Hare	Least Concern
16	*Desmodillus auricularis*	Cape Short-tailed Gerbil	Least Concern (2016)
17	*Otomys unisulcatus*	Karoo Bush Rat	Least Concern (2016)
18	*Parotomys brantsii*	Brants's Whistling Rat	Least Concern (2016)
19	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	Least Concern (2016)
20	*Procavia capensis capensis*	Cape Rock Hyrax	LC (IUCN 2015, global sp. level)
21	*Genetta tigrina*	Cape Genet (Cape Large-spotted Genet)	Least Concern (2016)

6.3.2.1 Reptiles and amphibians

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the Reptile Map database provided by the Animal Demography Unit (ADU, 2017) 13 reptile species are expected to occur in the project area. No species of conservation concern should be present

according to the above-mentioned sources within the project area but in situ observations may prove otherwise.

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the Amphibian Map database provided by the Animal Demography Unit (ADU, 2017) 3 amphibian species are expected to occur in the project area, Namely:

- *Vandijkophrynus gariepensis gariepensis*
- *Amietia fuscigula*
- *Tomopterna delalandii*

6.3.1.2 Avifuna

Birds are generally regarded as good ecological indicators, because their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological conditions are directly linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007). Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species.

The proposed development is located within close proximity to the Anysberg Nature Reserve which is classified as an Important Bird Area (IBA). According to the South African Bird Atlas Project (SABAP2), over species of birds have been identified in the area. According to Birdlife South Africa, “Globally threatened species are Blue Crane, Ludwig’s Bustard, Southern Black Korhaan Afrotis afra, Martial Eagle and Black Harrier. Regionally threatened species are Karoo Korhaan, Verreauxs’ Eagle, Black Stork, Lanner Falcon Falco biarmicus and Cape Rockjumper. Restricted-range and biome-restricted species that are common in the IBA are Cape Spurfowl, Cape Bulbul and Karoo Chat. Locally common restricted-range or biome-restricted species are Karoo Lark, Layard’s Tit-Babbler, Karoo Eremomela and Namaqua Warbler, while uncommon species in this category are Ludwig’s Bustard, Sickle-winged Chat Cercomela sinuata, Cape Rockjumper, Victorin’s Warbler, Cape Sugarbird, Cape

Siskin, Protea Seedeater Crithagra leucoptera, Orange-breasted Sunbird, Pale-winged Starling and Black-headed Canary".

6.3.2.3 Invertebrates

Butterflies are a good indication of the habitats available in a specific region (Woodhall 2005). Although many species are eurytropes (able to use a wide range of habitats) and are widespread and common, South Africa has many stenotrope or endemic species (specific habitat requirements with populations concentrated in a small area) which may be very specialized (Woodhall 2005). Butterflies are useful indicators as they are relatively easy to locate and catch, and therefore identify.

6.3.3 The Western Cape Biodiversity Spatial Plan (Wcbsp)

The Western Cape Biodiversity Spatial Plan (WCBSP) is a spatial tool that comprises the Biodiversity Spatial Plan Map (BSP Map) of biodiversity priority areas, accompanied by contextual information and land use guidelines that make the most recent and best quality biodiversity information available for land use and development planning, environmental assessment and regulation, and natural resource management. The Western Cape Biodiversity Spatial Plan (WCBSP) classifies the habitats of the province according to conservation value in decreasing value, as follows:

- Protected Areas (PA);
- Critical Biodiversity Areas 1 (CBA1);
- Critical Biodiversity Areas 2 (CBA2);
- Ecological Support Area 1 (ESA1);
- Ecological Support Area 2 (ESA2);
- Other Natural Areas (ONA).

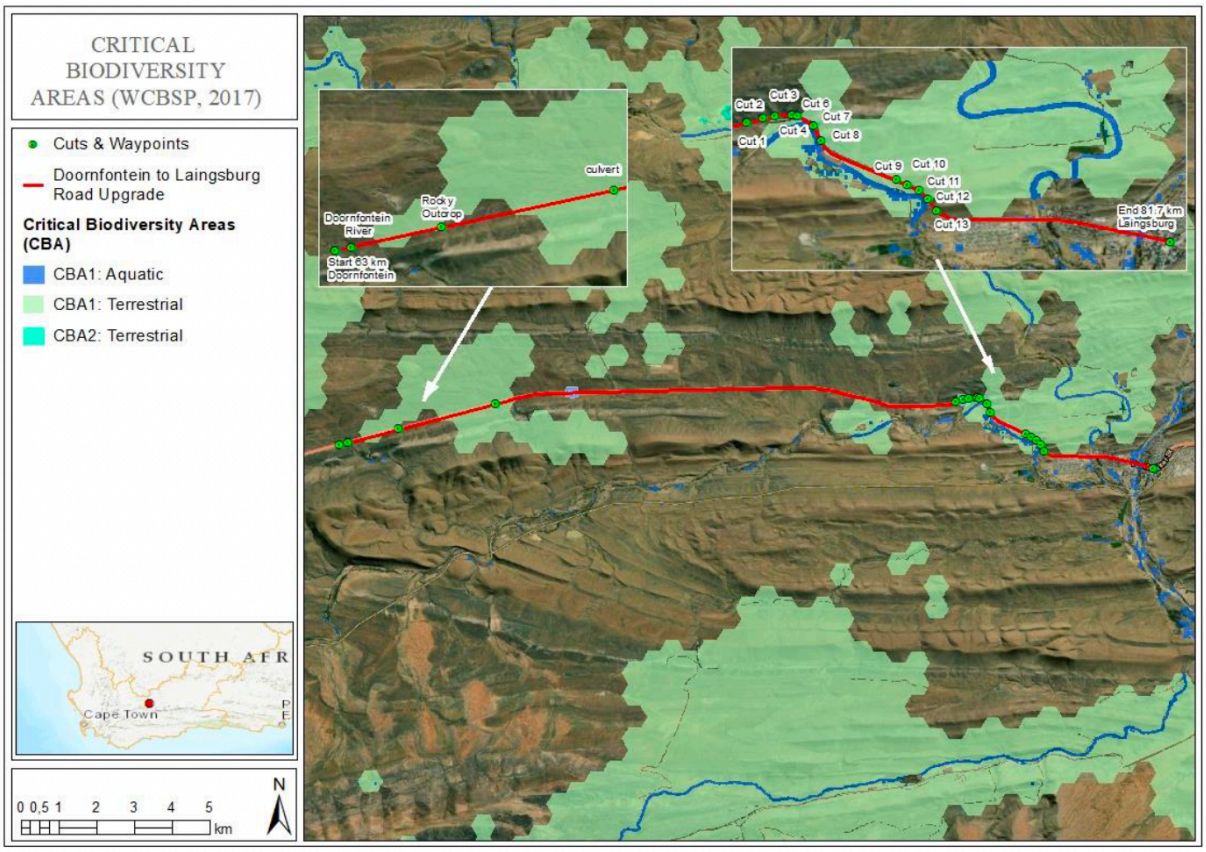


Figure 8: Critical Biodiversity Areas (WCBSP,2017).

According to the Western Cape Biodiversity Spatial Plan (WCBSP) the National Route 1 Section 4 between Doornfontein (KM 63.0) and Laingsburg (KM 81.7) is located within the following:

- **Critical Biodiversity Areas 1:** The starting of the of the National Road upgrade touches a CBA2 (Figure 4-3).
- **Ecological Support Area:** The section of the road where the cuts will take place will be touches a number of Ecological Support Areas 2 **(Figure above).**
- **Important Bird Area:** The road upgrde is located within close proximity to two Important Bird areas namely, Anysberg Nature Reserve and the Swartberg Mountains.

6.4 Cultural Landscape, Built Landscape and Historical Background

The proposed development falls within the Karoo. The name 'Karoo' has its roots in the Khoisan word meaning 'place of great dryness. It once supported large grassy flatlands and the San and Khoekhoen migrated across the region for hunting and

grazing purposes. Less than two hundred years ago large herds of antelope still roamed the grass plains. With the occupation of the area by stock farmers, the sheep gradually replaced the game and the grass receded along with changing grazing and weather patterns (Winter et al 2009; Winter & Oberholzer 2013). By the late 17th century, the Khoenhoen had moved from the region into the more water-rich southern Karoo and the coastal plains. During the early colonial period, the harshness of the Karoo region formed an almost impenetrable barrier from the Cape to the interior for colonial explorers, hunters and travellers. The 18th century was characterised by a marked increase in the rate of expansion of the boundaries of the settlement at the Cape. This was associated with the emergence of the migrant stock farmer (trekboer) (Guelke 1982 in Winter et al 2009). Early routes into the interior largely followed the tracks initially used by migrating herds of game or the cattle herds and sheep flocks of the Khoekhoen on their seasonal route between coastal and inland grazing grounds. These routes were later reinforced by generations of trek farmers moving between the markets at the Cape and their farms (Winter et al 2009).

De Kock and Schulz (2011, SAHRIS NID 503543) in their HIA located less than 10km southeast of the western end of the proposed upgrade, describe the landscape as "an arid Karoo landscape and is located along a lower-lying, gentle, north-facing slope and with the Witteberg mountain range as natural backdrop to the south." One Provincial Heritage Site (PHS) is located within a 100m radius of the development. This site, Dutch Reformed Church, Voortrekker Street, Laingsburg (SAHRIS ID 28191) but has been mapped incorrectly on SAHRIS. The correct location is approximately 400m eastwards and is still within 100m of the proposed upgrade. The Laingsburg cemetery is also within 200m of the proposed upgrade.

6.5 Socio-economic

This is the upgrade of the National Route 1 Section 4 between Doornfontein (KM 63.0) and Laingsburg (KM 81.7),). The project is in Western Cape Province, within Laingsburg Local Municipality in Central Karoo District Municipality.

The information presented in this section and of these aspects was obtained from the municipality IPD, 2024/25 final IDP.

6.5.1 Laingsburg Local Municipality

Laingsburg Municipality is a Category B Municipality in the Central Karoo District. It is the smallest municipality in the Western Cape Province and in South Africa. The municipality covers an area of more than 8781, 44 square kilometre (Population density about 1 person per square km) and straddled by the N1 national road. It accessible from all the major cities of the Western Cape as well as Northern Cape, Eastern Cape, Free State and Gauteng Province. (LLM, 5th Generation IDP).

Generally, Laingsburg is a one town Municipality. Laingsburg town has a population of 9093 people (80%), whereas the rest of the population 1500 resides in the Non-Rural (NU) which include the settlement Matjiesfontein and Vleiland and scattered farming community. The population of Matjiesfontein, the second largest community, has about 773 people.

6.5.2 Demographic Information

The population of the municipal area is 11 366 and has a total number of 3314 of households that live in the municipal area. The biggest part of the population falls within the age group of 15-35 (36.6%) and is mostly unemployed or works on a seasonal basis.

The municipality has a gender breakdown of 48.8% male and 51.2% female. According to the 2023 Socio Economic Profile, Laingsburg Municipality has a 42% youth population which are recorded as 4 774 of the whole population. The number of households for the area are recorded as 3 314, which is an increase since 2011 (2408), and the average household size is 3.4.

Age Structure and Sex

Laingsburg Municipality is composed of 5 825 female and 5 541 male persons (Information source: Census 2022). The population distribution shows a broader base for females in younger age groups (0-14), a balanced middle-aged population (25-54), and a higher percentage of females in older age groups (55+), indicating a longer life expectancy for women. The structure suggests a typical population distribution of a developed or developing country, highlighting an aging population and gender

disparities in longevity. This demographic data is useful for understanding challenges related to aging populations and gender differences in life expectancy.

Dwelling Types

The following table reflects the main dwelling types found in Laingsburg Municipality. Formal residential areas account for 96.2% percent of the total households followed by informal residential areas.

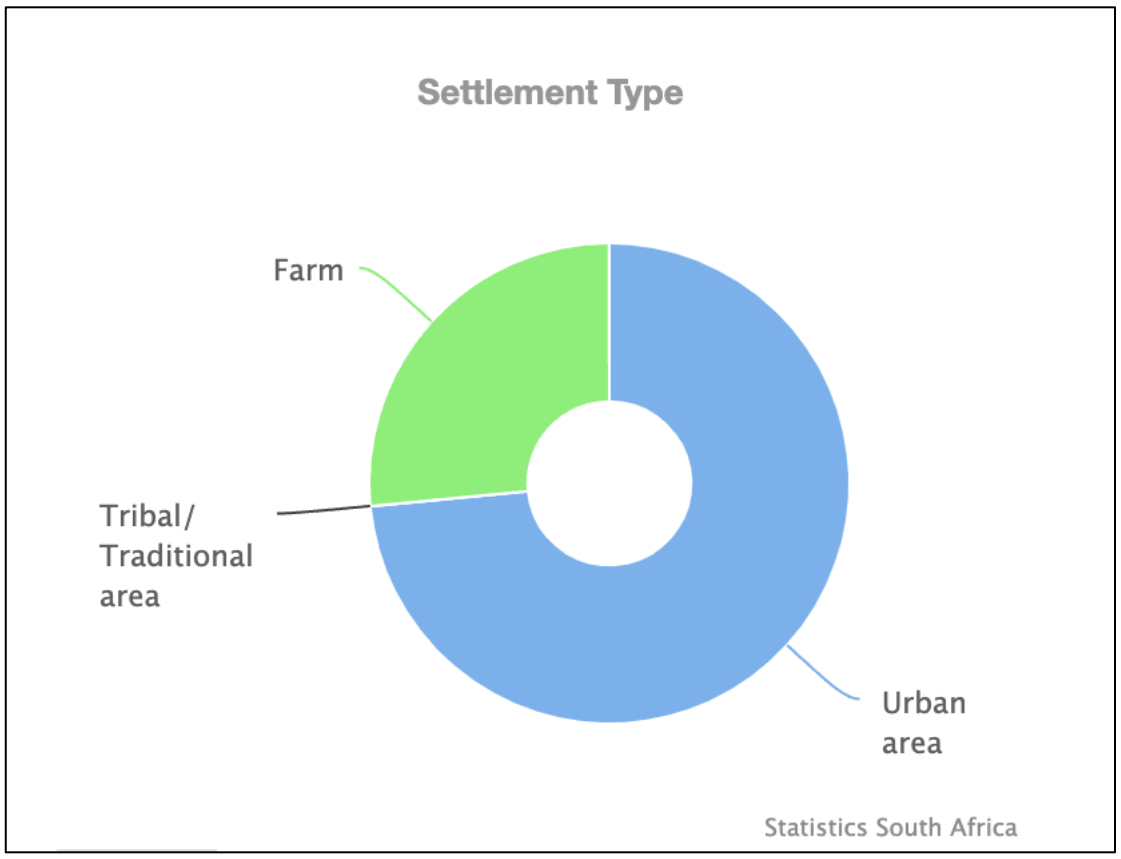


Figure 9: Types of dwellings

6.5.3 Economic Profile

The municipality has 3 735 people who are economically active (employed or unemployed but looking for work), and of these 17,9% are unemployed. 22,0% of the 1 544 economically active youth (15 – 34 years) in the municipality are unemployed.

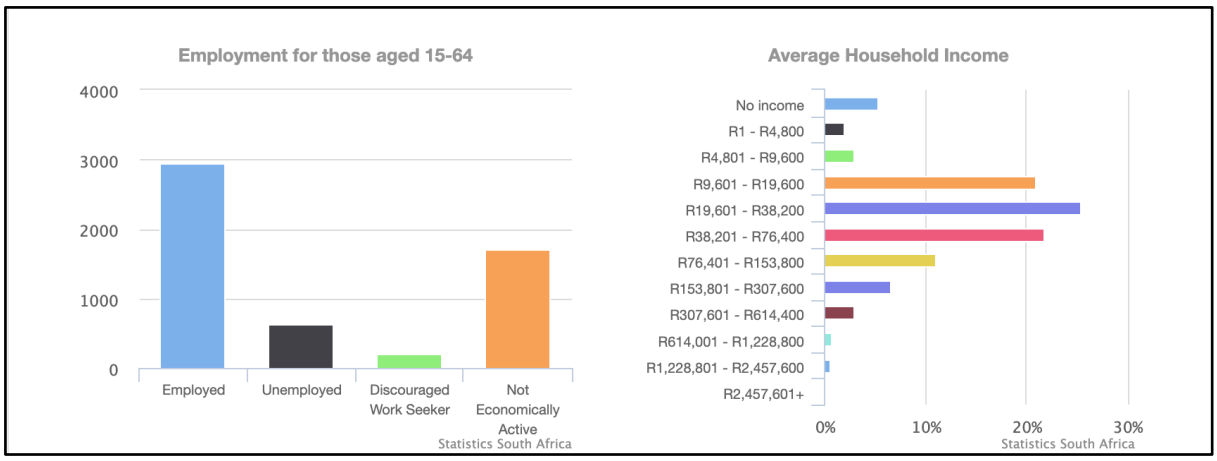


Figure 10: Economic Profile of Laingsburg Municipality

7. PUBLIC PARTICIPATION PROCESS

PPP process is being undertaken in terms of regulation 41 of the EIA 2014 Regulations, as amended, for the project triggering listed activity under the NEMA. Earthlink on behalf of SANRAL took into account all relevant guidelines applicable to public participation as contemplated in section 24J of the NEMA. Earthlink Environmental Services will be giving notices to all potential I&APs to participate in the proposed project by undertaking the following PPP:

7.1 Legal requirements of the PPP as required by Section 41 of the NEMA

41 (1) This regulation only applies in instances where adherence to the provisions of this regulation is specifically required.

(2) The person conducting a PPP must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential I&APs of an application or the proposed application which is subjected to public participation by:

(a) fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of (i) the site where the activity to which the application or proposed application relates is or is to be undertaken; and (ii) any alternative site.

(b) giving written notice, in any of the manners provided for in section 47D of the Act, to (i) the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken; (ii) owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken; (iii) the municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area; (iv) the municipality which has jurisdiction in the area; (v)

any organ of state having jurisdiction in respect of any aspect of the activity; and (vi) any other party as required by the competent authority;

(c) placing an advertisement in (i) one local newspaper; or (ii) any official that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;

(d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official referred to in paragraph (c)(ii); and

(e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to (i) illiteracy; (ii) disability; or (iii) any other disadvantage.

(3) A notice, notice board or advertisement referred to in sub regulation (2) must (a) give details of the application or proposed application which is subjected to public participation; and

(b) state (i) whether a BA or S&EIR procedures are being applied to the application; (ii) the nature and location of the activity to which the application relates; (iii) where further information on the application or proposed application can be obtained; and (iv) the manner in which and the person to whom representations in respect of the application or proposed application may be made.

(4) A notice board referred to in sub regulation (2) must (a) be of a size of at least 60cm by 42cm; and (b) display the required information in lettering and in a format as may be determined by the competent authority.

7.2 Announcement of the project and the draft basic assessment report availability

The project will be announced to the public, by means of the placement of a newspaper advertisement and site notices. Background Information Documents (BIDs) are being distributed to I&APs to create awareness of the project. Earthlink

have announced the availability of the Draft BAR. The report is being subjected to a PPP of at least 30 days and the Final BAR will reflect the incorporation of comments received, including any comments from the competent and commenting authorities.

The following processes are being undertaken to announce the project and the Draft Basic Assessment Report:

- An I&AP database has been opened and is being maintained, and includes all potential I&APs in respect of the application in accordance with Regulation 42.
- Letters are being sent to all I&APs, written in any of the manners provided for in section 47D of the NEMA, announcing the project and the availability of the Draft BAR, containing project information and a locality map to the municipal councillor of the ward in which the site is situated and any organisation of ratepayers that represent the community in the area, the municipality which has jurisdiction in the area, any organ of state having jurisdiction in respect of any aspect of the activity; and any other party as required by the competent authority.
- Site notice boards were plugged at a place conspicuous to and accessible by the public at the boundary of the site where the activity to which the application relates to.

Figure 11: Proof of site notices plugged

- An advertisement will be placed in the National Newspaper.

Subsequent to the 30 days' period, all comments and representations received from I&Aps will be considered and recorded in the Comments and Responses Report (CRR). All I&Aps who would have participated in the PPP will be thanked, and their comments acknowledged.

The Draft Basic Assessment Report is made available for public comment for 30 days from the day they received it.

7.4 Authority Consultation

The DFFE is the Competent Authority for this application. A record of all authority consultation undertaken, is included within this BAR. Consultation with the Competent Authorities (i.e. DFFE) will be done throughout the BA Process. On-going consultation included the following:

- Notification and Consultation with Organs of State that may have jurisdiction over the project, including: Provincial departments and Local Municipality
- The draft BAR will be submitted to the DFFE for review in September 2024 for comments, simultaneously with public review of the Draft BAR.
- Similarly, the draft BAR will be submitted to the organs of state during the public review of the draft BAR.

7.5 Announcement of the decision

Earthlink Environmental Services will ensure that all registered I&APs are provided with access to the decision and the reasons for such decision. I&APs will be drawn to the fact that appeals may be lodged against the decision in terms of the National Appeals Regulations of 2014 (GNR. 993), if such appeals are available in the circumstances of the decision. The decision will be advertised through the following methods:

- Distribution of notification letters to the stakeholder database via emails; and
- Placement of a newspaper advert in the same local newspaper where the project and the availability of the Draft BAR was announced.

8. ENVIRONMNTAL IMPACTS ASSESSMENT

8.1 Impacts and risks identified

The list below presents the impacts and risk that have been identified associated with the proposed N1 Section 4 Road upgrading, the impact identified we assessed in their **Nature, Significance, Consequence, Extent, Duration and Probability.**

8.1.1 Social and Economic Impacts

The preconstruction and construction phases of this proposed development will have certain consequences, but the developer can take steps to mitigate them. The following section will outline the impacts identified as part of this development.

a) Increased likelihood of road traffic accidents

The construction phase of the proposed project is likely to elevate the risk of road traffic accidents and potential fatalities. Several factors may contribute to this increased risk, including heightened traffic congestion near construction zones, lane narrowing, slow-moving construction and commuter vehicles, and the presence of construction workers. Both vehicle users and construction workers operating near the road or in the median are at risk**.**

A major concern is the presence of slow-moving construction vehicles operating in the fast lane (right-hand lane) and maneuvering in and out of this lane while working within the median. These vehicles pose a significant risk, especially when traffic calming measures are not followed, and drivers do not adequately reduce their speed. Traffic accidents resulting from these conditions could lead to temporary road closures, traffic congestion, and longer travel times. Moreover, there are emotional costs to the individuals involved and their families, as well as the economic impact on the country, with the cost of road traffic crashes in South Africa in 2015 estimated at R142.95 billion, or 3.4% of the national Gross Domestic Product (CSIR, 2016).

As the N1 Section 4 road undergoes upgrades, the cumulative impacts must be taken into account. These may include significant increases in travel time, leading to

driver fatigue, a rise in aggressive driving, and increased congestion. These factors are likely to heighten the risk of road traffic accidents during the construction phase.

b) Increased spread of disease

Any development that triggers the migration of people has the potential to contribute to the spread of disease. In South Africa, the spread of HIV/AIDS due to migration linked to projects is a particular concern. Before and during construction, there is likely to be an increase in the movement of people into and through the project area. This includes both those directly involved with the project, such as construction workers and truck drivers, as well as job seekers and opportunistic criminals. The movement of people is likely to heighten the risk of spreading diseases, particularly sexually transmitted infections like HIV/AIDS, either into the broader project area or from the project area to other locations. This risk is exacerbated by the presence of incoming construction workers, which often leads to increased activities like prostitution, with promiscuity often associated with groups of construction workers. The most vulnerable segments of the local population are those living in low-income and informal settlements, as well as those already involved in prostitution.

c) Potential Community Protest

It is increasingly common in South Africa for large construction projects to be temporarily halted due to protest actions. These protests often stem from grievances about the lack of employment opportunities and benefits for local community members. However, communities might also disrupt the project to express frustrations over unrelated issues, such as service delivery. If protests do occur, they could lead to costly project delays due to lost workdays, the potential for violent confrontations, destruction of both project-related and unrelated infrastructure and equipment, and, in extreme cases, injuries or fatalities. Additionally, such protest actions are likely to cause road closures, further exacerbating traffic disruptions and increasing commuter times.

D) Employment creation

The proposed project is expected to employ an average of 192 skilled and unskilled laborers. Based on past experience with similar projects, it is anticipated that the maximum number of people on site at any given time will not exceed 550. Of these, around 250 jobs will be for semi-skilled and unskilled labor. Contractors are likely to use their own skilled personnel, so local employment opportunities will be mainly limited to unskilled and semi-skilled positions. The number of job opportunities will vary each month, depending on the stage of the construction process.

e) Increased crime

Before and during construction, there is likely to be an influx of people, including potential criminal opportunists. The increase in human traffic—such as construction workers, job seekers, and informal traders—around the road and nearby properties can make it easier for criminals to operate. Additionally, during construction, boundary fences of residential or business properties may be compromised, either deliberately or accidentally, increasing the vulnerability of these properties to criminal activity. This could lead to a rise in crime, particularly theft, during the construction phase. It is essential to implement all necessary measures to minimize the risk of increased criminal activity in the area.

f) Quality of living environment

It is important to understand and consider the impact that such disruption may have on the ability of emergency vehicles to move freely on the road. During periods of peak flow, it is likely that some road users may attempt to use the exiting emergency lane (road shoulder) in order to avoid slow moving or backed up traffic. The use of the emergency lane by general road users may result in this lane also becoming blocked thus preventing a thoroughfare for emergency vehicles. It is imperative that measures are put in place to ensure that emergency vehicles have easy access to and through the sections of road where upgrades are taking place, especially during peak traffic periods.

Possible cumulative impacts may include increased traffic congestion on alternate routes as road users attempt to avoid areas where upgrades are taking place,

damage to alternate routes as a result of increased traffic, and public dissatisfaction.

g) Opportunities for local contractors and SMME's

There may be opportunities for local contractors and Small, Medium, and Micro Enterprises (SMMEs) with the necessary skills and expertise to offer services. These services could include equipment rental, security, material supply, cleaning, catering, and transport for materials and staff. Engaging local businesses will not only create additional job opportunities but also boost disposable income in the local economy. Efforts should be made to prioritize the employment of local contractors and SMMEs.

h) Opportunities for informal traders

The presence of construction workers in the project area is likely to attract informal traders from surrounding regions, who see the workers as a potential market. While the increased opportunities for informal traders can be seen as a positive impact, it also has potential downsides if not managed properly. Informal traders may benefit from increased earnings, but their presence could lead to more litter and a higher number of pedestrians around the construction site, which could reduce traffic safety. To address these issues, measures should be implemented to prevent unauthorized access to the construction areas. Ideally, a designated, well-serviced area should be provided for informal traders to avoid overcrowding, conflicts, pollution, and traffic hazards.

8.1.2 Increased noise

The construction phase of the project will lead to an increase in noise levels. This noise will stem from construction activities such as the use of excavation machinery, jackhammers, and potentially blasting in certain areas. The area's most likely to be negatively affected by the increased noise are those where residential or business properties are located close to the existing road reserve or where the proposed new road reserve extends near these properties. Smaller communities along the route, where the road upgrade passes through residential areas with currently low traffic volumes, are also expected to experience a significant rise in noise levels due to

increased traffic. Additionally, any efforts to improve the condition of these roads will further elevate noise levels for nearby residential properties.

It's important to note that while there will be a temporary increase in noise due to construction activities, the area already experiences noise, as the road passes through four communities.

8.1.3 Emission of dust

During the construction process, exposed soil and building materials will increase the likelihood of dust generation. Additionally, the presence of construction vehicles on site will lead to higher vehicle emissions. During windy periods, dust may be blown into nearby homes and businesses, becoming a nuisance that diminishes the quality of the living environment and affects cleanliness and health. Similarly, the increase in vehicle emissions from construction vehicles will reduce air quality for surrounding landowners and people in areas adjacent to the construction site.

8.1.4 Aesthetic impacts

The aesthetic nature of the area will be temporarily affected by construction activities. These changes will result from the temporary presence of infrastructure and materials associated with construction sites, such as construction vehicles, stockpiles, workers, and equipment. Households and businesses located near the existing road reserve or the proposed new road reserve are most likely to be impacted. However, it's important to note that this impact is temporary and not considered highly significant, as most of the construction will occur within an area that has already been transformed.

8.1.5 Unintended damages to private property

The use of a significant amount of construction equipment, such as jackhammers, rollers, and heavy-duty vehicles, could potentially cause damage to adjacent properties due to increased vibrations and ground destabilization. A photographic record of these areas should be taken before any project activities begin. Any damages that occur should be addressed and resolved between SANRAL and the contractor.

8.2 Impact Assessment Methodology

The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- **Nature:** A brief written statement of the environmental aspect being impacted upon by particular action or activity.
- **Extent:** The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;
- **Duration:** Indicates what the lifetime of the impact will be;
- **Intensity:** Describes whether an impact is destructive or benign;
- **Probability:** Describes the likelihood of an impact actually occurring; and
- **Cumulative:** In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Table 12: Criteria for evaluating potential environmental impacts

CRITERIA	DESCRIPTION			
Extent	National (4) : The whole of South Africa	Regional (3): Provincial and parts of neighbouring provinces	Local (2): Within a radius of 2 km of the site	Site (1): Within the site
Duration	Permanent (4): Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	Long-term (3): The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory	Medium-term (2): The impact will last for the period of the site establishment phase, where after it will be entirely negated	Short-term (1): The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the site establishment phase
Intensity	Very High (4): Natural, cultural and social functions and processes are altered to extent that they permanently cease	High (3): Natural, cultural and social functions and processes are altered to extent that they temporarily cease	Moderate (2): Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way	Low (1): Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected

CRITERIA	DESCRIPTION			
Probability of Occurrence	Definite (4): Impact will certainly occur	Highly Probable (3): Most likely that the impact will occur	Possible (2): The impact may occur	Improbable (1): Likelihood of the impact materialising is very low
Impact Reversal	Highly Impossible (4): Impact reversal will certainly be impossible	Moderate (3): Impact can be reversed to some extent with loss of natural resources	Possible (2): High possibility of impact reversal	Definite (1): Impact can be totally reversed
Loss of irreplaceable resources	Definite (4): Resources definitely be lost	Highly Probable (3): Most likely that resources will be lost	Possible (2): Resources may be lost	Improbable (1): Loss of resources is highly unlikely

Significance is determined through a synthesis of impact characteristics. Significance is also an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Significance=Extent+ Duration +Intensity x Probability

Table 13: Criteria for classifying impacts

Low impact/ Minor (3 -10 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
Medium impact/ Moderate (11 -20 points)	Mitigation is possible with additional design and construction inputs.
High impact (21 -30 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Very high impact/ Major (31 or more points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact.
Negative (-)	Deleterious or adverse impact.
Neutral (/)	Impact is neither beneficial nor adverse.
It is important to note that the status of an impact is assigned based on the status quo – i.e. should the project not proceed. Therefore not all negative impacts are equally significant.	

The suitability and feasibility of all proposed mitigation measures is included in the assessment of significant impacts. This was achieved through the comparison of the

significance of the impact before and after the proposed mitigation measure is implemented.

8.3 The positive and negative impacts that the proposed activity

At this moment there is no alternative layout, should the comments from IAPs and other relevant stakeholders warrants that we change the layout or have alternative, those comments will be addressed accordingly. The project will have minimal impacts on the environment as the project involves the upgrading of an existing N1 Section 4 road and the upgrading of existing bridges.

8.4 Motivation where no alternative sites were considered

The nature of the proposed activity dictates the proposed site location. The applicant has done preliminary studies that indicated that the required material can only be found within the proposed area.

8.5 Assessment of impacts

Potential impact of each main activity in each phase, and corresponding significance assessment. The significance of each activity in each phase of the proposed mining activity associated with the borrow pit is discussed in the tables below.

NB: SR= Significance rating; E=Extent; D=Duration; I=Intensity; P=Probability

Table 14: Impact assessment for the planning and construction phase

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
Non-compliance with legislative requirements	Non commencement/ delayed commencement of proposed project	Planning	3	4	3	2	(20 -ve)	Yes	N/A	1	1	1	2	(6 -ve)
Destruction loss of indigenous natural vegetation	Habitat and loss of species	Construction	2	3	3	3	(21 -ve)	Yes	Moderate	1	2	2	3	(15-ve)
	Alien plant invasions in disturbed areas	Construction	2	3	3	3	(21 -ve)	Yes	Moderate	1	2	1	3	(15 -ve)
	Loss of indigenous natural vegetation due to clearance of vegetation, for the road upgrade and	Construction	2	3	3	3	21-ve)	Yes						

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
	upgrade of culverts and bridges.													
Disturbance of soils and increase erosion	Vegetation cover establishes areas of soil stability. Clearance of vegetation may lead to rapid soil erosion.	Construction	2	3	3	3	(24-ve)	Yes	Moderate	1	2	2	2	(10-ve)
Fauna	Faunal mortality and displacement on site.	Construction	1	2	2	3	(15-ve)	Yes	Moderate -Low	2	1	1	2	(8 -ve)

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
Visual	The proposed development is of a modest scale when compared to the length of the road networks in the area. Given the relatively small footprint of the project and the prevailing visual pollution generated by road upgrade activities, it is anticipated that the visual impact of the proposed development will be minimal and low against	Construction	2	2	2	3	18(-ve)	Yes	Low	2	1	2	2	10(-ve)

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
	the backdrop of the dominating landscape and natural features. Therefore, it is recommended that the development proceed, considering its minimal visual impact within the context of the prevalent Karoo landscape.													
Groundwater quality	The trenches may result in the drawdown, which may affect the yield to the surrounding groundwater users. Material used for	Construction	3	3	3	4	(36 -ve)	Yes	Very High	2	2	3	3	(21 -ve)

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
	backfilling may leach pollutants that will result in the pollution of the surrounding groundwater regime.													
Surface water	Degradation and/or destruction of watercourse habitats.	Construction	2	2	3	3	21(-ve)	No	Moderate					
Waste Management	Waste from the construction material and from workers, during construction phase waste will also be generated by	Construction phase	2	3	3	3	24 (-ve)	Yes	Moderate	2	2	2	2	12 (-ve)

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
	motorist at the road closures.													
Noise disturbance	Noise generated from the movement of heavy vehicles on site	Operational	2	3	2	2	(14 -ve)	No	High	1	2	2	2	(10 -ve)
Project expenditure (incl. direct capital investment)	Investment and growth in local economy	Operational Phase	2	3	3	4	(32+ve)	No	Moderate	2	3	3	4	(32+ve)

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
Socio-economic	Potential friction with local business.	Planning, Site establishment, Operational Phase	3	3	2	3	(24 -ve)	Yes	N/A	1	2	1	2	(8 -ve)
	Potential spread of disease and increase in criminal activities within the Laingsburg area.	Construction	1	2	3	3	18(-ve)	Yes	Moderate	1	2	2	2	10 (-ve)

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
	Temporary employment opportunities	Construction Operational Phase	2	2	2	4	(24 +ve)	Yes	N/A	2	2	2	4	(24 +ve)
Cultural/ Heritage historical impacts	Discovery of gravesites and historical artefacts in the proposed area	Construction Phase	1	2	1	3	(12-ve)	Yes	Moderate	1	1	1	2	(6 -ve)
Palaeontology	The potential impact of the proposed N1 upgrade on local fossil heritage resources is primarily confined to the construction phase. The destruction, damage, or disturbance of fossils	Construction Phase	1	2	3	3	18(-ve)	Yes	Moderate - Low	1	1	2	2	8(-ve)

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
	during construction could result in direct negative impacts on palaeontological heritage resources within the development footprint. Although these impacts can often be mitigated, they cannot be fully rectiûed and are therefore considered permanent.													

Impact pathway	Nature of potential impact/risk	Phase impact occurs	Before Mitigation				Significance of impact	Reversibility of impact	Irreplaceability of receiving environment	After Mitigation				Significance of impact
			E	D	I	P				E	D	I	P	
Traffic	Increase of traffic in the area as some parts of the road will be closed for the preparation of the road upgrading activities, road closures will cause delays.	Site establishment and Construction	2	3	2	3	(24-ve)	Yes	Moderate-High	2	2	2	2	(12 -ve)

8.6 Proposed Mitigation Measures

8.6.1 Loss or fragmentation of indigenous natural vegetation

- Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint.
- 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.
- Lay down areas must not be located within any watercourses or drainage lines.
- Employees must be prohibited from making open fires during the construction phase.
- The Alien Invasive Management Plan should be complied and implemented.

8.6.2 Loss of Plant species of conservation concern

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.

8.6.3 Impact on faunal species habitat

- Only areas targeted for the proposed development should be cleared of vegetation, no other areas.
- Access to the site must only be through existing roads or authorised roads and as approved by the engineer and the Environmental Control Officer (ECO).
- Continuous rehabilitation and maintenance of the construction site should occur during construction. Seed mixes should match the surrounding vegetation types.
- Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Subcontractors' employees. This includes foraging, food and wood collecting outside of the road construction site.

- If animals become trapped in trenches and diggings, a specialist must be contacted to adequately and safely remove these and relocate them to the adjacent habitat.
- Implement speed limits on access roads to prevent unnecessary killing of animals by vehicles.
- No burning of material should be allowed on site. If required, access road maintenance should include cutting and removal of vegetation rather than seasonal burning.
- Snaring and poaching by employees are strictly forbidden. Regular snare assessment and removal actions are recommended.
- Suitable terrestrial movement corridors such as the watercourse areas should be demarcated as no-go areas where possible to facilitate safe movement of animals.
- Measures must be taken to ensure that workers are aware of laws and restrictions governing the hunting, capturing or trapping of animals and should be advised on the penalties associated with the needless destruction of wildlife.
- Conservation orientated clauses should be built into Contracts for personnel, complete with penalty clauses for non-compliance.
- The surface infrastructure site should be well demarcated, and workers should not enter into adjacent areas.
- Limit artificial lighting, which attracts faunal species. Yellow Sodium lighting is recommended as they do not attract invertebrates at night and will not disturb the existing wildlife within the study area.
- The site must be kept clean and tidy and free from litter that could attract rodents and other animal species.

8.6.4 Soil erosion

- Do not clear large areas of indigenous vegetation at a time, without work being conducted in that specific area.
- Erosion control must be implemented where vegetation cover is removed by strict monitoring and implementing erosion control measures where needed.

- Use of siltation bags, berms or gabions can reduce erosion by slowing the run of water.
- Revegetation of cleared areas must be undertaken as soon as possible. Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion.
- Topsoil stockpiles must be protected from erosion.
- Topsoil must be protected from getting washed into drainage ways.
- Compaction of soils should be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilised and any alien plants which establish should be cleared and follow-up undertaken for at least 2 years thereafter and preferably longer.
- Where compaction becomes apparent, remedial measures must be taken (e.g., "ripping" the affected area).
- A stormwater plan must be developed with the aid of an engineer to ensure that water runoff is diverted off the site without pooling and stagnation or erosion.
- The use of machinery within the aquatic areas area will lead to compaction of soils and destruction of vegetation and must therefore be strictly controlled.
- Appropriate buffer zones should be implemented around the aquatic areas, where required, to prevent sediment changes.

8.6.4 Groundwater contamination

- The proper storage, handling and disposal of hazardous substances (e.g. fuel, oil, cement, etc.) must be undertaken.
- All hazardous substances must be stored in appropriate containment structures free from the ingress and egress of stormwater runoff. Hazardous storage and re-fuelling areas must be bunded prior to their use on site during the construction period.
- The bund wall should be high enough to contain at least 110% of any stored volume. Mixing and/or decanting of all chemicals and hazardous substances

must take place on a tray, shutter boards or on an impermeable surface and must be protected from the ingress and egress of stormwater. Cement/concrete batching is to be located in an area to be hardened and must first be approved by the ECO.

- No batching activities shall occur directly on the ground. Provide drip-trays beneath standing machinery/plant that are prone to leaks. Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse.
- Ensure that no construction activities impact on the watercourse or buffer area. This includes edge effects, failure of infrastructure such as sewage pipes.
- Implement litter traps at all watercourse crossings.
- The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.

8.6.5 Surface water and wetlands

- A protocol must be in place by the applicant regarding spillages of fuels, pesticides or chemicals into the wetland areas. These refer to protocols that will be in place in an emergency situation. The protocol must outline actions to be taken and must be widely communicated to all staff. Where necessary, the appropriate authorities must be notified. This is normally required within 24 hours but must be stated in the protocol.
- There must be an ongoing programme to control invasive vegetation.
- All problems identified should be attended to timeously and the wetland should be protected.
- The upgraded road must be properly maintained and kept clean.

8.6.6 Social and economic (positive impacts)

- As far as possible, employ local residents during construction, where applicable. This will ensure a reduced dependency on temporary employment in addition to enhancing the living standards of local people.
- Use manual labour where possible and practical.

- Ensure recruitment measures are aimed particularly at construction workers classified as designated employees in terms of the Employment Equity Act (black people, as defined in the Act, women, and disabled people). A local employment procedure and recruitment process should be developed in consultation with local authorities and representatives.
- The contractor must ensure that a transparent process of employment is followed to limit opportunities for conflict situations.
- Ensure that the Labour Relations Amendment Act, 2002 (Act No. 12 of 2002) as well as the necessary policies and procedures are taken into consideration to ensure the correct procurement procedures.

8.6.7 Social (negative impacts)

a) Community Protest

- Engage business (small and large) and civil society organisations ahead of the commencement of construction for the purpose of establishing lines of communication and fostering a spirit of co-operation.
- As far as possible, source labour locally. All unskilled and semi-skilled labour should be sourced locally; establish a labour recruitment desk in conjunction with local municipality for this purpose.
- Employ a community liaison representative to ensure the free flow of information between the contractor and local communities.

b) Increased spread of disease

- An HIV/AIDS awareness/education component must be included in the induction programme for all personnel working on the proposed road upgrades.
- Ensure there is easy access to HIV/AIDS related information and condoms for all workers involved with the proposed road upgrades.

c) Increased crime

- Construction teams should be clearly identified by wearing uniforms and/or identification cards that should be exhibited in a visible place on their body.

- Instant dismissal and prosecution of any staff caught in criminal activities of any kind.
- Inform local law enforcement agencies of the possibilities of increased criminal activity in the area.
- In the event of boundary fences being temporarily compromised alternative security measures should be put in place.

8.6.8 Dust emission

- Dust caused by strong winds on exposed soils should be controlled by means of water spraying.
- Ensure all stockpiles are wet or covered.
- Minimise the number of exposed soils by only removing vegetation for construction when required.
- Ensure good 'housekeeping' is practiced on the construction site.
- Strict speed limits should be applied on any gravel roads to reduce dust levels. Unintended damages to private property
- Ensure a photo record is kept of all areas where private property will be
- affected.
- Ensure that any unintended damages to private property including walls,
- access routes, etc. are repaired immediately.
- In the event of security being compromised because of unintended damages
- suitable arrangements should be made to ensure suitable security is provided until such time as repairs have been made.

8.6.9 Traffic Management

- Develop a traffic management plan.
- Ensure that all staff members and people on site undergo road safety training.
- Ensure that all staff members and people on site have suitable PPE.
- Ensure there is suitable signage informing road users of construction activities.
- Implement measures to reduce traffic speed, including rumble strips, speed cameras and digital signage showing approaching drivers their vehicle speed.

- Ensure measures are put in place to prevent unauthorised people from accessing the area where upgrades are taking place.
- Develop and implement a traffic management plan. The traffic management plan should be inclusive of traffic management measures for alternative routes.
- Ensure there is suitable road signage, including the use of the variable messaging system informing road users of construction activities and potential delays.
- Where possible, separate fast- and slow-moving traffic into specific lanes.
- During peak periods (morning and evening) stack heavy duty vehicles and allow through during non-peak times.
- Do not allow heavy duty vehicles onto alternative routes.
- Encourage road users to avoid the affected section of road during peak hours
- (Particularly the communities who have alternatives routes to consider).
- Make use of local radio stations, newspapers, and social media to inform the public well in advance of any road closures or extended delays.

8.6.10 Heritage, Archaeology and Palaeontology

- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted
- immediately in order to determine an appropriate way forward.
- A palaeontologist must be present during all construction and excavation activities in the Whitehill Formation. This is particularly important near the rock outcrop closest to Laingsburg.
- The attached Chance Fossil Finds Procedure must be implemented (refer to heritage specialist study report).

8.7 Cumulative Impacts

The proposed project site is situated in an area already considered ecologically disturbed, particularly along the servitude of the N1 Section 4 Road. There are clear

signs of disturbance due to ongoing human activities and nearby communities and farming activities (livestock) and light industrial activities. Based on the risk assessment, the proposed project and its associated infrastructure are expected to further strain the environment, particularly affecting the local fauna, which will face increased human presence, habitat reduction, and higher noise levels. The fauna survey results suggest that wildlife activity in the area may decrease due to the current disturbances. Additionally, a cumulative loss of both fauna and flora is anticipated.

9. SUMMARY OF KEY ENVIRONMENTAL FINDINGS

In accordance with the EIA Regulations (GN No. 326), this section provides a summary of the key findings of the Basic Assessment (BA) Process, including Specialist Study findings. This section also provides a reasoned opinion as to whether the activity should or should not be authorised and conditions that should be made in respect of that authorisation, as necessary. This chapter provides a summary of the impacts identified and significance ratings, summary of key findings and recommendations from specialists and a motivation for the proposed development.

9.1 Summary of Specialist Studies findings and Recommendations

9.1.1 Agriculture Impact Assessment

a) Sensitivity analysis

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

b) Key mitigation measures

- Progressive rehabilitation during the road upgrade must be constituted.
- The project surface footprint should be kept as small as possible.
- All vehicular traffic should be restricted to the designated road servitudes as far as practically possible.

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

9.1.2 Aquatic and Wetland Delineation

a) Final Comments

The aquatic sensitivity of the proposed site is classified as VERY HIGH in the Screening Report. The study site is located within the Gouritz Water Management Area (WMA=27), Groot Subwater Management Area (WMA=17), and the existing National Route 1 Section 4 between Doornfontein (KM 63.0) and Laingsburg (KM 81.7), is located within 500m of two of watercourses (Perennial and non-perennial Rivers).

The watercourses are non perennial with the exception of the Buffels river which plays an it plays a major role in the water management area. The contractor should ensure that the construction process does not negatively impact the watercourse, and lead to the deterioration of the quality of the water onsite.

Since the applicant is proposing the expansion of two bridges, it is important to take note of section 19 of the NWA (1998), owners / managers / people occupying land on which any activity or process 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 the pollution/degradation.

Remedy the effects of any disturbance to the bed and banks of a watercourse/wetland.

b) 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.

9.1.3 Terrestrial Biodiversity Impact Assessment

a) Findings

The site inspection was conducted during the wet season, and thus there are plant species that may have been missed or misidentified. Some plant species that emerge and bloom during another time of the year or under very specific circumstances may have been missed entirely. It is important to schedule a follow-up site inspection to update the report where necessary, including the development of additional fine scale maps that will capture the sensitivity of the site.

The study site was surveyed on the 06th of July 2024 to ascertain the overall state of biodiversity. The National Route 1 Section 4 between Doornfontein (KM 63.0) and Laingsburg (KM 81.7) touches a few Critical Biodiversity Areas (CBA) and an Ecological Support Area (ESA), this implies that these areas should be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. A summary of the biodiversity assessment is outlined Below.

The proposed site consists mostly of the Koedoesberge-Moordenaars Karoo vegetation unit and while a small section of the road is located within the Southern Karoo Riviere vegetation unit both the vegetation units are classified as Least Threatened. The area consists of slightly undulating to hilly landscape covered by low succulent scrub and dotted by scattered tall shrubs, patches of 'white' grass visible on plains, the most conspicuous dominants being dwarf shrubs of *Pteronia, Drosanthemum* and *Galenia*. The has been disturbed to some extent, especially around the road servitude. The most sensitive areas are linked to the rocky outcrops and the mountain that will be cut to expand the upgrade the road.

9.1.4 Visual Impact Assessment

a) Findings

Diverse Development Types: The region under consideration exhibits a simple developmental landscape. Notably, agriculture and tourism play a pivotal role in the local economy, with associated infrastructure contributing significantly to these developments.

Urban and Industrial Relationship: Urban centres like Matjiesfontein and Laingsburg are intricately linked with agricultural activities, highlighting the symbiotic relationship between tourism and agricultural development. The towns serve as key hubs in the broader "through" N1 tourism.

Recreational Features and Tourism Constraints: The N1 is the dominant feeder road, feeding the region with visitors moving towards and heading home from Western Cape visits. The lack of distinctive attractions hinders significant visitor attention other than predominantly "sleep-over" facilities.

Agricultural Dominance: Agricultural development, predominantly focused on livestock, dryland, and crop irrigation farming, defines a substantial aspect of the region's development. Limited game farming was also observed.

Limited Scenic Features: The area lacks significant topographic features, with the mountains providing the most prominent scenic resource.

Visual Impact and Sensitivity: Visual sensitivity in the area is classified as "Medium", influenced by the typical typography of this area. The proposed development's impact might be diminished due to the horizontal addition to the road surface and slight adjustments to cuttings , new intersections and river crossings. The most sensitive receptors are the motorists.

Visual Absorption Capacity (VAC): The area exhibits a moderate VAC, and with appropriate rehabilitation measures allocated to the various impacted areas along this road, the visual impact will be low. Receptors along the road are less likely to be severely impacted.

b) Recommendations

The proposed development is of a modest scale when compared to the length of the road networks in the area. Given the relatively small footprint of the project and

the prevailing visual pollution generated by road upgrade activities, it is anticipated that the visual impact of the proposed development will be minimal and low against the backdrop of the dominating landscape and natural features. Therefore, it is recommended that the development proceed, considering its minimal visual impact within the context of the prevalent Karoo landscape.

9.1.5 Heritage Impact Assessment

a) Findings

In terms of the heritage resources identified in the archaeological field assessment, see Table below and Appendix 1 (refer to heritage impact assessment report) for full descriptions and images.

Table 15: Artefacts identified during the field assessment development area

POINT ID	Description	Density	Type	Period	Co-ordinates		Grading	Mitigation
1	NG Kerk 4 July 1904, stained glass windows, sandstone, with a lane of trees in front of the structure	n/a	Structure	Early 20th C	-33.196276	20.858121	Currently graded as Grade II on SAHRIS as it was an Old National Monument	No impact anticipated
2	NG Church Stephanus Greeff Saal, 23 July 1955	n/a	Structure	Mid 20th C	-33.196648	20.8570631	IIIc	No impact anticipated
3	Ox wagon monument 1838, different battles on one side of the monument, Voortrekker/ Boer Leaders on the other side	n/a	Monument	No date visible	-33.195586	20.8522349	IIIc	No impact anticipated
5	Possible raw lithic material source	Outcrop	Archaeological	Stone Age	-33.189945	20.8280544	IIIc	No impact anticipated
7	Klipwerf farmhouse with surrounding infrastructure	n/a	Structure	Historical	-33.188730	20.8187030	IIIc	No impact anticipated
9	Liebenhof farm entrance with tree lane	n/a	Structure	Unclear	-33.184289	20.8049497	IIIc	No impact anticipated
10	Liebenhof farm werf	n/a	Structure	Historical	-33.188328	20.8037503	IIIc	No impact anticipated

b) Recommendations

- Impact to the tree lanes, identified in Figure 8.1-8.4 should be avoided. If this is not possible, these tree lanes should be replaced with mature trees once the upgrades are completed.

- A palaeontologist must be present during all construction and excavation activities in the Whitehill Formation. This is particularly important near the rock outcrop closest to Laingsburg.
- The HWC Chance Fossil Finds Protocol must be integrated into the Environmental Management Programme (EMPr).
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these findings. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

9.1.6 Archaeological Impact Assessment

a) Findings

During the field assessment, eighth conservation-worthy heritage resources were identified. They include two historical plaaswerfs, the tree lane leading up to one of the farm werfs, as well as the tree lanes in the town, one raw material source for lithics, a Voortrekker Monument, and the two church buildings in Laingsburg. Most of these will not be impacted upon by the proposed upgrades as they fall outside the road reserve.

The tree lanes have been identified as a cultural landscape element that contributes to the experience of the landscape. Mature trees are rare in the broader landscape and are therefore a defining feature of towns in the Karoo. It therefore contributes to the townscape as well as a sense of place, and impact on these trees should be avoided. If impact cannot be avoided, mature trees should be planted alongside the upgraded road. Current trees that exist in the town include pine trees in front of the church, Schinus molle trees (Pepper trees) near the entrance of the town, poplar trees in the cemetery, and bluegum groves.

b) Recommendations

- Impact to the tree lanes, identified in Figure 8.1-8.4 should be avoided. If this is not possible, these tree lanes should be replaced with mature trees once the upgrades are completed.

- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these findings. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

9.1.7 Palaeontological Impact Assessment

a) Findings

The Dwyka Group is characterised by low-diversity trace fossils and generally exhibits low palaeontological sensitivity. In contrast, the Ecca Group formations, especially the Whitehill Formation, have yielded important fossil material, including well-preserved mesosaurid reptiles, trace fossils, and various microfossils. This formation is of high palaeontological significance. The primary impact on fossil heritage will occur during the construction phase due to potential destruction, damage, or disturbance of fossils. However, given the sparse occurrence of scientifically significant fossils in most of the bedrock formations, the overall severity of impacts is considered moderate. However, the presence of the existing N1 road infrastructure is expected to reduce the likelihood of significant fossil impact, though the confidence in this assessment remains moderate due to the absence of field assessments.

b) Recommendations

To mitigate these impacts, it is recommended that during excavation or rock removal activities beyond the current road and marginal boundaries, a palaeontologist must be present during all construction and excavation activities in the Whitehill Formation. This is particularly important near the rock outcrop closest to Laingsburg. The HWC Chance Fossil Finds Protocol must be integrated into the Environmental Management Programme (EMPr).

By adhering to these recommendations, the proposed N1 upgrade can proceed with minimised impact on palaeontological resources.

9.2 Summary of impacts and significance rating

A concise summary of the impacts that has been identified for the proposed stormwater drainage and associated infrastructure, as well as the residual impact significance ratings after the implementation of the proposed mitigation measures (impact management actions) are provided (refer to table below)

Table 16: Summary of identified impact

Environmental Aspect	Impacts
Construction Phase	
Vegetation	- Potential loss of indigenous vegetation units - Potential increase in alien vegetation - Potential loss of floral species of conservation importance - Loss of catchment area and decreased water inputs - Contamination of the area by petrochemical spillages - Contamination of the area by construction and domestic waste - Contamination of the area as a result of leaking portable toilet facilities.
Water Quality	- Increase in water turbidity due to sediment inputs and/or erosion - Physio-chemical water pollution related to potential spillages of cement and fuels.
Wildlife	- Potential loss of faunal species of conservation importance - Potential loss of vulture breeding habitat - Potential loss of foraging habitat for game species - Contamination of the area by petrochemical spillages - Contamination of the area by construction and domestic waste

Environmental Aspect	Impacts
	- Contamination of the area as a result of leaking portable toilet facilities. - Road Mortalities
Soils, Land Capability and Land Use	- Soil Contamination - Soil loss / Soil erosion - Loss of agricultural potential - Temporary change in land use from open veld to construction
Noise	- Noise disturbance from the movement of construction vehicles - Noise disturbance from the operation of machinery
Traffic	- Increase in traffic - Increase of incidents with pedestrians and livestock - Increase in dust from gravel roads - Increase in road maintenance - Additional abnormal loads - Increase in dust from gravel roads - New / larger access points

9.3 Environmental Impact Statement

Assuming all phases of the project comply with the conditions outlined in the EMPr (Appendix F), it is anticipated that the construction will not have any significant negative environmental impact on the surrounding area. The road is located within Critical Biodiversity Areas (1), meaning the site contributes to achieving biodiversity targets for ecosystems, species, and ecological processes as outlined in a systematic biodiversity plan. The road upgrade is located within close proximity to two Important Bird areas namely, Anysberg Nature Reserve and the Swartberg Mountains.

The construction and operation phases are expected to yield positive impacts, such as providing services to the local community, creating job opportunities, and enhancing skill development. However, the construction phase may also result in the degradation or destruction of wetland habitats, a reduction in the diversity of

indigenous fauna and flora, loss of habitat, and potential harm to Species of Special Concern (SCC). During the operational phase, anticipated impacts include sedimentation and soil erosion, pollution of water resources and soil, the spread of invasive alien species, and ongoing habitat loss.

In Summary, the proposed development will entail an upgrade of the National Road (N1) Section 4 between Doornfontein (Km 63.0) And Laingsburg (Km 81.7). The project is in Western Cape Province, within Laingsburg Local Municipality in Central Karoo District Municipality.

9.4 Construction Timeframes

It is requested that the Environmental Authorisation, if issued by the Competent Authority, be valid for a period of (10) ten years from the date of signature.

9.5 Other environmental authorisations, licences and permits.

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 regulations:

- 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.

10. CONCLUSIONS AND RECOMMENDATIONS

The Basic Assessment Process for the proposed project has been undertaken per 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 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".

The following key conditions would be required to be included within an authorisation issued for the upgrade of N1 Section 4 and associated infrastructure:

- Conditions that may be set by DFFE in terms of the EA must be adhered to. If it is found that it will not be possible to adhere to certain conditions, this must be communicated to DFFE ahead of time to prevent a non-compliant situation.
- Should any additional activities listed in terms of the EIA Regulations be planned on the site, the appropriate application(s) for authorisation must be lodged with the relevant authority.
- All mitigation strategies described in this BA Report, must be put into practice.
- A project-specific draft EMPr (legally binding) has been compiled according to (but not limited to) the impacts and mitigation measures included in this assessment.

- Obtain the relevant permits for any protected plant species or specimens that will be lost during project construction.
- A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

APPENDIX A: SITE PLAN (S)

APPENDIX B: SITE PHOTOGRAPHS

APPENDIX C: SPECIALIST STUDIES

APPENDIX D: PUBLIC PARTICIPATION

APPENDIX E: ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

APPENDIX F: DETAILS OF EAP

APPENDIX H: OTHER INFORMATION