GA Environment

DRAFT BASIC ASSESSMENT FOR THE PROPOSED UPGRADE OF NATIONAL ROAD R101 SECTION 8 FROM BELA BELA (KM 0.0) TO MODIMOLLE (KM 26.8), WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

Revision I
August 2021

SANRAL

bvi ENGINEERING PROCUREMENT MANAGEMENT

Environmental best practice, safety and sustainability

DRAFT BASIC ASSESSMENT REPORT

for

THE PROPOSED UPGRADE OF NATIONAL ROAD R101 SECTION 8 FROM BELA BELA (KM 0.0) TO MODIMOLLE (KM 26.8), WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

Revision I

Prepared for:

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Note well: This report is an updated version (Revision 1) of the Draft Basic Assessment Report initially published in June 2021. All text written in navy blue indicate an addition to the initial Draft Basic Assessment Report (Revision 0). The report was revised due to additional construction information received after the publication of Revision 0.

PROJECT INFORMATION

Title:	The Proposed Upgrade of National Road R101 Section 8 from Bela Bela (km 0.0) to Modimolle (km 26.8), Waterberg District Municipality, Limpopo Province
Competent Authority:	Department of Forestry, Fisheries and Environment (DFFE)
Application Reference Number:	14/12/16/3/3/1/2354
Applicant:	South African National Roads Agency SOC Limited
Environmental Assessment Practitioner:	GA Environment (Pty) Ltd.
Compiled by:	Vukosi Mabunda
Reviewer:	Nkhensani Khandlhela
Date:	05 August 2021

DOCUMENT HISTORY AND QUALITY CONTROL

Revision	Revision Date	Revision Comments	Originator	Reviewed By
0	**25 May 2021**	Draft report for Public Review	Vukosi Mabunda	Nkhensani Khandlhela
1	**2 August 2021**	Revised Draft report for Public Review	Vukosi Mabunda	Nkhensani Khandlhela

SIGNING OF THE ORIGINAL DOCUMENT

Original	Prepared by	Reviewed by	Approved by
Date: **25 May 2021**	Name: **Vukosi Mabunda**	Name: **Nkhensani Khandlhela**	Name: **Nkhensani Khandlhela**
Version 0	Signature: 	Signature: 	Signature: 

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LEGISLATIVE REQUIREMENTS FOR A BASIC ASSESSMENT REPORT

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.

Section	Content	Reference in report
A Basic Assessment Report (BAR) must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		
3 (1) (a)	details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	Section 1.10 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 1.2 and Section 1.3
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;	Section1.2, And Appendix A
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 1.5 and Section 1.6
3 (1) (e)	a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments	Chapter 2
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 1.5.10
3 (1) (g)	a motivation for the preferred site, activity and technology alternative	Chapter 5

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. (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	Chapter 5
3 (1) (i)	(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures	Chapter 7
3 (1) (j)	(j) an assessment of each identified potentially significant impact and risk, including-	Chapter 8

	(i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated	
3 (1) (k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	Executive Summary and Appendix F
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 9.1
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	Chapter 8 and Appendix G
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 9.2
3 (1) (o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed	Section 1.12
3 (1) (p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	Chapter 9.2
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	Chapter 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 I&APs;	Appendix H

	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	
3 (1) (s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	Not Applicable
3 (1) (t)	any specific information that may be required by the competent authority	Not Applicable
3 (1) (u)	any other matters required in terms of section 24(4)(a) and (b) of the Act	Not Applicable

AFFIRMATION OF ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

This report was compiled and prepared by Vukosi Mabunda under the guidance of Nkhensani Khandlhela and Andrew Woghiren. I ***Vukosi Mabunda***, an EAP employed by ***GA Environment (Pty) Ltd*** declare that the information provided in this report is correct and relevant to the activity/ project, that comments from Interested and Affected Parties have been incorporated into this report, that the report has included inputs from Specialists and that all relevant project information was made available to Interested and Affected Parties.

SIGNATURE OF EAP **DATE: 2nd August 2021**

EXECUTIVE SUMMARY

1 INTRODUCTION

The South African National Roads Agency SOC Ltd (SANRAL) is proposing to improve/upgrade the National Road R101 Section 8 from Bela Bela (km 0.0) to Modimolle (km 26.8). The National Road, R101 Section 8 is situated within two Local Municipalities (Bela Bela and Modimolle) both located within the Waterberg District Municipality, Limpopo Province. The proposed upgrade starts in Bela Bela at the intersection of R101 and Voortrekker Road/Chris Hani Drive (km 0.0) and ends at Modimolle at the intersection of R101 and R33 (km 26.8). The road will start at coordinates 24°53'5.16"S and 28°17'56.88"E and will end at coordinates 24°42'0.33"S and 28°24'21.10"E.

The R101-8 consists of a two lane, single carriageway road with gravel shoulders along most of the route. The road has an average surfaced width of 7.0 m. Within Modimolle, the road widens to four lanes with parking bays and sidewalks in the central business district (CBD). The general objective of this project is to successfully and optimally upgrade the National Road R101 Section 8 from Bela Bela (km 0.0) to Modimolle (km 26.8). The broad goal of the road upgrade is to relieve traffic congestion to an acceptable level of service, improve road geometry and road safety, replacement of bridges and other structures where required for hydraulic and traffic capacity improvement, and provide adequate pavement capacity for the design period.

In line with the requirements of the National Environmental Management Act (NEMA), Environmental Impact Assessment (EIA) Regulations, 2014 as amended, BVi Consulting Engineers has appointed GA Environment (Pty) Ltd on behalf of SANRAL as the Independent Environmental Consultants to undertake an Environmental Authorisation process (EA) and Water Use Authorisation (WUA) Processes for the proposed upgrade of Section 8 of the National Road R101. An environmental screening report was therefore prepared to outline authorisation or permitting requirements prior to construction phase of the project.

The purpose of this report is to present the results of the environmental assessment undertaken for the proposed National Road R101 upgrade from Bela Bela to Modimolle. The report presents the following:

- Legislative framework governing the site;
- The status quo of the environmental conditions of the site as well as applicable environmental studies, licences 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.

An Environmental Authorization through a Basic Assessment (BA) Process in terms of Section 24(5) of the NEMA, Act No. 107 of 1998 and a Water Use Authorization (WUA) as per the National Water Act (No. 36 of 1998) are required for the proposed national road upgrade.

2 LEGISLATIVE FRAMEWORKS

All legal provisions and the legal context for the proposed development presented in this document include a review of legislation, regulations, policies and guidelines, which are relevant to, or have implications, for the proposed project. The National, Provincial and Local Government legislation are presented in the report and include the following:

- 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);
- National Forest Act, 1998 (Act 36 of 1998);
- The South African National Roads Agency Limited and National Roads Act, 1998 (Act 7 of 1998);
- Waterberg District Environmental Management Framework;
- Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003); and
- Limpopo Province Spatial Development Plan 2015;
- Limpopo Biodiversity Conservation Plan.
- Protection of Personal Information Act 4 of 2013; and
- Promotion of Access to Information Act, 2000 (Act No. 2 of 2000).

3 BASIC ASSESSMENT AND PUBLIC PARTICIPATION PROCESS

In terms of section 24(2) of NEMA, the Minister and or any MEC in concurrence with the Minister may identify activities which 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:

- *Listing Notice 1, Activity 9:* The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water with an internal diameter of 0,36 metres or more; or with a peak throughput of 120 litres per second or more.
- *Listing Notice 1, Activity 12:* The development of infrastructure or structures with a physical footprint of 100 square metres or more. Where such development occurs: (a) within a

watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.

- *Listing Notice 1, Activity 19:* the infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.
- *Listing Notice 1, Activity 24:* The development of a road where no reserve exists where the road is wider than 8 metres.
- *Listing Notice 1, Activity 30:* Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
- *Listing Notice 1, Activity 56*: The widening of a road by more than 6 metres, or the widening of a road by more the 1km (i) Where there existing reserve is wider than 13.5meters
- *Listing Notice 3, Activity 4:* The development of a road wider than 4 meters with a reserve less than 13.5 metres.
- *Listing Notice 3, Activity 12*: the clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.
- *Listing Notice 3, Activity 14:* the development infrastructure of structure with a physical footprint of 10 square metres or more where the development occurs within a watercourse or if not, development setback has been adopted, within 32 metres of a watercourse measured from the edge of a watercourse.
- *Listing Notice 3, Activity 18:* The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometer;
- *Listing Notice 3, Activity 23*: the expansion of infrastructure or structures where the physical footprint is expanded by 10 square metres or more, where such expansion occurs, if no development set back has been adopted, within 32 metres of a water course measured from the edge of a watercourse.

A Public Participation Process (PPP) consistent with Chapter 6 of the NEMA EIA Regulations 2014, as amended (Government Notice R. 982 in Government Gazette No. 40772 of 07 April 2017) was followed for the project. In addition to Chapter 6 of the NEMA EIA Regulations, 2014 as amended, on the 5th of June 2020, the Minister of the Department of Forestry, Fisheries and Environment, issued directions regarding the measures to address, prevent and combat the spread of the COVID-19 relating to the National Environmental Management Permits and Licences. A Public Participation Plan was submitted to the DFFE on the 10th of March 2021, the plan was approved on the 11th of March 2021.

This draft Basic Assessment Report (Revision I) has been re issued for public review due to additional information provided by the Engineering team regarding to construction methodology that will be used especially during the demolition and construction of the existing bridges. It is anticipated that the construction methodology will have direct impacts on the watercourses and in particular on the aquatic biota in the watercourses. All the specialists (flora, fauna, wetland, aquatic and heritage) have following this submission of the updated construction methodology updated their reports (where applicable) to reflect additional impacts and risks that could occur when working within the watercourses, riparian environment and other sensitive environments in the study area.

The Draft Basic Assessment Report has been compiled and will be reissued out for Public and Competent Authority (CA) review for the legislated period of at least 30 days. The comments raised by the CA as well as various Interested and Affected Parties (I&APs) will be recorded and addressed in the Final BAR. The PPP that commenced in March 2021 and is summarised as follows:

Initial Public Participation Phase:

A newspaper advertisement was placed in the local newspaper (Die Pos / The Post) on the 1st of April 2021, calling for I&AP registration with the project and comments. Proof of the newspaper advertisement is attached in **Appendix E1** of this report;

- Notification letters were compiled and distributed to all adjacent landowners on the 31st of March and 1st of April 2021. Proof of the of the distribution is attached in **Appendix E2 and E8** of this report;
- Site notices were placed in various locations along and within proximity of the R101 Section 8 on the 31st of March and 1st of April 2021. Proof of the site notices placement is attached in **Appendix E3;**
- Electronic versions of the notification letters were distributed to I&APs and is currently on-going;

Draft Basic Assessment Report (Revision 0) Public Review Phase:

- As mentioned, the Draft Basic Assessment report was made available to the public in both electronical and hard copy format for a 30-day review period. All comments made by the public and Commenting Authorities were incorporated in this revised DBAR version and will be incorporated into the final report which will be submitted to DFFE for review and decision-making.
- The following commenting authorities and institutions were provided with a copy of the report in electronic and/or hardcopy format:
    - Waterberg District Municipality;
        - Environment, Social and Disaster Department;
        - Infrastructure Development Department; and
        - Planning Department and Economic Development.
    - Bela Bela Local Municipality;
        - Technical Services (Roads and Stormwater);
        - Planning and Economic Development;
        - Roads and Infrastructure;
        - Town Planning; and
        - Bela Bela Local Municipality Library.
    - Modimolle Local Municipality;
        - Technical Services (Roads and Stormwater);
        - Planning and Economic Development;
        - Roads and Infrastructure;
        - Town Planning; and
        - Modimolle Local Municipality Library.
    - Limpopo Provincial Government:
        - Department of Agriculture and Rural Development;
        - Department of Economic Development Environment and Tourism;

        - Biodiversity Management; and
        - Environmental Impact Management,
      - Department of Transport;
      - Public Works, Roads and Infrastructure Department; and
      - Limpopo Provincial Heritage Resources Authority (LIHRA)
  - Roads Agency Limpopo (RAL);
  - South African Heritage Resources Agency (SAHRA); and
  - Department of Water and Sanitation (DWS) - Limpopo Regional Office.

SMS, e-mail notifications and telephone calls were utilised to notify all registered I&APs about the availability of the report. Public Participation was undertaken as per the approved Public Participation Plan.

Draft Basic Assessment Report (Revision I) Public Review Phase:

- The revised Draft Basic Assessment report will be made available to the public both electronically and through hard copy formats for a legislated 30-day review period. All comments made by the public and Commenting Authorities will be incorporated into the final report which will be submitted to DFFE for review and decision-making.
- The following commenting authorities and institutions will be provided with a copy of the report in both electronic format and hardcopy format if requested:
  - Department of Forestry, Fisheries and Environment:
    - Integrated Environmental Authorisations;
    - Biodiversity and Conservation Unit; and
    - Forestry Management - Limpopo/Mpumalanga Region.
  - Waterberg District Municipality;
    - Environment, Social and Disaster Department;
    - Infrastructure Development Department; and
    - Planning Department and Economic Development.
  - Bela Bela Local Municipality;
    - Technical Services (Roads and Stormwater);
    - Planning and Economic Development;
    - Roads and Infrastructure;
    - Town Planning;
    - Bela Bela Local Municipality Library
  - Modimolle Local Municipality;
    - Technical Services (Roads and Stormwater);
    - Planning and Economic Development;
    - Roads and Infrastructure;
    - Town Planning; and
    - Modimolle Local Municipality Library.
  - Limpopo Provincial Government:
    - Department of Agriculture and Rural Development;
    - Department of Economic Development Environment and Tourism;
      - Biodiversity Management; and

    - Environmental Impact Management,
  - Department of Transport;
  - Public Works, Roads and Infrastructure Department; and
  - Limpopo Provincial Heritage Resources Authority (LIHRA)
- Roads Agency Limpopo (RAL);
- South African Heritage Resources Agency (SAHRA); and
- Department of Water and Sanitation (DWS) - Limpopo Regional Office.

SMS, e-mail notifications and telephone calls have been utilised to notify all registered I&APs about the availability of the revised report. Public Participation will be undertaken as per the approved Public Participation Plan.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT

An understanding of the overall character and other sensitivities that were identified in the surrounding environment is pertinent to the project. The Biophysical aspects discussed are *Climate, Geology, Protected Areas, Regional Vegetation and Conservation Plan Area*, *Hydrological* and *Heritage features*. The Socio-Economic conditions, Demographics, employment levels as well as housing and service delivery are also discussed in this report.

5 SPECIALIST STUDIES AND MANAGEMENT PLANS

In accordance with the requirements of Appendix 6 of the NEMA EIA Regulations, 2014 as amended, and a review of the DFFE Screening tool Specialist studies requirements, the following Specialist Studies were undertaken:

- The Terrestrial Biodiversity Impact Assessment;
- Freshwater Assessment: Wetland Delineation and Impact Assessment;
- Heritage Impact Assessment;
- Palaeontology Impact Assessment Phase I; and
- Detailed Desktop Agricultural Impact Assessment, Remedial Measures and Implementation Measures.

It must be noted that specialist's study area was exaggerated at the realignment areas to assess a larger area than the actual proposed upgrade area. The aim of this process was to obtain a holistic environmental sensitivity in the case that the realignments were to slightly deviate from the originally proposed route. The Ecological studies (flora, fauna and wetland) were undertaken under the recently published Government Notice 320 (dated 20 March 2020) and Government Notice 1150 (dated 30 October 2020) in terms of NEMA: "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation".

According to the Terrestrial Biodiversity Assessment undertaken by The Biodiversity Company in May 2021, the road is surrounded by a number of game farms and a protected area. In these areas including the areas of the realignments, one avifauna and seven mammal species of conservation concern are known to occur. This habitat is mostly mountain bushveld that is in pristine condition. Two different

types of protected trees (*Sclerocarya birrea subsp. caffra* (Marula) and *Combretum imberbe* (Leadwood)) were also observed in the area. A protected tree search and rescue plan will be undertaken by an ecologist prior to construction to ensure that all protected trees in the area are accounted for and effectively managed. The ecological integrity, importance and functioning of the ecosystem is still intact. The preservation of this habitat and associated species of conservation concern is of utmost importance. The most significant impacts on terrestrial biodiversity will be encountered during construction, especially during the blasting process at the three realignment areas. Disturbance and mortalities of fauna species including species of conservation concern due to blasting and destruction, further loss and fragmentation of the vegetation community including the sensitive ridge habitat are some of the impacts that are anticipated. Therefore, the proposed development of the R101 Section 8 from Bela Bela to Modimolle will result in the destruction and fragmentation of intact and functional CBA areas, areas rated "Very High".

According to the Heritage Impact Assessment and Palaeontological Phase I Impact Assessment undertaken by Heritage Contracts and Archaeological Consulting (HCAC) in May 2021, the existing road servitude and associated construction activities of the national road would have already impacted on any surface heritage features if any ever existed in the servitude. The two bridges which will be demolished and replaced have been in existence for less than 60 years and are of no heritage significance. Heritage resources within the larger area consist of Stone Age finds, Later Iron Age settlements, graves and structures older than 60 years, some which dates to the Anglo Boer War. The potential impacts to heritage resources are generally considered to be of low significance after mitigation and no fatal flaws are expected. The project will have a socio-economic benefit. In addition to the findings of the Heritage Specialist, it is the opinion of the heritage specialist that due to the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would occur in the northern section, the Nylstroom Subgroup, and very unlikely be preserved in the sandstones of the Clarens Formation. Therefore, it is recommended that no palaeontological site visit is required unless fossils are found once excavations and drilling commence.

The wetland and aquatic biodiversity impact assessment undertaken by Envass (2021) revealed that the present ecological scores of the watercourses within a 500m radius of the site ranged between Moderately Modified (C) and Seriously Modified (E). The overall ecological importance and sensitivity for these watercourses were 'High'. The assessment found that the proposed road upgrade and bridge and culverts replacement will predominantly take place in already infilled and transformed areas directly adjacent to the existing R101 roadway within the existing road reserve. The main activities of concern will be blasting, demolition, temporary diversions of flow, and excavations during the construction phase. The aforementioned activities will negatively impact the water quality, the aquatic biota and wetland habitats. These activities were assessed to be of 'High' and "Medium' impact significance prior to mitigations and "Medium' and 'Low' post mitigations. However, small areas of wetland habitat will be lost during the widening of the R101. Although wetland habitat will be permanently lost, the intensity of the impact has been reduced by recommending means of improving the currently degraded state of the at-risk watercourses to a condition better than the baseline data presented herein.

It is a recommendation of the Aquatic specialist that a Water quality assessments and biomonitoring (upstream and downstream of the construction activities) be undertaken before and after the

construction phase. During the construction phase, weekly water quality assessment and biomonitoring both upstream and downstream sites at construction activities within watercourse (i.e. at the two (2) major bridges and three (3) major culverts (if inflow)) must be undertaken. The parameters to be monitored should include as a minimum; pH, EC, TDS, Total Suspended Solids (TSS), Turbidity, DO (mg/l), DO (%) and in situ temperature. Hydrocarbon monitoring utilised Total Petroleum Hydrocarbons (TPH) as the parameter measured should also be conducted on a 2-weekly basis (i.e. twice a month). The period and frequency of monitoring required post-construction will be determined by a suitably qualified aquatic ecologist and approved by the ECO. The natural processes within the remainder of the wetlands will continue post-development. The impact prior to the implementation of mitigation measures was therefore calculated to be of a medium (negative) significance after the implementation of mitigation measures.

The agricultural and soils impact assessment found that the study area can be categorised into two parts, the southern portion consisting of open savannah and the northern portion consisting of Waterberg Mountains. Soils in the southern half are likely to have a depth of 1 m or more, and have a poor water holding capacity with a moderate to high erosion hazard. In contrast to these, soils in the northern portion of the route will be mainly shallow and steep with a very poor yield potential. The Agricultural Potential for the southern portion is likely to be Land Capability Class IV (LCCIV), a marginal crop potential or LCC VII suitable or livestock and wild game only, on a scale of LCCI to LCCVIII. The northern portion is most probably LCCVII only. Therefore, a low agricultural and soils impact before mitigation is anticipated for the proposed road upgrade.

The Specialist reports are attached to **Appendix F** of this report. With regards to the Management Plans for the project, an Environmental Management Programme (EMPr), Alien Invasive Management Plan, Erosion and Soil Management Plan, and Rehabilitation Plan have been compiled to provide mitigation measures for all potential issues that are likely to emanate from the project.

6 ALTERNATIVES

In terms of Section 24 of NEMA, the proponent is required to demonstrate that alternatives have been described and investigated in sufficient detail during the BA process. It is important to highlight that alternatives must be practical, feasible, reasonable and viable to cater for an unbiased approach to the project and in turn to ensure environmental protection. A total of three (3) routing alternatives, two (2) intersections alternatives were identified for the project. These are as follows:

- No-go option;
- Route Alternatives:
  - Preliminary route (geometry) design (preferred);
  - Alternative Route 1;
  - Alternative Route 2;
- Bridge Alternatives:
  - Option 1: Rehabilitation;
  - Option 2: Raise Existing Deck;
  - Option 3: Add Additional Spans; and
  - Option 4: Replacement/New Bridge (preferred)

- Cross Section Alternatives:
  - Preliminary Cross Section Option 1 (preferred); and
  - Cross Section Design Option 2.
- Construction Methodology for the Replacement of Major Culverts:
  - Preliminary Construction Sequence Option 1 (**preferred**); and
  - Construction Sequence Option 2
- Construction Methodology for the Replacement of Bridges:
  - Preliminary Construction Sequence Option 1 (**preferred**); and
  - Construction Sequence Option 2

These alternatives were provided by the client. The advantages and disadvantages of each of these alternatives as well as the reason for the preferred alternative are presented in **Chapter 5**. Other alternatives such Design and process are also referred to in **Chapter 5**.

7 ENVIRONMENTAL IMPACTS

In accordance with Government Notice R. 982, promulgated in terms of Section 24 of the National Environmental Management Act, 1998 (Act 107 of 1998), the EAP is required to assess the significance of potential impacts in terms of the following criteria:

- Nature of the impact;
- Extent of the impact;
- Intensity of the impact;
- Duration of the impact;
- Probability of the impact occurring;
- Reversibility of impacts; and
- Impact on irreplaceable resources; and
- Cumulative impacts.

The potential impacts identified and discussed were divided into two themes which are as follows.

- *Theme 1: Impacts on the Biophysical Environment* - (impacts on surrounding indigenous plant species, fauna, soil and surface water)*;* and
- *Theme 2: Impacts on the Human Environment*- (impacts on the surrounding residential area and business. These include traffic, dust and air quality, noise, visual, health and safety, and employment opportunities)

Cumulative impacts were also discussed in this report and the **Table 1** below indicates a summary of impacts identified.

Table 1: Impact Assessment Summary Table

Impact description	Type of impact	Project phase	Significance without mitigation	Significance with mitigation
IMPACT 1: Loss of floral habitat and species diversity	**NEGATIVE (- VE)**	Construction	High	Medium
		Operational	Low	Low

Impact description	Type of impact	Project phase	Significance without mitigation	Significance with mitigation
IMPACT 2: Loss of floral SCC and destruction of protected trees	NEGATIVE (- VE)	Construction	High	Medium
		Operational	Low	Low
IMPACT 3: Destruction, further loss and fragmentation of the vegetation community	NEGATIVE (- VE)	Construction	High	Medium
		Operational	Low	Low
IMPACT 4: Displacement of faunal community (Including SCCs) due to habitat loss, direct mortalities	NEGATIVE (- VE)	Construction	High	Medium
		Operational	Low	Low
IMPACT 5: Loss of fauna migration with connectivity	NEGATIVE (- VE)	Construction	Medium	Low
		Operational	Low	Low
IMPACT 6: Introduction and spread of alien vegetation	NEGATIVE (- VE)	Construction	Medium	Low
		Operational	Low	Low
IMPACT 7: Changes in water quality due to foreign materials and increase nutrients	NEGATIVE (- VE)	Construction	High	Medium
		Operational	Medium	Low
IMPACT 8: Changes in sediment entering and exiting the system	NEGATIVE (- VE)	Construction	High	Medium
		Operational	Medium	Low
IMPACT 9: Disturbance of watercourses by blasting in road realignment sections	NEGATIVE (- VE)	Construction	Medium	Low
		Operational	Low	Low
IMPACT 10: Disturbance on aquatic biota during bridge and culvert replacement	NEGATIVE (- VE)	Construction	High	Medium
		Operational	Medium	Low
IMPACT 11: Disturbance of wetland, riparian and instream habitat.	NEGATIVE (- VE)	Construction	Medium	Low
		Operational	Medium	Low
IMPACT 12 Pollution of surface water and soils due to demolition	NEGATIVE (- VE)	Construction	Medium	Low
		Operational	Medium	Low
IMPACT 13: Loss of Topsoil and Soil Compaction	NEGATIVE (- VE)	Construction	Medium	Low
		Operational	Low	Low
IMPACT 14: Traffic on local roads	NEGATIVE (- VE)	Construction	Medium	Low
	POSITIVE (+ VE)	Operational	Positive	No significance
IMPACT 15: Dust and air quality	NEGATIVE (- VE)	Construction	Medium	Low

Impact description	Type of impact	Project phase	Significance without mitigation	Significance with mitigation
		Operational	Low	Low
IMPACT 16: Noise impacts	**NEGATIVE (- VE)**	Construction	Medium	Low
		Operational	Low	Low
IMPACT 17: Heritage impacts	**NEGATIVE (- VE)**	Construction	Low	Low
		Operational	Low	Low
IMPACT 18: Palaeontological impacts	**NEGATIVE (- VE)**	Construction	Low	Low
		Operational	Low	Low
IMPACT 19: Visual impacts	**NEGATIVE (- VE)**	Construction	Medium	Low
		Operational	Low	Low
IMPACT 20: Health and safety impacts	**NEGATIVE (- VE)**	Construction	Medium	Low
	POSITIVE (+ VE)	Operational	Positive	No significance
IMPACT 21: Temporary employment opportunities	**POSITIVE (+ VE)**	Construction	Positive	No significance
		Operational	*Not Applicable*	

8 CONCLUSIONS AND RECOMMENDATIONS

This DBAR provides a broader description of the biophysical, Infrastructural and socio-economic issues associated with the proposed development for the proposed roads. A comprehensive public participation process was conducted and is also presented in this report.

The DBAR has presented an assessment of the impacts of each of the proposed activities as well as the potential cumulative impacts of the development in its entirety. Mitigation measures for each of the impacts are discussed to ensure that positive impacts can be optimised, and negative impacts minimised in order for the project to be integrated into the environment in a sustainable manner.

It is the recommendation of the EAP that the **proposed design** is the most effective way of meeting the need and purpose of the proposed activity. Taking into consideration the findings of the environmental impact assessment, the project benefits outweigh the negative impacts identified, provided that mitigation measures are applied effectively. Impacts of high significance are not foreseen once proper mitigation measures have been implemented

The EAP's key recommendations outlined in the report are as follows:

a. An Independent Environmental Control Officer (ECO) must be appointed to monitor all construction activities and ensure the demarcation of all applicable areas and approve the locations of all infrastructure;
b. A protected tree search and rescue plan must be undertaken by a qualified ecologist before the construction phase to ensure all potentially affected protected trees are

accounted for and managed accordingly;

c. The Contractor may only establish on the least sensitive environment which must be approved by the ECO. It is recommended that the Contractor assess the four potential site establishment areas for the establishment of associated construction activities as indicated in **Section 1.5.8** of this report.
d. Construction work within the watercourses should be limited to the dry season as far as possible as indicated in the Bridges and Major Culverts Construction Methodology to reduce impacts on the aquatic ecosystems.
e. Water quality and aquatic biota assessments and monitoring must be undertaken before and after the construction phase. During the construction phase, regular water quality and biomonitoring must be undertaken as and when necessary, at least once a month.
f. The Contractor shall inform all adjacent landowners of the commencement of construction activities at least 30 days before the commencement via adequate signage at strategic points on site;
g. Floral Species of Conservation Concern (SCC) *Cleomaceae* and *Apocynaceae* and repyile SCC (*Crocodylus niloticus, Lygodactylus waterbergensis and Pseudocordylus transvaalensis*) encountered within the study area should ideally be conserved *in situ.* Where the encroachment of the proposed road alignment encroaches the SCC is unavoidable, it is recommended that these SCC be relocated under the supervision of a qualified botanist and/or zoologist to suitable adjacent habitats.
h. It is recommended that a walk-down of the development footprint within the realignment areas noted to be of increased ecological sensitivity be undertaken by an ecologist within the appropriate season prior to commencement of construction. Should any SCC be identified to fall within the proposed construction footprint (road reserve) but will not necessarily be impacted on, these SCC shall be clearly marked and the areas barricaded as a no-go zone;
i. Movement of faunal species through the study area must be catered for by the provision of drainage culverts, in order to maintain regional meta-population dynamics and to prevent local extinctions;
j. If water is sprayed on the operational surfaces for any reason during the operational process, utmost care must be taken to ensure the runoff water does not pollute the system or any of the associated catchment areas. A storm water cut-off drain should be constructed between the operational area and the aquatic system to ensure that storm water flowing through the operational area cannot flow into the aquatic system.
k. Topsoils should be excavated and stockpiled separately from the subsoils to be used during the rehabilitation of the road verges. Drip trays shall be provided in construction areas for stationary plant and for "parked" plant; Drip trays, sumps and bunds must be emptied regularly, especially before a known rain event and after a rain event, and the contents disposed of at a licensed disposal facility;
l. The Contractor must be trained to recognise any heritage features. Should there be a sign of such objects, construction must halt in that area immediately and a suitably qualified heritage specialist must be called to investigate through the ECO;
m. Adhere to all conditions of the Environmental Authorisation issued by DFFE as well as any conditions of permits that may be required thereafter; and

n. Adhere to all recommendations outlined in the specialist Reports (**Appendix F),** and the Environmental Management Programme in **Appendix G**.

DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED UPGRADE OF NATIONAL ROAD R101 SECTION 8 FROM BELA BELA (KM 0.0) TO MODIMIOLLE (KM 26.8) WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

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LIST OF ABBREVIATIONS / ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent Authority
CBA	Critical Biodiversity Area
DBAR	Draft Basic Assessment Report
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EAP	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Areas
FBAR	Final Basic Assessment Report
I&APs	Interested and Affected Parties
LEDET	Limpopo Department of Economic Development, Environment & Tourism
NEMA	National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998),
NEMA	National Environmental Management Act (Act 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003)
RI&APs	Registered Interested and Affected Parties
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency SCO Ltd

GLOSSARY OF TERMS

This section provides a catalogue of terms and definitions, which may be used in this report and, or other documents drafted for the project.

Term	Definition
Clearing/Clearance	Clearing/Clearance refers to the removal of vegetation through permanent eradication and in turn no likelihood of regrowth. 'Burning of vegetation (e.g. fire- breaks), mowing grass or pruning does not constitute vegetation clearance, unless such burning, mowing or pruning would result in the vegetation being permanently eliminated, removed or eradicated'.
Competent Authority	In respect of a listed activity or specified activity, means the organ of state charged by this Act with evaluating the environmental impact of that activity and, where appropriate, with granting or refusing an environmental authorisation in respect of that activity.
Limpopo Biodiversity Conservation Plan (LCPv2)	The Limpopo Conservation Plan, Version 2 (LCPv2), was completed in 2018 for the Limpopo Department of Economic Development, Environment & Tourism (LEDET) (The Biodiversity Company, 2021). The purpose of the LCPv2 was to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas and associated land-use guidelines). The previous Limpopo Conservation Plan (LCPv1) was completely revised and updated (The Biodiversity Company, 2021). A Limpopo Conservation Plan map was produced as part of this plan and sites were assigned to the following CBA categories based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes: • Critical Biodiversity Area 1 (CBA1); • Critical Biodiversity Area 2 (CBA2); • Ecological Support Area 1 (ESA1); • Ecological Support Area 2 (ESA2); • Other Natural Area (ONA); • Protected Area (PA); and • No Natural Remaining (NNR).
Critical Biodiversity Area	Areas that are deemed important to conserve ecosystems and species. For this reason, these areas require protection.
Duty of Care	Every person who causes, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environmental is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution and degradation of the environment."
Decommissioning	Means to take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily recommissioned.
Ecological Support Area	Areas that support the ecological functioning of protected areas or CBAs or provide important ecological infrastructure.
Environment	the surroundings within which humans exist and that are made up of— (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental Assessment Practitioner	The individual responsible for the planning, management, coordination or review of environmental impact assessments, strategic environmental assessments, environmental management programmers or any other appropriate environmental instruments introduced through regulations.
Environmental Management Programme	A programme with set objectives and timeframes that seek to achieve a required end state and describes how activities that have or could have an adverse impact on the environment will be mitigated, controlled and monitored.
Flora	Plant life that occurs in a specific geographical region and/habitat.
Fauna	Animal life that occurs in a specific geographical region and/habitat.

Term	Definition
Indigenous vegetation	Refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Interested and Affected Parties (IAPs)	a) Any person, group of persons or organisation interested in or affected by such operation or activity; and (b) Any organ of stale that may have jurisdiction over any aspect of the operation or activity.
Regulated area of a watercourse:	• The outer edge of the 1:100-year flood line and /or delineated riparian habitat whichever is the greatest measured from the middle of a river, spring, natural channel, lake or dam; • In the absence of a determined 1:100-year flood line or riparian area, the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); • 500m radius from the delineated boundary of any wetland or pan.
Riparian Area	A Habitat that includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.
Protected Area	A protected area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values.
Public Participation Process	In relation to the assessment of the environmental impact of any application for an environmental authorisation, means a process by which potential Interested and Affected Parties are given opportunity to comment on, or raise issues relevant to, the application.
Species of Conservation Concern	IUCN Red List definition: Threatened species, and other species of significant conservation importance: Extinct, Extinct in the Wild, Near Threatened, Data Deficient. In South Africa, the following additional categories are added: Rare, Critically Rare.
Threatened or Protected Species	These refers to either plants or animals that are at a threat of Extinction or are protected due to their high conservation value or national importance.
Urban Edge	A demarcated edge of an area that is used as land use management tool to manage, direct and control the outer limits of development growth around an urban area. The aim is to control urban sprawl due to its associated adverse impacts.
Watercourse	(a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.
Wetland	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

1 INTRODUCTION

1.1 Background

Access Roads in the Waterberg District Municipality are adequately connected with National, Provincial, and District Roads. The primary route network includes the N1, N11, R518, R572, R33, R510, R516, and the R101. There is concern on the rapid degradation of many roads due to the increasing economic activities in the District (increase in heavy vehicles with mining materials), and a lack of maintenance and rehabilitation. In addition to the above roads, the local access roads are gravel and predominantly utilised by buses and taxis. The conditions of these roads are below standard as they require upgrading, improved storm water management, lighting, parking, and other road infrastructure. Some of Internal access roads in towns and villages within the Waterberg in are also in a bad state. It is anticipated that once major roads have undergone general upgrading, attention can be given to the upgrading the minor roads.

BVi Consulting Engineers was appointed by the South African National Roads Agency SOC Limited (SANRAL) in August 2018 to provide Consulting Engineering Services for the Improvement of National Road R101 Section 8 from Bela Bela (km 0.0) to Modimolle (km 26.8). In line with the NEMA EIA 2014 Regulations (as amended), BVi Consulting Engineers has appointed GA Environment (Pty) Ltd on behalf of SANRAL as the Independent Environmental Consultants to undertake an Environmental Authorisation process (EA) and Water Use Authorisation Processes (WUA) for the proposed upgrade of Section 8 of the National Road R101. According to the pavement management system (PMS) information, the road was constructed in 1964 as National Road N1 joining Pretoria and Polokwane. The N1 was however realigned during 1995/1996 under a concession contract at the time which this section was renumbered as R101. Road R101 serves as an alternative route to the N1 toll route.

This Draft Basic Assessment Report is part of the Design Development stage (Preliminary Design) and forms a part of the initial overall project stage which are set out as follows:

- Project Assessment;
- Investigation for Design Development;
- Design Development Stage:
  - Preliminary Design;
  - Detail Design;
- Tender Documentation;
- Clarification Meeting, Tender Period and Tender Evaluation;
- Administration and Monitoring of the Works Contract;
- Additional Duties, Special Services and Specialist Advice;
- Quality Control: Works Contract; and
- Close Out.

The riparian area of the Bad se Loop, Klein Kariba and Groot Nyl Rivier forms part of the study area and impacts on the rivers are anticipated. As such, the following processes are currently underway for the proposed improvement of the national road before commencement:

- Water Use License Application in terms of National Water Act (Act No. 36 of 1998); and
- Basic Assessment Process in terms of the NEMA Environmental Impact Assessment Regulations, 2014, as amended.

Construction material will be required for the proposed upgrade of Road R101 (Section 8). Material sources cannot be exploited without authorisations from the Department of Mineral Resources and Energy (DMR). However, BVi Engineers have indicated that they will obtain the required construction material from approved or commercial material sources. These material sources will be obtained from a nearby road upgrade project where SANRAL is the project proponent. The approval of materials sources is outside the scope of this EA application.

The proposed road upgrade will also traverse various private and state-owned properties. It is important to note that a land acquisition process is already underway between BVi Engineers and all potentially affected landowners who have been contacted by GA Environment (refer to **Appendix B3**). At least six (6) farm properties will be affected by the realignment, two (2) private properties will be affected by bridge widening, four (4) private properties will be affected by servitude acquisition and one (1) game farm property is proposed to be used as a temporary traffic deviation. Nineteen (19) parent farms as well as numerous erven properties have been identified as potentially affected (refer to **Appendix B3**). The affected and adjacent property owners have been included in the Interested and Affected Parties (land owners) database and will be engaged throughout the Basic Assessment process.

1.2 Locality Description and Surrounding Land-Uses

The project starts in Bela Bela at the intersection of the R101 and Voortrekker Road/Chris Hani Drive (km 0.0) and ends in Modimolle at the intersection of the R101 and R33 (km 26.8). The road will start at coordinates 24°53'5.16"S and 28°17'56.88"E and will end at coordinates 24°42'0.33"S and 28°24'21.10"E (**Figure 1**). The R101 Section 8 consists of a two lane, single carriageway road with gravel shoulders along most of the route with an average surfaced width of 7.0 m. Within Modimolle, the road widens to four lanes with parking bays and sidewalks in the central business district (CBD). The general objective of this project is to successfully and optimally upgrade the National Road R101 Section 8 from Bela Bela (km 0.0) to Modimolle (km 26.8).

The broad goals of the road upgrade is to relieve traffic congestion to an acceptable level of service, improve road geometry and road safety, widen bridges and other structures where required for hydraulic and traffic capacity improvement, and provide adequate pavement capacity for the design period. Road R101 Section 8 is defined as a mobility road, connecting development centres over long distances. Road R101 Section 8 falls within the interurban collector and rural roads category and can therefore be classified as *a Category B Road*. This road category is seen as strategically important and is expected to deliver a good Level of Service to its users. It also connects other collector roads and can therefore be classified as a Class 2 rural major arterial.

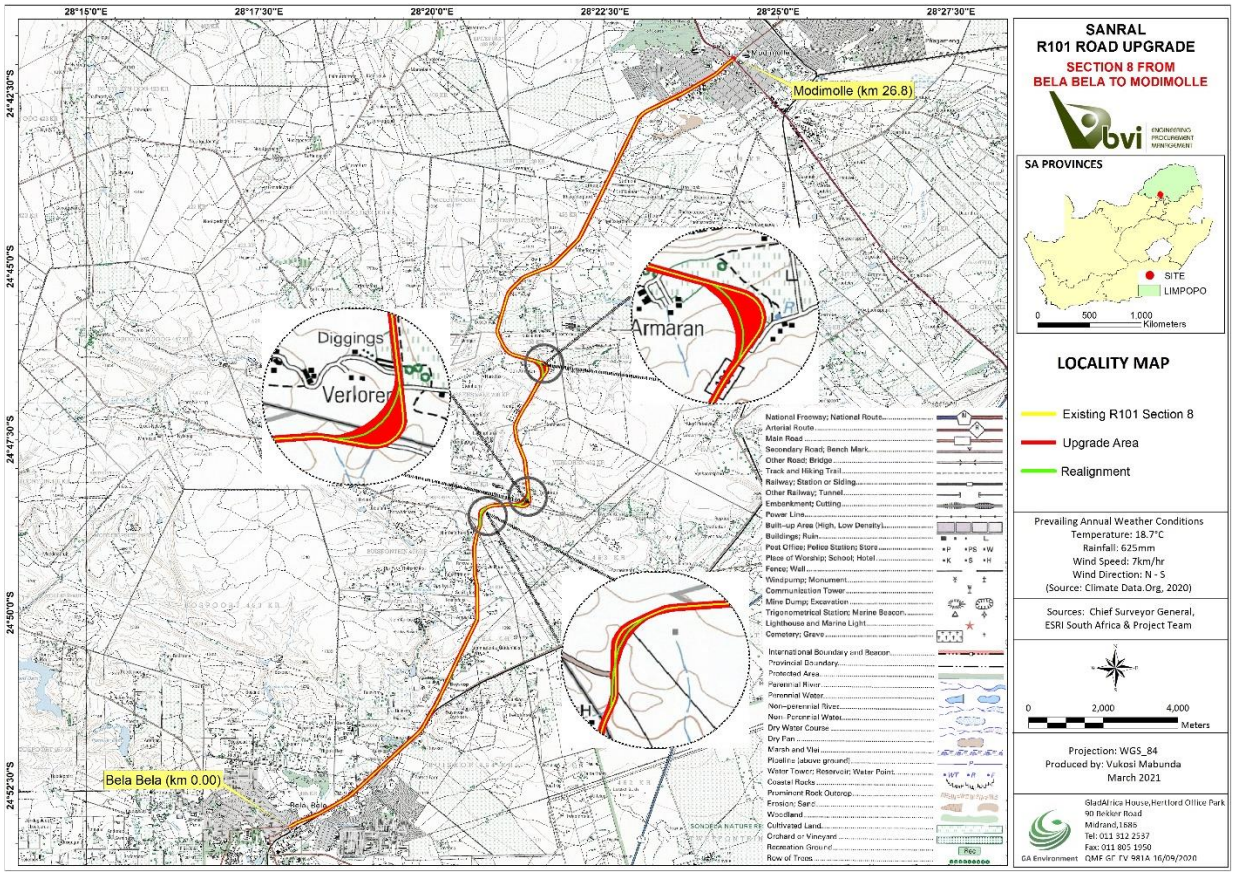

Figure 1: Locality Map

The road is approximately 27km long beginning in Bela Bela at the km 0.0 and ending in Modimolle at km 26.8 as indicated on the chainage map in **Figure 1**.

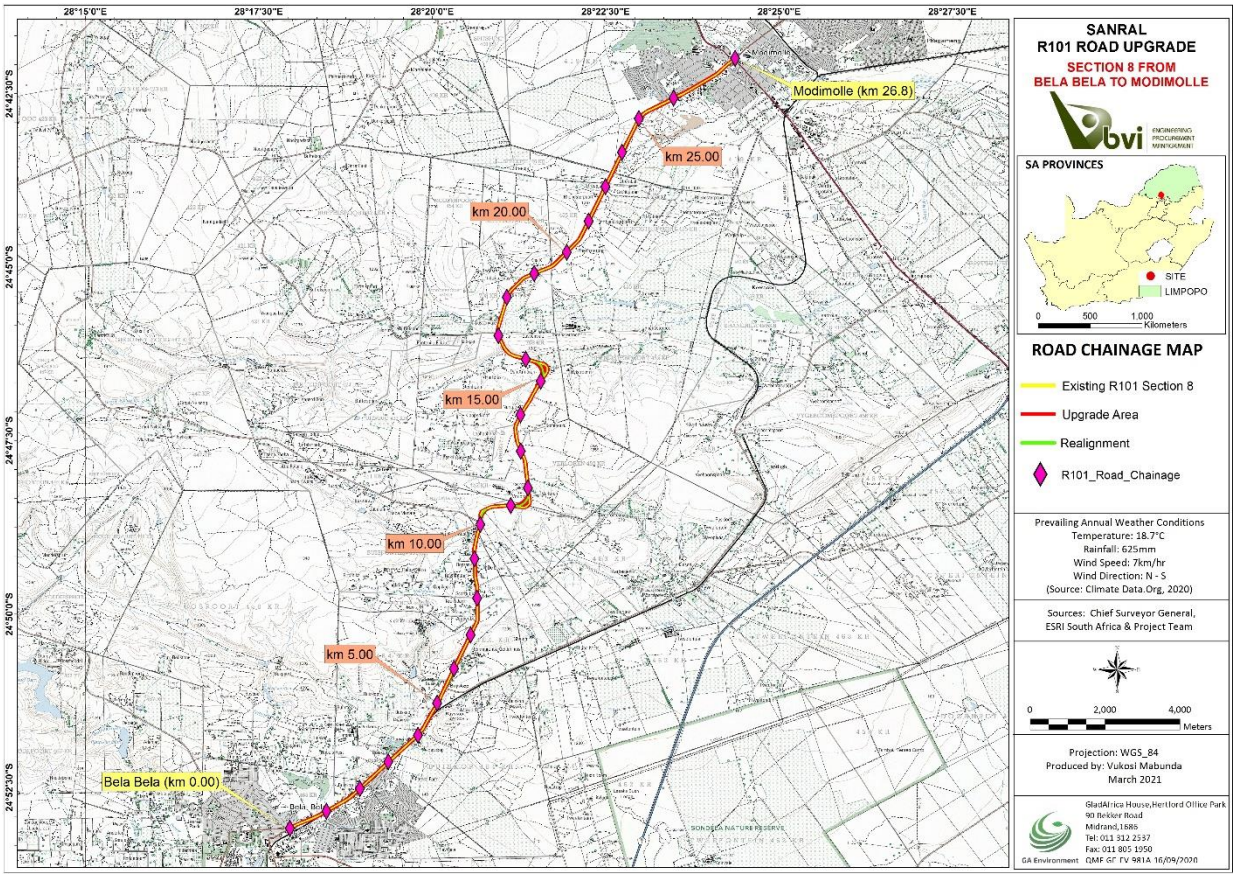

Figure 2: Road Chainage Map

Section 8 of national road R101 begins in the urban area of Bela Bela, traverses northwards through game and agricultural land and ends the urban area of Modimolle as indicated on **Figure 2**.

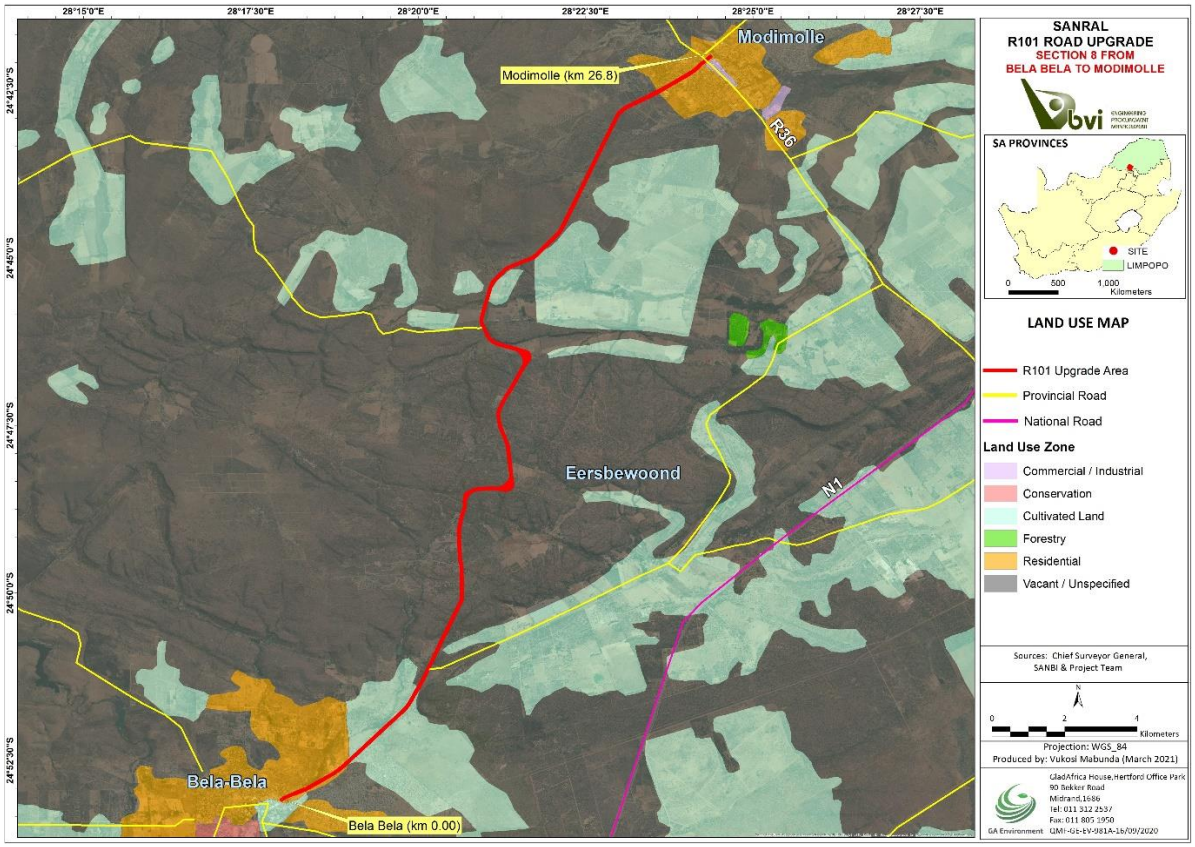

Figure 3: Map showing land uses in the area

The R101 Section 8 is situated within two Local Municipalities (Bela Bela and Modimolle) both situated within the Waterberg District Municipality in the Limpopo Province. Bela-Bela and Modimolle Local Municipalities are located in the south-eastern part of the district and are the least populated municipalities within the Waterberg District Municipality. According to the Waterberg District Municipality Environmental Management Framework (Waterberg EMF), the biggest contributors to employment in the Waterberg District are mining and quarrying, wholesale and retail trade, agriculture, hunting and fishing, as well as the manufacturing sectors, with the percentage representation of the different sectors being 6.5%, 5.5%, 4.6%, and 3.7% (https://screening.environment.gov.za/ScreeningDownloads/EMF/WDEMF_Final_EMF_Report.pdf).

In the context of the Waterberg EMF, mining, agriculture and the manufacturing sectors play an important role in the economy of the region, in improving livelihoods and sustaining the regional economy. Even more important is the contribution of these sectors to the Gross Geographic Production (GGP) of the region. This is critical to the project as the R101 Section 8 traverses through several cultivated land. BVi Engineers proposes to obtain material sources for the upgrade from the nearby borrow pit and/or quarry mining facilities which is one of the major economic activities in the area.

1.3 Potentially Affected Properties

The potentially affected list of properties have been separated into three parts for purposes of identifying the nature of the landowner within the study area. In order to effectively assess the

proposed road upgrade area, a corridor of 100m along the straight road and 600m along the realignment area was determined and assessed. The exaggerated corridor is effective in assessing the study area holistically, but also exaggerates the number of directly affected properties. As such, the total potentially affected properties for this road section are higher than the actual directly affected properties.

The first group of potentially affected properties include the properties within the realignment areas, bridge widening and servitude areas for the service road (a road parallel to a R101 Section 8 to allow local traffic to gain access to adjacent properties) with a total of twelve (12) privately owned properties. There are approximately eighty-four (84) potentially affected farm properties and approximately ninety-two (92) potentially affected erven properties. All landowners were contacted during the public participation in order to inform them about the proposal. A land acquisition process is currently underway. BVi Engineers together with SANRAL have had initial consultation meetings with the six directly affected property owners. **Table 2** provides details of the potentially affected properties.

Table 2: Potentially Affected Properties

Item No	Township/Farm Name	ERF No/Portion Number	SG Code	Registered Owner
Directly Affected Properties				
1	Tweefontein 463 KR	127	T0KR00000000046300127	Jan Benjamin Espach
2	Tweefontein 463 KR	151	T0KR00000000046300151	Mechlec Enterprises Pty Ltd
3	Tweefontein 463 KR	Re/71	T0KR00000000046300071	Gedeelte 71 Tweefontein Pty Ltd
4	Verloren 452 KR	Re/3	T0KR00000000045200003	Cheetah Conservation ZA Trust
5	Sussesvale 702 KR	45	T0KR00000000070800045	Paradise Sun Farming CC
6	Sussesvale 702 KR	46	T0KR00000000070800046	Andreas Opperman
7	Sussenvale 708 KR	26	T0KR00000000070800026	Louw Erasmus
8	Sussenvale 708 KR	32	T0KR00000000070800032	Potgieter Frederik/ Fred van Heerden
9	Buiskop 464 KR	Re/22	T0KR00000000046400022	Nosijeje Family Trust
10	Buiskop 464 KR	Re/34	T0KR00000000046400034	Nosijeje Family Trust
11	Buiskop 464 KR	35	T0KR00000000046400035	Nosijeje Family Trust
12	Buiskop 464 KR	125	T0KR00000000046400125	Nosijeje Family Trust
Potentially Affected Farm Properties				
1	Belabela 647 KR	2	T0KR00000000064700002	Bela Bela Municipality
2	Belabela 647 KR	3	T0KR00000000062700003	Bela Bela Municipality
3	Buisfontein 451 KR	15	T0KR00000000045100015	Nel Elizabeth Johanna Petronella
4	Buisfontein 451 KR	14	T0KR00000000045100014	Loodsoord Ontwikkelings CC
5	Buisfontein 451 KR	13	T0KR00000000045100013	Mr and Mrs Grobler
6	Buisfontein 451 KR	33	T0KR00000000045100033	Stano and Hendrik Schoeman
7	Buisfontein 451 KR	2	T0KR00000000045100002	Thaba Monate CC
8	Buisfontein 451 KR	11	T0KR00000000045100011	Themisi Psycho Maepa
9	Buisfontein 451 KR	35	T0KR00000000045100035	Jateuma Beleggings CC
10	Buisfontein 451 KR	20	T0KR00000000045100020	La Prevance Pty Ltd
11	Buiskop 464 KR	97	T0KR00000000046400097	Transnet Ltd
12	Buiskop 464 KR	101	T0KR00000000046400101	Transnet Ltd
13	Buiskop 464 KR	22	T0KR00000000046400022	Nosijeje Family Trust
14	Buiskop 464 KR	34	T0KR00000000046400034	Nosijeje Family Trust
15	Buiskop 464 KR	98	T0KR00000000046400098	Transnet Ltd

Item No	Township/Farm Name	ERF No/Portion Number	SG Code	Registered Owner
16	Buiskop 464 KR	109	T0KR00000000046400109	Transnet Ltd
17	Buiskop 464 KR	106	T0KR00000000046400106	Transnet Ltd
18	Buiskop 464 KR	105	T0KR00000000046400105	Transnet Ltd
19	Buiskop 464 KR	103	T0KR00000000046400103	Transnet Ltd
20	Buiskop 464 KR	102	T0KR00000000046400102	Transnet Ltd
21	Buiskop 464 KR	100	T0KR00000000046400100	Transnet Ltd
22	Buiskop 464 KR	17	T0KR00000000046400017	Mr and Mrs De Kock
23	Buiskop 464 KR	108	T0KR00000000046400108	Transnet Ltd
24	Buiskop 464 KR	138	T0KR00000000046400138	Wilma Heuer Trust
25	Buiskop 464 KR	139	T0KR00000000046400139	Chamile Trust
26	Buiskop 464 KR	21	T0KR00000000046400021	Nosijeje Family Trust
27	Buiskop 464 KR	126	T0KR00000000046400126	Not Found
28	Buiskop 464 KR	125	T0KR00000000046400125	Not Found
29	Buiskop 464 KR	62	T0KR00000000046400062	Rua-Naga Trust
30	Buiskop 464 KR	29	T0KR00000000046400029	Nederduitse Gereformeerde Kerk Van Transvaal-Pretoria
31	Buiskop 464 KR	99	T0KR00000000046400099	Transnet Ltd
32	Buiskop 464 KR	35	T0KR00000000046400035	Nosijeje Family Trust
33	Buiskop 464 KR	107	T0KR00000000046400107	Transnet Ltd
34	Buiskop 464 KR	104	T0KR00000000046400104	Transnet Ltd
35	Buiskop 464 KR	110	T0KR00000000046400110	Transnet Ltd
36	Buiskop 464 KR	48	T0LR00000000046400048	Rhino Pride Foundation Trust
37	Buiskop 464 KR	137	T0KR00000000046400137	Kwena Trust
38	Buiskop 464 KR	127	T0KR00000000046400127	Not Found
39	Buiskop 464 KR	14	T0KR00000000046400014	Bela Bela Municipality
40	Buiskop 464 KR	18	T0KR00000000046400018	Janine Jacqueline Dinkelmann
41	Buiskop 464 KR	94	T0KR00000000046400094	Inyanga Trading 444 Pty Ltd
42	Buiskop 464 KR	93	T0KR00000000046400093	Buiskop Landgoed CC
43	Buiskop 464 KR	43	T0KR00000000046400043	Starvest Eleven CC
44	Buiskop 464 KR	95	T0KR00000000046400095	Transnet Ltd
45	Buiskop 464 KR	96	T0KR00000000046400096	Transnet Ltd
46	Buiskop 464 KR	0	T0KR00000000046400000	Bela Bela Municipality
47	Buiskop 464 KR	212	T0KR00000000046400212	Toremar INV 145 CC
48	Buiskop 464 KR	213	T0KR00000000046400213	Toremar INV 145 CC
49	Buiskop 464 KR	199	T0KR00000000046400199	Toremar INV 145 CC
50	Buiskop 464 KR	198	T0KR00000000046400198	Toremar INV 145 CC
51	Cussonia 712 KR	0	T0KR00000000071200000	Cheetah Conservation ZA Trust
52	Het Bad 465 KR	56	T0KR00000000046500056	Bela Bela Municipality
53	Het Bad 465 KR	25	T0KR00000000046500025	Groter Warmbad Oorgangsraad
54	Het Bad 465 KR	2	T0KR00000000046500002	Transnet Ltd
55	Het Bad 465 KR	28	T0KR00000000046500028	Limpopo Provincial Government
56	Het Bad 465 KR	58	T0KR00000000046500058	Transnet Ltd
57	Het Bad 465 KR	30	T0KR00000000046500030	Transnet Ltd
58	Klein-Kariba 849 KR	0	T0KR00000000084900000	Afrikaanse Taal-En Kultuurvereniging M S W
59	Lapha Phanzi 715 KR	0	T0KR00000000071500000	Potsmitte Landgoed CC
60	Nylstroom Town and Townlands 419 KR	51	T0KR00000000031800051	Modimolle Municipality
61	Nylstroom Town and Townlands 419 KR	100	T0KR00000000041900100	Modimolle Municipality

Item No	Township/Farm Name	ERF No/Portion Number	SG Code	Registered Owner
62	Nylstroom Town and Townlands 419 KR	0	T0KR00000000041900000	Republic of South Africa. Farm subdivided into private properties
63	Nylstroom Town and Townlands 419 KR	121	T0KR00000000041900121	Farm subdivided into private properties
64	Nylstroom Town and Townlands 419 KR	74	T0KR00000000041900074	Abbacpm Construction & Cale CC
65	Nylstroom Town and Townlands 419 KR	116	T0KR00000000041900116	Limpopo Provincial Government
66	Nylstroom Town and Townlands 419 KR	106	T0KR00000000041900106	Limpopo Provincial Government
67	Nylstroom Town and Townlands 419 KR	113	T0KR00000000041900113	Limpopo Provincial Government
68	Nylstroom Town and Townlands 419 KR	104	T0KR00000000041900104	Limpopo Provincial Government
69	Nylstroom Town and Townlands 419 KR	25	T0KR00000000041900025	Limpopo Provincial Government
70	Nylstroom Town and Townlands 419 KR	53	T0KR00000000041900053	Limpopo Provincial Government
71	Nylstroom Town and Townlands 419 KR	2	T0KR00000000041900002	Modimolle Municipality
72	Nylstroom Town and Townlands 419 KR	208	T0KR00000000041900208	Farm subdivided into private properties
73	Nylstroom Town and Townlands 419 KR	164	T0KR00000000041900164	Farm subdivided into private properties
74	Rheno 455 KR	26	T0KR00000000045500026	Dr Andre Ebersohn Incorporated
75	Rheno 455 KR	10	T0KR00000000045500010	Jacobus Nicolaas Pretorius
76	Rheno 455 KR	4	T0KR00000000045500004	Sleepy Orange Trading CC
77	Rheno 455 KR	28	T0KR00000000045500028	Oorbegin Ontwikkelings Trust
78	Rheno 455 KR	27	T0KR00000000045500027	Ockert Stefanus Fourie
79	Rheno 455 KR	25	T0KR00000000045500025	Leonard Johannes Oberholzer
80	Rheno 455 KR	6	T0KR00000000045500006	Mr and Mrs Moleki
81	Rheno 455 KR	0	T0KR00000000041800000	Afriq Petroleum Pty Ltd
82	Streepje 420 KR	2	T0KR00000000042000002	Louis Daniel Pienaar
83	Streepje 420 KR	1	T0KR00000000042000001	Mr and Mrs Smith
84	Streepje 420 KR	0	T0KR00000000042000000	Mr and Mrs Fritz
Potentially Affected Erven Properties				
1	Modimolle	3838	T0KR00350000383800000	Modimolle Municipality
2	Modimolle	3839	T0KR00350000383900000	Modimolle Municipality
3	Modimolle	3840	T0KR00350000384000000	Modimolle Municipality
4	Modimolle	3841	T0KR00350000384100000	Modimolle Municipality
5	Modimolle	3842	T0KR00350000384200000	Modimolle Municipality
6	Modimolle	3843	T0KR00350000384300000	Modimolle Municipality
7	Modimolle	3844	T0KR00350000384400000	Modimolle Municipality
8	Modimolle	3845	T0KR00350000384500000	Modimolle Municipality
9	Modimolle	3846	T0KR00350000384600000	Modimolle Municipality
10	Modimolle	3847	T0KR00350000384700000	Modimolle Municipality
11	Modimolle	3848	T0KR00350000384800000	Modimolle Municipality
12	Modimolle	3849	T0KR00350000384900000	Modimolle Municipality
13	Modimolle	3850	T0KR00350000385000000	Modimolle Municipality
14	Modimolle	4121	T0KR00350000412100000	Modimolle Municipality

Item No	Township/Farm Name	ERF No/Portion Number	SG Code	Registered Owner
15	Modimolle	4122	T0KR00350000412200000	Modimolle Municipality
16	Modimolle	4123	T0KR00350000412300000	Modimolle Municipality
17	Modimolle	4124	T0KR00350000412400000	Modimolle Municipality
18	Modimolle	4125	T0KR00350000412500000	Modimolle Municipality
19	Modimolle	4126	T0KR00350000412600000	Modimolle Municipality
20	Modimolle	4127	T0KR00350000412700000	Modimolle Municipality
21	Modimolle	4128	T0KR00350000412800000	Modimolle Municipality
22	Modimolle	4129	T0KR00350000412900000	Modimolle Municipality
23	Modimolle	4130	T0KR00350000413000000	Modimolle Municipality
24	Modimolle	4182	T0KR00350000418200000	Modimolle Municipality
25	Modimolle	4183	T0KR00350000418300000	Modimolle Municipality
26	Modimolle	4184	T0KR00350000418400000	Modimolle Municipality
27	Modimolle	4185	T0KR00350000418500000	Modimolle Municipality
28	Modimolle	4186	T0KR00350000418600000	Modimolle Municipality
29	Modimolle	4187	T0KR00350000418700000	Modimolle Municipality
30	Modimolle	4188	T0KR00350000418800000	Modimolle Municipality
31	Modimolle	4189	T0KR00350000418900000	Modimolle Municipality
32	Modimolle	4190	T0KR00350000419000000	Modimolle Municipality
33	Modimolle	4191	T0KR00350000419100000	Modimolle Municipality
34	Modimolle	4192	T0KR00350000419200000	Modimolle Municipality
35	Modimolle	4193	T0KR00350000419300000	Modimolle Municipality
36	Modimolle	4194	T0KR00350000419400000	Modimolle Municipality
37	Modimolle	4195	T0KR00350000419500000	Modimolle Municipality
38	Modimolle	4196	T0KR00350000419600000	Modimolle Municipality
39	Modimolle	4197	T0KR00350000419700000	Modimolle Municipality
40	Modimolle	4198	T0KR00350000419800000	Modimolle Municipality
41	Modimolle	4199	T0KR00350000419900000	Modimolle Municipality
42	Modimolle	4200	T0KR00350000420000000	Modimolle Municipality
43	Modimolle	4202	T0KR00350000420200000	Modimolle Municipality
44	Modimolle	4319	T0KR00350000431900000	Modimolle Municipality
45	Modimolle	3838	T0KR00350000383800000	Modimolle Municipality
46	Modimolle	3839	T0KR00350000383900000	Modimolle Municipality
47	Modimolle	3840	T0KR00350000384000000	Modimolle Municipality
48	Modimolle	3841	T0KR00350000384100000	Modimolle Municipality
49	Modimolle	3842	T0KR00350000384200000	Modimolle Municipality
50	Modimolle	3843	T0KR00350000384300000	Modimolle Municipality
51	Modimolle	3844	T0KR00350000384400000	Modimolle Municipality
52	Modimolle	3845	T0KR00350000384500000	Modimolle Municipality
53	Modimolle	3846	T0KR00350000384600000	Modimolle Municipality
54	Modimolle	3847	T0KR00350000384700000	Modimolle Municipality
55	Modimolle	3848	T0KR00350000384800000	Modimolle Municipality
56	Modimolle	3849	T0KR00350000384900000	Modimolle Municipality
57	Modimolle	3850	T0KR00350000385000000	Modimolle Municipality
58	Modimolle	4121	T0KR00350000412100000	Modimolle Municipality
59	Modimolle	4122	T0KR00350000412200000	Modimolle Municipality
60	Modimolle	4123	T0KR00350000412300000	Modimolle Municipality
61	Modimolle	4124	T0KR00350000412400000	Modimolle Municipality
62	Modimolle	4125	T0KR00350000412500000	Modimolle Municipality
63	Modimolle	4126	T0KR00350000412600000	Modimolle Municipality
64	Modimolle	4127	T0KR00350000412700000	Modimolle Municipality
65	Modimolle	4128	T0KR00350000412800000	Modimolle Municipality
66	Modimolle	4129	T0KR00350000412900000	Modimolle Municipality

Item No	Township/Farm Name	ERF No/Portion Number	SG Code	Registered Owner
67	Modimolle	4130	T0KR00350000413000000	Modimolle Municipality
68	Modimolle	4182	T0KR00350000418200000	Modimolle Municipality
69	Modimolle	4183	T0KR00350000418300000	Modimolle Municipality
70	Modimolle	4184	T0KR00350000418400000	Modimolle Municipality
71	Modimolle	4185	T0KR00350000418500000	Modimolle Municipality
72	Modimolle	4186	T0KR00350000418600000	Modimolle Municipality
73	Modimolle	4187	T0KR00350000418700000	Modimolle Municipality
74	Modimolle	4188	T0KR00350000418800000	Modimolle Municipality
75	Modimolle	4189	T0KR00350000418900000	Modimolle Municipality
76	Modimolle	4190	T0KR00350000419000000	Modimolle Municipality
77	Modimolle	4191	T0KR00350000419100000	Modimolle Municipality
78	Modimolle	4192	T0KR00350000419200000	Modimolle Municipality
79	Modimolle	4193	T0KR00350000419300000	Modimolle Municipality
80	Modimolle	4194	T0KR00350000419400000	Modimolle Municipality
81	Modimolle	4195	T0KR00350000419500000	Modimolle Municipality
82	Modimolle	4196	T0KR00350000419600000	Modimolle Municipality
83	Modimolle	4197	T0KR00350000419700000	Modimolle Municipality
84	Modimolle	4198	T0KR00350000419800000	Modimolle Municipality
85	Modimolle	4199	T0KR00350000419900000	Modimolle Municipality
86	Nylstroom	1/155	T0KR00040000015500001	Ismini Christoforides
87	Nylstroom	RE/156	T0KR00040000015600000	Ismini Christoforides
88	Nylstroom	2/157	T0KR00040000015700002	Modimolle Municipality
89	Nylstroom	1/157	T0KR00040000015700001	Hentja Beleggings CC
90	Nylstroom	4/166	T0KR00040000016600004	Maxicamp CC
91	Nylstroom	RE/166	T0KR00040000016600000	Ludwig Field Arme Fonds
92	Nylstroom	RE/167	T0KR00040000016700000	Nederduitsch Hervormde Kerk Van Afrika - Waterberg
93	Nylstroom	4/167	T0KR00040000016700004	Skymax Prop Trust
94	Nylstroom	19/167	T0KR00040000016700019	Wedsar Pty Ltd
95	Nylstroom	18/167	T0KR00040000016700018	Avante Beleggings
96	Nylstroom	RE/192	T0KR00040000019200000	Nylmed Pty Ltd
97	Nylstroom	201	T0KR00040000020100000	NG Kerk Waterberg
98	Nylstroom	395	T0KR00040000039500000	NG Kerk Waterberg
99	Nylstroom	1/396	T0KR00040000039600001	NG Kerk Waterberg
100	Nylstroom	RE/396	T0KR00040000039600000	Modimolle Municipality
101	Nylstroom	RE/1/519	T0KR00040000051900001	Roos Frans
102	Nylstroom	RE/519	T0KR00040000051900000	George Frederik Theodores Pistorius
103	Nylstroom	RE/521	T0KR00040000052100000	Mr and Mrs Cawood
104	Nylstroom	1/521	T0KR00040000052100001	No Information
105	Nylstroom	RE/1/523	T0KR00040000052300001	Strydomstraat 26a Pty Ltd
106	Nylstroom	RE/523	T0KR00040000052300000	Jan LouisCampher
107	Nylstroom	2/527	T0KR00040000052700002	No Information
108	Nylstroom	3/527	T0KR00040000052700003	No Information
109	Nylstroom	RE/527	T0KR00040000052700000	Glen Maritz
110	Nylstroom	529	T0KR00040000052900000	Anna Johanna Niewenhuis
111	Nylstroom	1/531	T0KR00040000053100001	Wendy Buitendag
112	Nylstroom	RE/531	T0KR00040000053100000	Willem Frederik Du Toit
113	Nylstroom	1/535	T0KR00040000053500001	Bezuidenhout Family Trust
114	Nylstroom	3/535	T0KR00040000053500003	Bezuidenhout Family Trust
115	Nylstroom	2/535	T0KR00040000053500002	Bezuidenhout Family Trust

Item No	Township/Farm Name	ERF No/Portion Number	SG Code	Registered Owner
116	Nylstroom	RE/535	T0KR00040000053500000	Elizabeth Magdalena Jansen Kotze
117	Nylstroom	538	T0KR00040000053800000	Maryna Adriana Grobler
118	Nylstroom	RE/2/540	T0KR00040000054000002	Frederik Johannes Botes
119	Nylstroom	4/540	T0KR00040000054000004	Frederik Johannes Botes
120	Nylstroom	RE/540	T0KR00040000054000000	Elsje Du Plessis
121	Nylstroom	2/542	T0KR00040000054200002	Marthinus Stephanus Bothma
122	Nylstroom	1/542	T0KR00040000054200001	Anna Magdelena Adendorff
123	Nylstroom	RE/542	T0KR00040000054200000	Gabriel Ernst Bosch
124	Nylstroom	2/544	T0KR00040000054400002	Le Roux Family
125	Nylstroom	RE/544	T0KR00040000054400000	Le Roux Family
126	Nylstroom	548	T0KR00040000054800000	Limpopo Provincial Government
127	Nylstroom	RE/620	T0KR00040000062000000	Gideon Ferreira
128	Nylstroom	1014	T0KR00040000101400000	Lukas Johannes Groenewald
129	Nylstroom	1022	T0KR00040000102200000	Catharina Maria Dreyer
130	Nylstroom	1023	T0KR00040000102300000	Mr and Mrs Heyns
131	Nylstroom	1024	T0KR00040000102400000	Van Der Walt Trust
132	Nylstroom	1025	T0KR00040000102500000	Nicolaas Petrus Van Der Merwe
133	Nylstroom	1026	T0KR00040000102600000	Mr and Mrs Vermaak
134	Nylstroom	1027	T0KR00040000102700000	Arthur Paul Degroof
135	Nylstroom	1028	T0KR00040000102800000	Natasha Nel Briel
136	Nylstroom	1029	T0KR00040000102900000	Isak Johannes Enslin
137	Nylstroom	1030	T0KR00040000103000000	Samajamari Trust
138	Nylstroom	1031	T0KR00040000103100000	Dorethea Johanna Le Roux
139	Nylstroom	1032	T0KR00040000103200000	Willem Jacobus Fourie
140	Nylstroom	1038	T0KR00040000103800000	Modimolle Municipality
141	Nylstroom	1060	T0KR00040000106000000	Limpopo Provincial Government
142	Nylstroom	1061	T0KR00040000106100000	Limpopo Provincial Government
143	Nylstroom	1062	T0KR00040000106200000	Limpopo Provincial Government
144	Nylstroom	1124	T0KR00040000112400000	No Information
145	Nylstroom	1512	T0KR00040000151200000	Jacobus Abel Johannes Hoffmann
146	Nylstroom	1513	T0KR00040000151300000	Mr and Mrs Knoetze
147	Nylstroom	1514	T0KR00040000151400000	Petrus Johannes Schoeman
148	Nylstroom	1515	T0KR00040000151500000	Elsa Esterhuizen
149	Nylstroom	1516	T0KR00040000151600000	Mr and Mrs Botha
150	Nylstroom	1517	T0KR00040000151700000	Gideon Lourens Grobbelaar
116	Nylstroom	1556	T0KR00040000155600000	Johannes Stephanus Stoffberg
117	Nylstroom	1557	T0KR00040000155700000	Pieter Hein Vermaak
118	Nylstroom	RE/1650	T0KR00040000165000000	No Information
119	Nylstroom	2/1650	T0KR00040000165000002	No Information
120	Nylstroom	4/1650	T0KR00040000165000004	No Information
121	Nylstroom	2394	T0KR00040000239400000	No Information
122	Nylstroom	2/2816	T0KR00040000281600002	No Information
123	Nylstroom	1/2816	T0KR00040000281600001	No Information
124	Nylstroom	RE/2816	T0KR00040000281600000	No Information
125	Nylstroom	RE/2891	T0KR00040000289100000	No Information

Item No	Township/Farm Name	ERF No/Portion Number	SG Code	Registered Owner
126	Nylstroom	16/2961	T0KR00040000296100016	No Information
127	Nylstroom	20/2961	T0KR00040000296100020	No Information
128	Nylstroom	17/2961	T0KR00040000296100017	No Information
129	Nylstroom	18/2961	T0KR00040000296100018	No Information
130	Nylstroom	19/2961	T0KR00040000296100019	No Information
131	Nylstroom	143/2961	T0KR00040000296100143	No Information
132	Nylstroom	21/2961	T0KR00040000296100021	No Information
133	Nylstroom	22/2961	T0KR00040000296100022	No Information
134	Nylstroom	23/2961	T0KR00040000296100023	No Information
135	Nylstroom	24/2961	T0KR00040000296100024	No Information
136	Nylstroom	73/2961	T0KR00040000296100073	No Information
137	Nylstroom	74/2961	T0KR00040000296100074	No Information
138	Nylstroom	75/2961	T0KR00040000296100075	No Information
139	Nylstroom	76/2961	T0KR00040000296100076	No Information
140	Nylstroom	77/2961	T0KR00040000296100077	No Information
141	Nylstroom	78/2961	T0KR00040000296100078	No Information
142	Nylstroom	79/2961	T0KR00040000296100079	No Information
143	Nylstroom	80/2961	T0KR00040000296100080	No Information
144	Nylstroom	81/2961	T0KR00040000296100081	No Information
145	Nylstroom	82/2961	T0KR00040000296100082	No Information
146	Nylstroom	140/2961	T0KR00040000296100140	No Information
147	Nylstroom	2974	T0KR00040000297400000	No Information
148	Nylstroom	3083	T0KR00040000308300000	No Information
149	Nylstroom	1/155	T0KR00040000015500001	Ismini Christoforides
150	Nylstroom	RE/156	T0KR00040000015600000	Ismini Christoforides
151	Nylstroom	2/157	T0KR00040000015700002	Modimolle Municipality
152	Nylstroom	1/157	T0KR00040000015700001	Hentja Beleggings CC
153	Nylstroom	4/166	T0KR00040000016600004	Maxicamp CC
154	Nylstroom	RE/166	T0KR00040000016600000	Ludwig Field Arme Fonds
155	Nylstroom	RE/167	T0KR00040000016700000	Nederduitsch Hervormde Kerk Van Afrika - Waterberg
156	Nylstroom	4/167	T0KR00040000016700004	Skymax Prop Trust
157	Nylstroom	19/167	T0KR00040000016700019	Wedsar Pty Ltd
158	Royal Northland	9	T0KR00200000000900000	Masa Group Pty Ltd
159	Royal Northland	10	T0KR00200000001000000	Masa Group Pty Ltd
160	Royal Northland	11	T0KR00200000001100000	Masa Group Pty Ltd
161	Warmbaths	655	T0KR00090000065500000	Bela Bela Municipality
162	Warmbaths	699	T0KR00090000069900007	Shell Downstream South Africa Pty Ltd
163	Warmbaths	713	T0KR00090000071300000	No Information
164	Warmbaths	1147	T0KR00090000114700000	No Information
165	Warmbaths	1174	T0KR00090000117400000	No Information
166	Warmbaths	1175	T0KR00090000117500000	No Information
167	Warmbaths	655	T0KR00090000065500000	Bela Bela Municipality

These details of all affected Interested and Affected are also attached in **Appendix E4.**

1.4 Existing Environmental Authorisations

There is currently no existing environmental authorisation for the National Road Section 8. Details regarding the triggered activities for the present EA process are provided in **Section 1.6**.

1.5 Project Description

GA Environment (Pty) Ltd has been appointed by BVi Consulting Engineers Western Cape (Pty) Ltd ("BVi Engineers" hereafter) on behalf of The South African National Roads Agency SOC Ltd (SANRAL) to undertake an Environmental Impact Assessment process through a Basic Assessment and Water Use License Authorisation for all activities associated with the upgrade of the National Road R101 Section 8 from Bela Bela (km 0.0) to Modimolle (km 26.8) situated within the Waterberg District Municipality in Limpopo Province.

The National Road, R101 Section 8 is situated within two Local Municipalities (Bela Bela and Modimolle) both located within the Waterberg District Municipality, Limpopo Province. The project starts in Bela Bela at the intersection of the R101 and Voortrekker Road (km 0.0) and ends at Modimolle at the intersection of the R101 and the R33. The road will start at coordinates 24°53'5.16"S and 28°17'56.88"E and will end at coordinates 24°42'0.33"S and 28°24'21.10"E. The R101- Section 8 consists of a two-lane, single carriageway road with gravel shoulders along most of the route. The road has an average surfaced width of 7.0 m. Within Modimolle, the road widens to four lanes with parking bays and sidewalks in the central business district (CBD). According to the pavement management system (PMS) information, the road was constructed in 1964 as National Road N1 joining Pretoria and Polokwane.

The general objective of this project is to successfully and optimally upgrade the National Road R101 Section 8 from Bela Bela (km 0.0) to Modimolle (km 26.8). The broad goals of the road upgrade are to relieve traffic congestion to an acceptable level of service; improve road geometry and road safety; reconstruct bridges and other structures, where required, for hydraulic and traffic capacity improvement; and provide adequate pavement capacity for the design period.

Construction material will be required for the proposed upgrade of Road R101 (Bela Bela to Modimolle). Material sources cannot be exploited without authorisations from the Department of Mineral Resources and Energy (DMR). However, the Applicant intends to obtain the required construction material from commercial material sources located in closer proximity to the road upgrade, which have already been exploited for a nearby road upgrade project where SANRAL is the project proponent.

The proposed road upgrade will traverse various private and state-owned properties. It is important to note that a land acquisition process is already underway and all potentially affected landowners have be contacted by BVi Engineers and GA Environment. At least six farm portions will be affected by the realignment, two private properties will be affected by bridge widening, four private properties will be affected by servitude acquisition and one property affected by temporary deviation. About one hundred (100) farm properties, as well as one hundred and fifty (150) erven properties have been identified as affected properties within the extended study area or road corridor.

1.5.1 Route Description

The National Road R101 Section 8 (R101-8) is approximately 27km long road extending between Bela Bela and Modimolle. R101-8 consists of a two lane, single carriageway road with gravel shoulders

along most of the route. The road has an average surfaced width of 7.0 m. Climbing/passing lanes are provided from km 6.2 to km 7.5 and km 14.4 to km 15.7. Road R101-8 has an average road reserve width of approximately 35 meters and an average traffic flow speed of 100km/hr. In both Bela Bela and Modimolle, the road widens to a four lane undivided single carriageway. Road R101-8 falls within the interurban collector and rural roads category and can therefore be classified as a Category B Road. This road category is seen as strategically important and is expected to deliver a good Level of Service to its users. The proposed road upgrade is categorized into three (3) sections:

a. Bela Bela Urban Section:
    - Bela Bela (km 0.0) to Klein Kariba (km 5.5).
    - Proposed upgrade will include 4 x 3.5m wide lanes, 2.5 kerbed median and sidewalks.
b. Rural Section:
    - Klein Kariba (km 5.5) to Modimolle entrance (km 24).
    - Proposed upgrade will include a 2 x 3.7m wide lanes, 3m wide surfaced shoulders and climbing/bypass lanes where warranted.
c. Modimolle Urban Section:
    - Modimolle (km 24) to limit of contract (km 26.8).
    - Proposed upgrade will include 4 x 3.5 m wide lanes, 2.5m kerbed median, sidewalks and parallel parking.

According to the Final Preliminary Design Report (FPDR), there are three possible route designs as part of the proposed upgrade. The route designs follow the same path as per the three sections discussed above. The only difference between these routes is along the realignment areas (sharp curves) and is based on maximum permissible speeds. The detailed route description and illustration is provided in **Section 1.5.5** of this report.

The existing route also traverses through two bridges (Modderloop and Groot Nyl River), three major culverts and fifty-five minor culverts. The proposed upgrade intends to demolish and replace the bridges and major culverts while also repairing and upgrading the minor culverts. Detailed information regarding the bridges and culverts is provided in **Section 1.5.4** of this report.

1.5.2 Intersections

According to the PDR, National Road R101 Section 8 can be classified as a Class 2 rural major arterial (km 0.00 to km 25.76) and a Class 4a collector street (km 25.76 to km 26.80). The minimum allowable intersection and access spacing is dependent on the development environment, road classification and type of intersection control. All intersections/accesses were also evaluated in terms of sight distances and access spacing. The urban (town) sections were assessed in terms of Gap Acceptance Sight Distance and the rural sections were assessed in terms of Shoulder Sight Distance. Based on the sight distances and access spacing, the intersections/accesses were then categorized as either “retain”, “re-align/relocate” or “close” as indicated on **Table 3** which provides a summary of the findings.

Table 3: Access management plan

Symbol	Future Status	Motivation	No. of Access	% Contribution
	Retain: Formalise bell mouths and add edge beams	Sight distance and/or spacing sufficient.	66	53
	Re-align/relocate	Staggered intersection	10	8
	To be closed	Accesses deserted, not permitted or closed due to insufficient spacing.	48	39
		TOTAL	124	100

The proposed plan as per the PDR is that all affected accesses that need to be consolidated or closed have to be communicated with the affected property owners. A meeting with Municipalities will also be arranged by SANRAL as part of Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA) to present and consider their input regarding the access management plan and project scope works in general.

1.5.3 Non-Motorised

Non-motorised transport (NMT) can be defined as those transport modes that are powered by non-mechanical means, including walking, animal-power and cycling, as well as variants such as small wheeled transport (skates, skateboards, push scooters and hand carts) and wheelchair travel. The following NMT infrastructure within the urban sections is proposed for the project:

- Walkways on one or both sides of the road in the urban sections;
- The NMT infrastructure shall be designed in manner that accommodates for a shared pedestrian bicycle facility;
- Pedestrian crossings at the signalised intersections; and
- High visibility signage's with appropriate speed limits.

In order to enhance nigh time visibility and safety, the proposed roads will include street lighting. Road studs are also proposed throughout the project in order to provide guidance to motorists regarding the road alignment during low visibility scenarios.

1.5.4 Storm water Drainage and Bridge Structures

Drainage along Road R101-8 is effected through culverts and bridges. The proposed road upgrade intends to replace bridges and other structures where required for hydraulic and traffic capacity improvement and provide adequate pavement capacity for the design period. The riparian area of the Bad se Loop, Klein Kariba and Groot Nyl Rivier forms part of the study area and impacts on the rivers are anticipated during the replacement of the bridges and major culverts.

In order to ensure that stormwater is accommodated, and adequate drainage is allowed, BVi Consulting Engineers undertook a hydrological and hydraulic analysis. Basic hydrological parameters as per the SANRAL drainage manual was used in determining flood peaks for the lesser culverts and the major structures. The design flood peaks were calculated for each structure, based on the guidelines in the *South African Road Drainage Manual*. **Figure 4** below shows the locations of the bridges and major culverts.

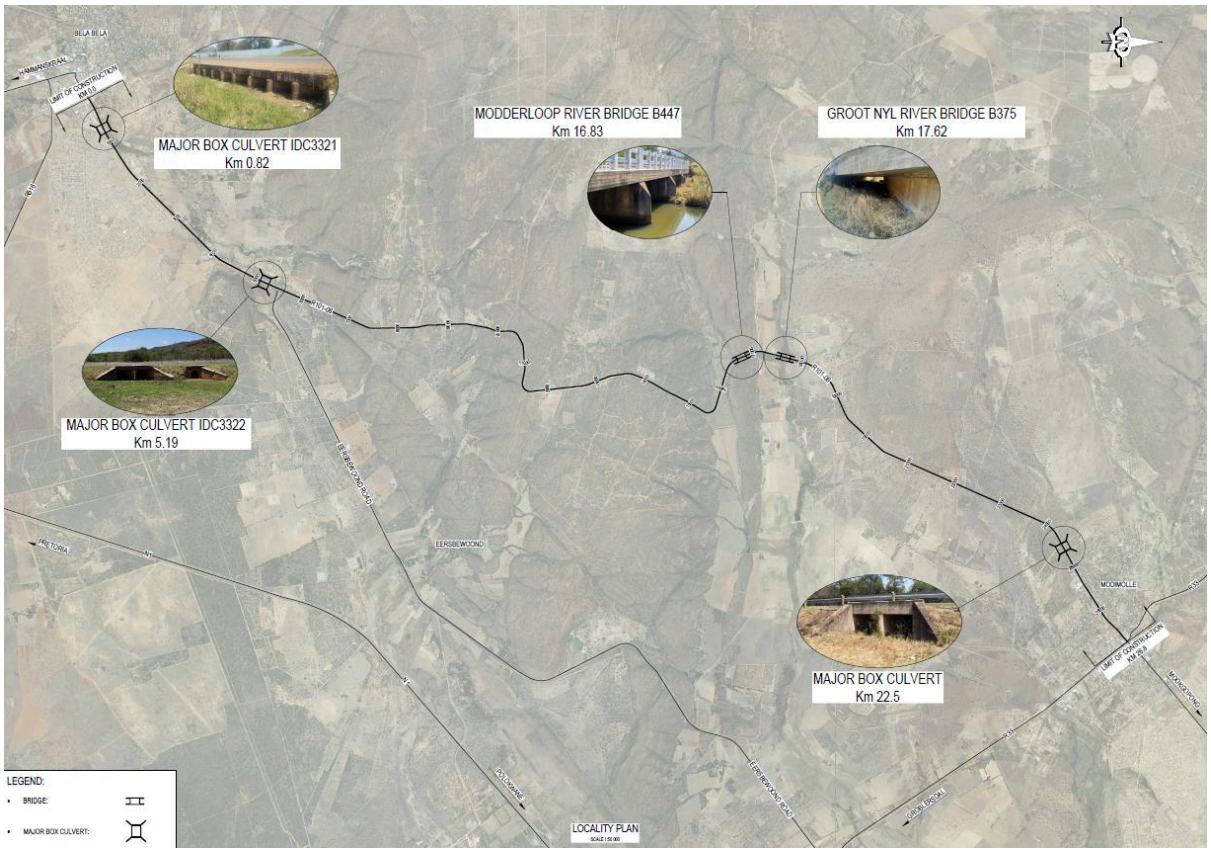

Figure 4: Hydraulic upgrade locations (BVi Consulting Engineers, 2020)

a) Upgrade of bridges

Based on the hydrological analysis, both the Modderloop and Groot Nyl River Bridges will have to be replaced. The bridges are located at 24°46'04.34"S; 28°20'59.74"E and 24°45'40.30"S; 28°21'00.58"E respectively. The bridges are Class 3 Road bridges and were constructed in 1936, widened and extended in 1966. The full description, status quo and proposed upgrades of the bridges is represented in **Table 4**.

Table 4: Proposed stormwater upgrade - Bridges

Aspect	Modderloop Bridge	Groot Nyl River Bridge
Bridge Number	B375	B447
Location	• R101-Section 8 km 16.83 • 24°46'04.34"S; 28°20'59.74"E	• R101-Section 8 km 17.62 • 24°45'40.30"S; 28°21'00.58"E

Aspect	Modderloop Bridge	Groot Nyl River Bridge
Existing Structures/Conditions	• Bridge constructed in 1936; • Class 3 Road; • Flood lines (Qr): o 1:20 Year: 182.05m^3/s o 1:40 Year: 242.22m^3/s • 5 x 12.75 m simply supported solid concrete spans; • Two lane single carriageway with shoulders; • 3.7m wide lanes; • 2.4m wide shoulders; • 0.99m concrete barrier; • 12 200m wide bridge; • Approximately 99.49m^2 footprint; and • Has an average road reserve of 35m.	• Bridge constructed in 1936, widened and extended in 1966; • Class 3 Road; • Flood lines (Qr): o 1:14.5 Year: 64.46m^3/s o 1:29 Year: 90.39m^3/s • 3 x 6.7 m simply supported solid concrete spans; • Two lane single carriageway with shoulders; • 3.7m wide lanes; • 2.4m wide shoulders; • 1m concrete barrier; • 12 200m wide bridge; • Approximately 85m^2 footprint. • Has an average road reserve of 35m.
Proposed upgrade	• Demolish and replace with fully integrated 3x12m span reinforced concrete flat slab supported on wall type abutments and piers; • Class 2 Road; • Flood lines (Qr): o 1:50 Year: 272.3m^3/s o 1:100 Year: 348.67m^3/s • Two lane single carriageway with shoulders; • 3.7m wide lanes; • 3.0m wide shoulders; • Replace concrete barriers with 1.22m F-Shape Type A in-situ parapets; • Widening the bridge by 1m on both edges; • 13 400m wide bridge; • Maintaining the current bridge length; • Raising the deck of the bridge by at least 1.1m; and • Additional infill will be required.	• Demolish and replace with fully integrated 4x12m span reinforced concrete flat slab supported on wall type abutments and piers; • Class 2 Road; • Flood lines (Qr): o 1:35 Year: 96.25m^3/s o 1:67 Year: 128.92m^3/s • Two lane single carriageway with shoulders; • 3.7m wide lanes; • 3.0m wide shoulders; • Replace concrete barriers with 1.22m F-Shape Type A in-situ parapets; • Widening the bridge by 1m on both edges; • 13 400m wide bridge; • Maintaining the current bridge; • Raising the deck of the bridge by at least 1.7m; • Infill of +- 8400m^2

The following information pertains to the Modderloop Bridge. The Drainage Manual 6th Edition as indicated in the PDR, states that the clearing of siltation to increase the hydraulic capacity of an existing structure is not recommended, therefore Option 1 is not recommended. Option 2 was the preliminary preferred option as it is the most cost-effective solution to bring the existing structure up to current standards. Option 3 does not address the ageing structures and therefore not recommended. According to information obtained from BVi Engineers the Modderloop Bridge will be demolished and a new bridge will be constructed to address the issue of ageing structures and substantially implement the proposed upgrades indicated in **Table 4**.

As indicated in the PDR, the *Drainage Manual 6th Edition* states that the clearing of siltation to increase the hydraulic capacity of an existing structure is not recommended, therefore for the Groot Nyl River Bridge, Option 1 is not recommended. The *SANRAL* Code of Procedure for the Planning and

Design of Highway and Road Structures in South Africa states in Section 1.3.2 (ii) that, if the cost of remedial works exceeds approximately 67% of the cost of reconstructing the structure, consideration should be given to effecting the latter option. The minimum estimated cost of remedial work is 69% of the estimated structure replacement cost for this structure. The original structure was constructed in 1936 and approaching the end of its original design-life, while also having been widened and extended in 1966. Taking all of this into consideration, **Option 4** is the preliminary preferred option for Groot Nyl River. BVi Engineers have indicated that Option 4 will be implemented for the proposed upgrades.

b) Upgrade of major culverts

Based on the hydrological analysis, the three major box culverts will also be replaced. The major culverts are located at R101-Section 8 km 0.82, km 5.19 km 22.5 respectively. The culverts provide access to tributaries at the various locations. The full description, status quo and proposed upgrades of the major culverts is represented in **Table 5**.

Table 5: Proposed stormwater upgrade - Bridges

Aspect	Major Box Culvert 1 - IDC 3321	Major Box Culvert 2 - IDC 3322	Major Box Culvert 3 – km 22.5
Culvert Number	• IDC 3321	• IDC 3322	• Nil
Location	• R101-Section 8 km 0.82	• R101-Section 8 km 5.19	• R101-Section 8 km 22.5
Existing Structures/ Conditions	• The culvert provides access across a tributary system situated at km 0.82. • The structure consists of: • in-situ portal frame culvert with 9 cells propped cantilever walls; and continuous top slab. • Each cell has an internal width of 900mm and internal height of 600mm; • The culvert has an overall length of 13m and overall width of 12.4m. • Identified defects: • Damaged wing walls; • Spalling to internal walls and top slab; and • No guardrails. • Hydraulic analysis show that the existing culvert has insufficient drainage capacity, and there is a risk of scour occurring	• The culvert provides access across a tributary system situated at km 5.19. • The structure consists of: • In-situ portal frame with 2 cells and a pipe culvert propped cantilever walls; and top slab. • Each cell has an internal width of 1.4m and internal height of 1.2m; • The pipe culvert having an internal diameter of 0.9m; • The culvert has an overall length of 5.4m and overall width of 17m. • Identified defects: • Severely damaged wing walls; and • Spalling to internal walls and top slab. • Hydraulic analysis show that the existing culvert has insufficient drainage capacity, and there is a risk of scour occurring	• The culvert provides access across a tributary system situated at km 22.5. • The structure consists of: • In-situ portal frame culvert with 2 cells propped cantilever walls and Continuous top slab. • Each cell has an internal width of 1.9m and internal height of 1.2m; • The culvert has an overall length of 17m. • Identified defects: • Severely damaged wing walls; • Spalling to internal walls; • Scour behind wing walls and evidence of overtopping; and • No number plates. • Hydraulic analysis show that the existing culvert has insufficient drainage capacity, and there is a risk of scour occurring
Proposed upgrade	• Demolish and replaced by a new major culvert of a suitable size to	• Demolish and replaced by a new major culvert of a suitable size to	• Demolish and replaced by a new major culvert of a suitable size to

Aspect	Major Box Culvert 1 - IDC 3321	Major Box Culvert 2 - IDC 3322	Major Box Culvert 3 – km 22.5
	accommodate the peak design flood; • New Cast In-Situ Box culvert; • 5 cells of 3.5 x 1.2 m high; • Overall cell length of 25.2m; • Overall culvert width of 33.2m; • Estimated cost of R4.8 million.	accommodate the peak design flood; • Box and pipe culvert; • 4 cells of 3.5 x 1.2 m high; • Overall cell length of 20.2m; • Overall culvert width of 33.68m; • Estimated cost of R4.0 million.	accommodate the peak design flood; • Box culvert; • 3 cells of 3.0 x 1.8 m high; • Overall cell length of 16.1m; • Overall culvert width of 10.4m; • Estimated cost of R2.2 million.

c) Minor Culverts

A total of 55 existing minor culverts are located along this road section. Majority of the culverts are blocked, mainly by silt. The majority of culvert head walls and wing walls along Road R101-8 were constructed in concrete and are in a fair to warning condition. The culverts have no in- or outlet structures or are missing wing walls. Four box culverts were previously extended using Ø900mm pipes and six pipe culverts are misaligned. The tables below (**Tables 6** and **7**) provide a summary of the minor culverts as well as identified defects and proposed repair mode.

Table 6: Summary of minor culverts

Culvert Type	Size	Number of Culverts	Percentage
Pipe Culvert	Ø450 mm	5	9%
	Ø600 mm	19	31%
	Ø900 mm	18	33%
Box Culvert	Various	13	22%
Unknown	Covered /buried	2	4%
Total		55	100%

Table 7: Summary of defects and proposed repair mode

Failure Mode	Repair Mode	No of Structures
Silted and containing debris	Clear silts and debris to spoil	39
Damaged inlet head walls	Reconstruct entire inlet structure	11
Damaged outlet head walls	Reconstruct entire outlet structure	14
Cracked wing wall	Crackseal the structure	3
Misaligned barrel	Realign the barrel	6
Spalling concrete	Repair spall (including honeycombing)	6

It is proposed that the culverts upgrades will be undertaken as follows:

- Extension of all culvert structures to align with road widening (max width of 20m);
- Replace 20 culverts for hydraulic capacity improvement;

- Construction of new side drains of a total of approximately 6 m;
- New in- and outlet structures will be constructed;
- Misaligned culverts will be rehabilitated; and
- Damaged or missing danger plates will be replaced.

The remaining 22 existing culverts will be extended to suit the new cross section. The watercourse will be protected with lined drains. The new in- and outlet structures will be constructed for new and extended culverts. Road surface drainage would be managed with kerbs and channels combination that outlet into down chutes or catch pits which collect water into an underground pipe system for urban drainage networks. All concrete side drains will include subsoil drains in rural areas.

1.5.5 Bridges and Major Culverts Construction Methodology

There are five (two bridges and three major culverts) major structures on the R101 Section 8 between Bela Bela and Modimolle. A Construction Methodology for the replacement of major structures on R101 Section 8 to be applied for the replacement of these structures was compiled by BVi Engineers and is attached to this report in **Appendix B2**. The construction methodology includes the preliminary traffic accommodation solutions, sequence of demolition, as well as sequence of construction of new bridge components. It must be noted that the methodology may change during construction after inputs from the contractor and discussions with the client. However, primary environmental recommendations and government requirements must be met at all times.

a) Construction of Major Culverts

Three Major Culverts are situated along the R101 Section 8, namely, IDC3321, IDC3322 and major culvert at km 22.5. BVi Engineers have recommended the replacement of the existing structures due to insufficient drainage capacity. This proposal was accepted by SANRAL. All 3 major culverts will be constructed in half-widths, with the construction following the sequence below:

- Before excavations or demolition works commence, all endangered plants to be removed and relocated by a qualified ecologist, where required, for later relocation.
- Reduce the roadway width and introduce a stop-and-go if necessary. Strict Health and Safety measures will be put in place to ensure safety of the road users and pedestrians.
- The roadway fill on the side of the first half-width construction will be removed and part of the existing structure demolished.
- Demolition will be done using excavators, jack hammers, water-jetting, and/or manual demolition methods, with material being taken to a temporary stockpiling area. The use of explosives will not be permitted during demolition works.
- Excavations of between 1m and 2m deep will be required for soil improvements, over the full footprint of the culvert. Slopes will be maintained to within a safe limit to ensure collapse of soil into the excavations do not take place. Where space is limited, shoring will be provided.
- A temporary pipe culvert will be installed for minor flow in the dry season. This pipe is provided to mitigate any contamination of the water through contact with the construction site and materials. As an alternative, a river or stream could also be diverted, with a temporary culvert being constructed away from the construction site. River diversion, if applicable, will be undertaken in accordance with all the conditions stipulated in the General Authorisation

or Water Use Licence that will be issued by the Department of Water and Sanitation. Due to the high traffic volumes along this road, and substantial delays possible for construction of a temporary bypass, this option is not preferred, but can be considered again once construction commences and with inputs from the contractor.

- Graded material or rock-fill will be imported, placed and compacted where excavations took place. This whole infill will be lined by Geofabric.
- A concrete blinding layer will be cast above the new infill material, for setting out of the new structures' foundations.
- The first half-width portion of the structure will be constructed, with formwork and reinforcement being placed, concrete cast, and curing of concrete taking place, in successive portions (as planned by contractor).
- Once the first half has been completed, backfilling with graded material around the structure, as well as new road layer works and surfacing construction will commence.
- Once completed, the traffic will be diverted over the newly constructed half of the structure.
- A similar sequence will commence for the excavation, fill, and construction of the second half-width of the major culverts.
- Once the structure has been constructed, rehabilitation of the site can take place, with any endangered plants initially removed and relocated, being reintroduced. The replanting will be undertaken by a botanist that will be appointed for the project. Embankments can be seeded and planted, to prevent short- to medium-term erosion around the new structure.

b) Construction of Bridge B375

The existing Bridge B375 is a 5 span structure with a total length of 62m. BVi Engineers recommended that the bridge be replaced due to insufficient drainage capacity, an increased roadway width at the structure, as well as a vertical realignment of the road. Due to the limited space around the structure (the river flows almost parallel to the road approaches, and the structure is situated between two steep hills), a bypass was not recommended. Since the bridge is located within a watercourse, all construction works with the river will be undertaken in accordance with all the conditions stipulated in the General Authorisation or Water Use Licence that will be issued by the Department of Water and Sanitation. A construction sequence consisting of half-width type construction, while retaining the existing structure's abutments, were considered most viable, considering the severe spatial constraints. SANRAL approved the structural replacement, as well as the construction sequence. The construction sequence is detailed as follows:

- Excavations will take place underneath the existing structure, while the structure remains in use.
- Areas between the existing foundations will be excavated for the new foundations, down to natural rock level (up to 3m deep). Slopes will be maintained to within a safe limit to ensure collapse of soil into the excavations do not take place. Where space is limited, shoring will be provided.
- A temporary pipe culvert will be installed for minor flow in the dry season. This pipe is provided to mitigate any contamination of the water through contact with the construction site and materials. A temporary diversion of the river is not possible in this location, due to

the constrained space between the two steep hills on either sides of the watercourse. Given that this watercourse is not a perennial river, limited to no flow is expected in the dry season.

- Cordon off the structure construction area, which should include the full excavation footprint and areas where plant is to be positioned. Stormwater management and isolation of this area is to be prioritized, to prevent any hazardous materials from leaving the perimeter of the site or infiltrate the groundwater. All endangered plants to be removed and relocated by a specialist, where required, for later relocation.
- The new foundations will be constructed onto the exposed natural rock, in between the existing foundations. Piers will be partially constructed to the underside of the existing deck soffit.
- Traffic will be closed on the western side of the existing bridge, and a stop-and-go facility will be implemented on the eastern side. Strict Health and Safety measures will be put in place to ensure safety of the road users and pedestrians.
- Holes are to be demolished through the western side of the existing bridge deck, for new piers to pass through.
- Formwork and reinforcement for the new piers and abutment alterations are to be placed, and concrete cast, for the first half-width of the new bridge.
- Formwork and reinforcement placement, and casting and curing of concrete for the first half-width of the new bridge deck will take place. The existing deck as well as staging to be utilized to support the new deck formwork.
- Once construction of the first half-width is completed, backfilling with graded material around the structure, as well as new road layer works and surfacing construction will be initiated.
- Two-way traffic to be diverted over the newly constructed half-width of the bridge.
- Demolition will be done using excavators, jack hammers, water-jetting, and/or manual demolition methods. The use of explosives will not be permitted during demolition works. Shielding (such as sheeting or similar protective layers) can be placed underneath the existing structure, if required. Rubble to be spoilt at temporary stockpiles.
- A similar sequence will commence for the excavation, fill, and construction of the second half-width of the new bridge.
- Once complete, the bridge will be fully opened for traffic. Rehabilitation of the site can then take place, with any endangered plants initially removed and relocated being reintroduced. The replanting will be undertaken by a botanist that will be appointed for the project. Embankments can be seeded and planted, to prevent short- to medium-term erosion around the new structure.

c) Construction of Bridge B447

The existing Bridge B447 is a four-span structure with a total length of 30m. BVi Engineers recommended that the bridge be replaced due to insufficient drainage capacity as well as a vertical realignment of the road. **This bridge is situated in a large perennial river, and a diversion of the watercourse will be necessary, even during the dry season**. Since the bridge is located within a watercourse, all construction works with the river will be undertaken in accordance with all the conditions stipulated in the General Authorisation or Water Use Licence that will be issued by the Department of Water and Sanitation. The construction sequence for this structure is as follows:

- Clearing vegetation, placement of fill and construction of temporary drainage structure for the temporary bypass. All endangered plants to be removed and relocated by an ecologist specialist before construction, where required, for later relocation.
- Divert the river through the temporary structure, as well as through the existing structure, and also divert traffic over the bypass.
- Demolish part of the existing fill next to the existing structure, and divert the river through this area, away from the bridge construction area.
- Cordon off the bridge construction area, which should include the full excavation footprint and areas where plant is to be positioned. Stormwater management and isolation of this area is to be prioritized, to prevent any hazardous materials leaving the perimeter of the site or infiltrate the groundwater. All endangered plants to be removed and relocated by an ecologist, where required, for later relocation.
- Demolition will be done using excavators, jack hammers, water-jetting, and/or manual demolition methods. The use of explosives will not be permitted during demolition works. Shielding (such as sheeting or similar protective layers) can be placed underneath the existing structure, if required. Rubble to be spoilt at temporary stockpiles.
- Excavations to take place for new structure foundations, to a maximum depth of 2m. Slopes will be maintained to within a safe limit to ensure collapse of soil into the excavations do not take place. Where space is limited, shoring will be provided.
- Pilling operations to take place, with auger piles being installed to a maximum depth of 11m and socketed into the bedrock.
- The rest of the bridge will be constructed, with formwork being placed, reinforcement placed, concrete cast, and curing of concrete taking place, in successive portions (as planned by the Contractor).
- Once construction of the bridge is completed, backfilling with graded material around the structure, as well as new road layer works and surfacing construction will be initiated.
- Once complete, the traffic will be diverted over the new bridge.
- Demolition of the temporary bypass as well as the temporary drainage structure will take place. This will happen in sequence, ensuring that no debris and materials enter the river.
- Once complete, the site will be rehabilitated, and any endangered plants can be relocated as in alignment with the specialist and environmental management plans (EMPr and Rehabilitation Plans) recommendations and in consultation with the ECO.

Examples of the above construction sequences and detailed explanations are provided in the Construction Methodology for the Replacement of Major Structures on R101 Section 8 attached as **Appendix B2**. Considering that these structures are located within watercourses and riparian areas, it is recommended that major construction activities be undertaken during the dry season. During construction, monitoring of the river water quality must be undertaken as and when necessary. The application of a no-go buffer area to areas within which construction is required is therefore considered impractical. However, it is recommended that non-essential construction and operational activities (e.g. ablution facilities, construction camps, laydown areas, mixing of cement, stockpiling of soils, waste dumping and any additional activities which may be detrimental to the health and functionality of the freshwater resources) must be strictly prohibited within the buffer zones. Any

unauthorised or potentially detrimental activities which occur in the direct vicinity or upstream of the freshwater resources should be rehabilitated according to the site EMPr and preventative or mitigation strategies.

1.5.6 Project Alternatives

There are two types of alternatives considered for the proposed road upgrade, route and cross sections alternatives. The route alternatives are based on geometry alignment or speed while the cross section alternatives are based on economic viability. These alternatives are briefly described in this section; however, **Section 5** of the report provides a detailed description and assessment of Alternatives. **Figure 4** shows the proposed route alternatives that have been assessed as part of the Basic Assessment Process.

According to the Preliminary Design Report (PDR), there are three possible route designs as part of the proposed upgrade. The route designs follow the same path as the existing road and are not anticipated to influence the overall length of Road R101 Section 8. The only difference between the route alternatives and existing road is that the route alternatives will slightly deviate from the existing road between km 10 and km 11 (realignment area 1), between km 11 and km 12 (realignment area 2) and between km 15 and km 16 (realignment area 3). It must be noted that although there are three realignment areas, the route alternatives are the same for all of the three realignment areas. The routes deviate at the aforementioned road chainage and link back to the existing road as indicated on Figure 1. Overall, the route alternatives are limited to the realignment areas (sharp curves) located within the rural section of R101 Section 8 and are based on maximum permissible speeds.

a) Route (geometry) alternatives for realignment areas

Preliminary design route (Green line)

The proposed route has an 'open up' parabola shape with a lower curve angle. The proposed route alignment has the highest permissible speed of 100km/hr, is much flatter and slightly longer than the two other routes (**Figure 4**). Although the cut and fill material that will be generated is similar to that of route alternative one, realignment to accommodate a 100 km/h horizontal design speeds will generate sufficient quantities of material which is intended to be utilised for construction of the Lower Selected Subgrade. In addition, this alternative will allow the curves to meet the speed standard of the road. Therefore, this alternative emerged as the **Preferred Option.**

Route Alternative 1 (Blue line)

Route alternative one follows a similar path to the preliminary design route. Route alternative 1 has the median permissible speed of 90km/hr, has much sharper bend than and shorter than the preferred route. This alternative is not preferred as these sections of the road will still not meet required road speed standard.

Route Alternative 2 (Yellow line)

The last alternative has the 80km/hr speed restriction and is the shortest as well as the most bent. This route alternative also follows a similar path to the existing route and the two other alternatives. This alternative is not preferred as these sections of the road will still not meet required road speed standard.

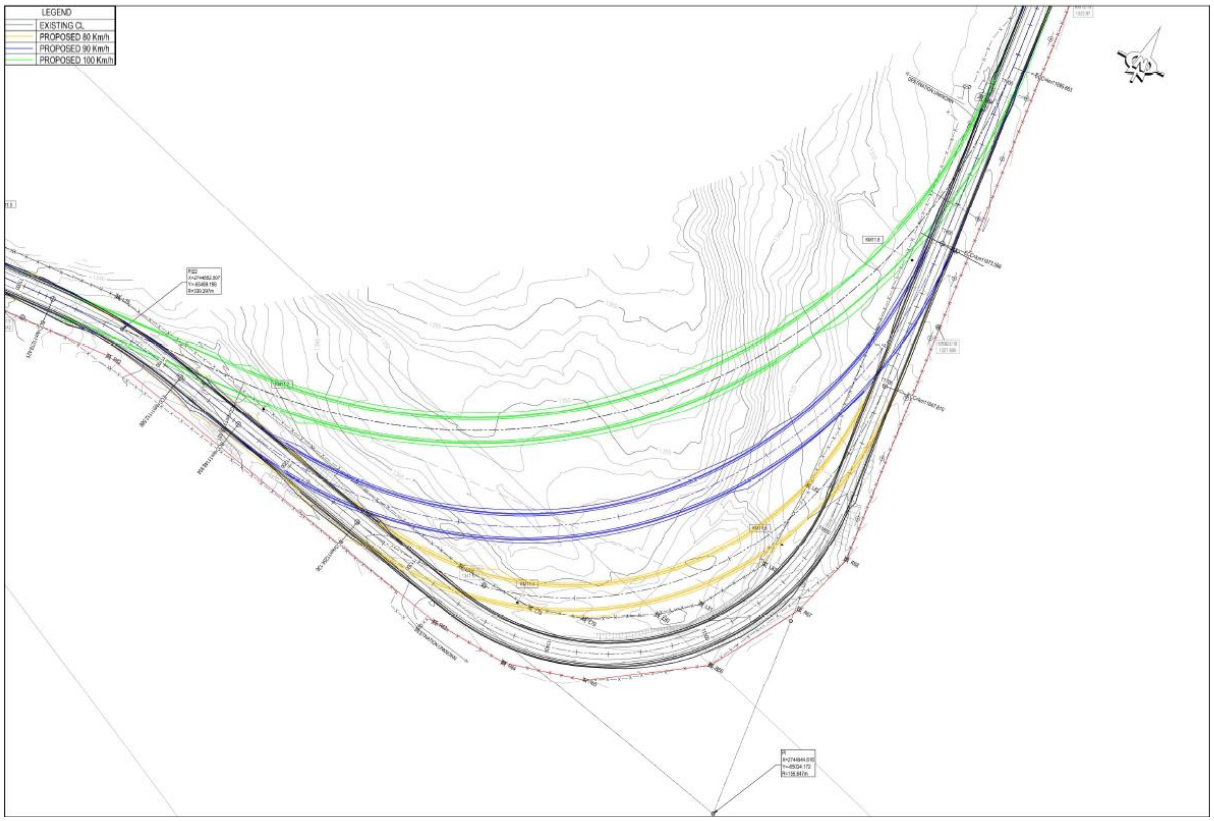

Figure 5: Route Alternatives assessed (realignment area 2)

b) Cross section alternatives

As discussed in **Section 1.5.2**, the preferred cross section in the PDR is Option 1. Both options are hybrid cross sections and are more suitable than the initially proposed three cross sections. The two hybrid cross sections options have similar designs as indicated below and on **Figure 5**:

- **Cross section Option 1**:
  - Section from km 0.00 to km 5.44: A 4-lane urban configuration with kerbed median;
  - Section from km 5.44 to km 24.00: A 2-lane cross section with 3m surfaced shoulders and existing climbing lanes; and
  - Section from km 24.00 to km 26.80: a 4 lane configuration with kerbed sidewalks.
- **Cross section Option 2**:
  - Section from km 0.00 to km 5.44: A 4-lane urban configuration with kerbed median;
  - Section from km 5.44 to km 24.00: A 2-lane cross section with 3m surfaced shoulders, existing climbing lanes and additional climbing lanes at specific sections; and
  - Section from km 24.00 to km 26.80: a 4-lane urban configuration with kerbed sidewalks.

The proposed hybrid cross-sections were analyzed for cost and economic viability using the rates from recently completed projects. The analysis shows that Cross Section Option 1 using Cape seal surfacing for rural section (km 5.44 to km 24.00) and asphalt surfacing for urban sections has the highest economic internal rate of return (IRR), while Cross Section Option 2 has a lower IRR. It is therefore recommended that Cross Section Option 1 (with asphalt in urban and Cape seal in rural) be carried into the Detail Design and implemented for improvement of Road R101-8.

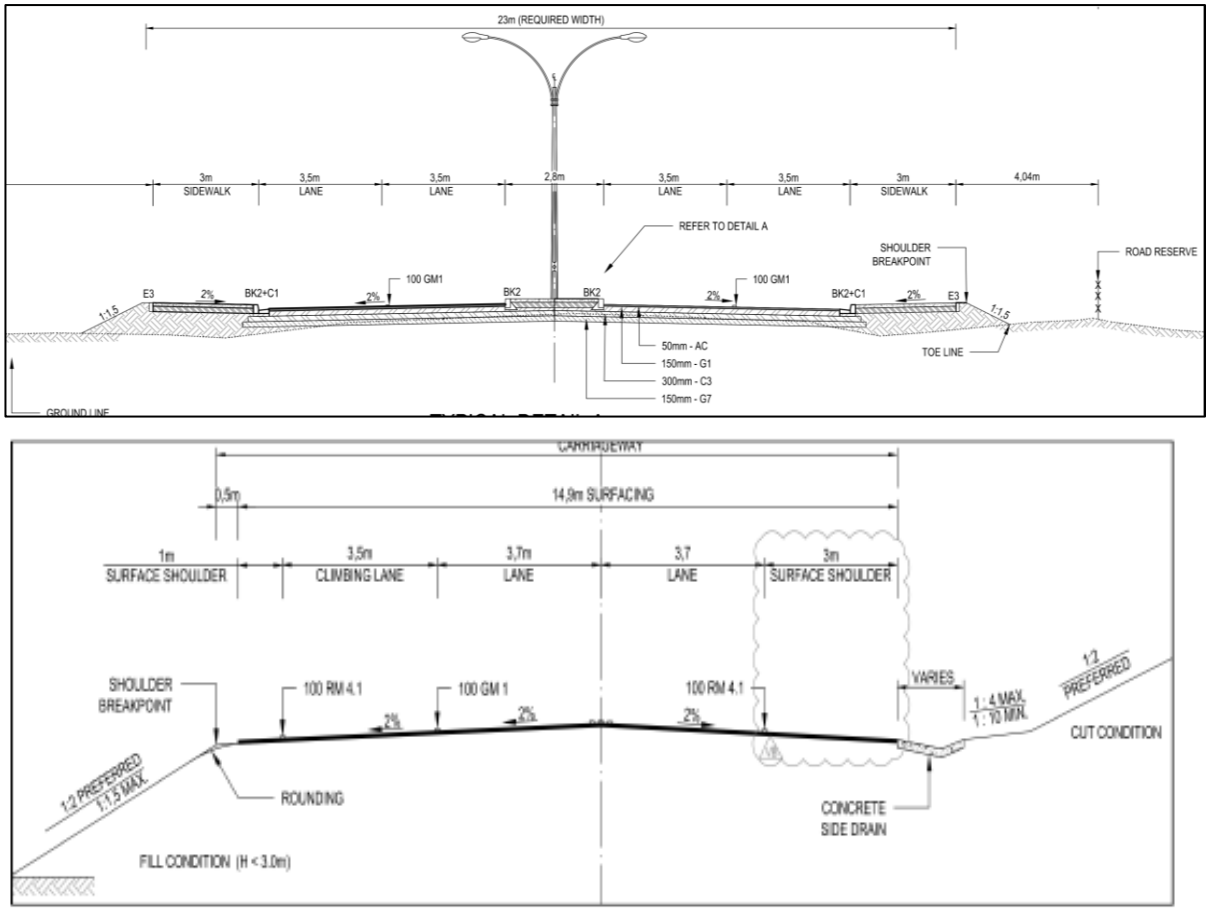

Figure 6: Route Typical cross sections for the proposed upgrades. Top shows the urban sections and bottom shows the rural section.

c) Bridge alternatives

As discussed in **Section 1.5.4**, there are two bridges (Modderloop and Groot Nyl River Bridge) within this road section. The detailed information regarding the location, condition, type of structures and the nature of the proposed upgrades are indicated on **Table 4**. This section of the report highlights the alternative options to the bridge upgrades. The bridge upgrade alternatives are summarised in Table below.

Table 8: Summary of defects and proposed repair mode

Modderloop Bridge	Groot Nyl River Bridge
Option 1: Rehabilitation • Repair spalling and apply a protective coating to all substructures. • Clear siltation, provide gabion mattresses below the deck, strengthen the existing balustrades; and • Provide new expansion joints. • The cost estimate for this option is approximately R4.00 million.	**Option 1: Rehabilitation** • Repair spalling and apply a protective coating to all substructures. • Clear siltation, provide gabion mattresses below the deck, replace the existing balustrades with SANRAL standard F-shaped parapets, replace the bearing system, and provide new expansion joints. • The cost estimate for this option is approximately R3.67 million.
Option 2: New Deck	**Option 2: Raise Existing Deck**

Modderloop Bridge	Groot Nyl River Bridge
• Demolish the existing bridge deck and construct a new deck at a raised level and extend the existing sub-structure to accommodate the design flood peak. • The deck will also be widened on both sides and the parapet replaced with a SANRAL standard F-shaped parapet. • A protective coating will be applied to all substructures and new elastomeric bearing will be provided. • The cost estimate for this option is approximately R12.40 million.	• Jack the existing bridge deck and extend the existing sub-structure to accommodate the design flood peak. • Apply protective coating to substructures and replace bearing system and expansion joints. • The deck will also be widened on both sides and the parapet replaced with a SANRAL standard F-shaped parapet. • The cost estimate for this option is approximately R6.48 million.
Option 3: Raise Existing Deck • Jack the existing bridge deck and extend the existing sub-structure to accommodate the design flood peak. • Apply protective coating to substructures and replace bearing system and expansion joints. The deck will also be widened on both sides and the parapet replaced with a SANRAL standard F-shaped parapet. • The existing deck will require strengthening due to the demolition of the structural balustrade. • The cost estimate for this option is approximately R13.09 million.	**Add Additional Spans** • Repair concrete spalling and provide protective coating to all substructures. • Replace the bearing system, expansion joints and balustrades with SANRAL standard F-shaped parapets. • Widening of the existing deck and substructures, adding additional deck spans and new abutments. • The cost estimate for this option is approximately R9.36 million.
Option 4: New Bridge (Preferred) • Demolish the existing structure and replace it with a new structure with less interference with the natural flow of the river. This will entail longer spans and a substantially raised deck. • The cost estimate for this option is approximately R20.78 million.	**Option 4: New Bridge (Preferred)** • Demolish the existing structure and replace it with a new structure. • The cost estimate for this option is approximately R9.42 million.

d) Construction methodology alternatives for the major structures

As discussed in **Section 1.5.5**, there are three major culverts and two bridges within this road section of R101. The detailed information regarding the location, condition, type of structures and the nature of the proposed upgrades are indicated in **Table 4** and **Table 5**. This section of the report highlights the alternative options for the major culverts and bridges.

There are two options for the major culverts construction and only differ based on the temporary diversion of the water flow. Preliminary Construction Sequence Option 1 (**preferred**) includes the installation of a temporary pipe culvert for minor flow in the dry season. This pipe is provided to mitigate any contamination of the water through contact with the construction site and materials. The alternative, Construction Sequence Option 2, includes a river or stream temporal diversion with a temporary culvert being constructed away from the construction site. Due to the high potential environmental impacts associated with the temporal flow diversion, the high traffic volumes along this road, and substantial delays possible for construction of a temporary bypass, this option is not preferred.

There are two bridges with different hydraulic and geographical conditions. Although the construction sequence for the bridges is slightly different due to the spatial constraints of the Modderloop Bridge, the overall process is similar. The main difference between the two construction methodologies is that a temporary pipe culvert will be installed for minor flow in the dry season rather than a temporal flow diversion for the Modderloop Bridge. This pipe is provided to mitigate any contamination of the water through contact with the construction site and materials. A temporary diversion of the river is not possible due to the constrained space between the two steep hills on either side of the watercourse. The construction sequence of the Groot Nyl River will however temporarily divert flow. The **preferred construction sequence** (**Preliminary Construction Sequence Option 1**) for the bridges includes the installation of temporary pipe culvert, temporary flow diversion, manual demolitions and construction at half-widths which will allow for traffic flow throughout the construction phase. The alternative would include the use of blasting for demolitions and closure of the roads diverting full traffic through Eersbewoond which would result in higher impacts on the water quality and aquatic biota as well as traffic congestion through the Eersbewoond Road.

1.5.7 Material Sources

Construction material will be required for the proposed upgrade of Road R101 (Section 8). Material sources cannot be exploited without authorisations from the Department of Mineral Resources and Energy (DMR). However, BVi Engineers have indicated that they will obtain the required construction material from approved or commercial material sources. These material sources will be obtained from a nearby road upgrade project where SANRAL is the project proponent. The approval of materials sources is outside the scope of the EA. It is the understanding of GA Environment that the concrete waste material from the bridge and culvert demolitions may be crushed and reused. Furthermore, the material from the realignment cuts may be crushed to G5 material and utilised for subbase layer during the upgrade. It is expected that some of the material may be left in the properties to be acquired by SANRAL (currently ongoing). The anticipated volume required for the upgrade from waste material is approximately 120 000m^3 crushed G5. Detailed information will be made available to the ECO during the planning phase to ensure that such activities are within the National Environmental Management: Air Quality Act, No 39 of 2004 (AQA) standards and the activities are not located within any sensitive environments. The crusher plant should be within the designated construction camp and material laydown area approved by the ECO. It is of importance that these crushing activities be undertaken in the best environmentally friendly practices. It must be noted that waste from the demolitions, if it cannot be reused, be disposed at registered landfills (Bela Bela Local Municipality Landfill and/or Modimolle Local Municipality Landfill).

1.5.8 Construction Camp and Materials Storage Area

The construction camp and materials storage area will be situated in the vicinity of the construction area. Landowner's permission and negotiations will be undertaken by the Applicant prior to establishment. The exact position of the camp will be negotiated with the Contractor. The construction camp may not be situated within any of the sensitive areas identified by the specialists such as the wetland area/riparian area or its buffer zone or within SCC habitats. The construction camp will include the following amongst others:

- Site Office;

- Temporary refuelling area;
- Temporary ablution facilities;
- Hazardous materials storage area;
- Concrete batching area;
- Overnight parking area for all machinery and construction vehicles;
- Demarcated general waste and hazardous waste storage areas; and
- Demarcated area for the storage of construction road signs, surveyor pegs and all other construction materials.

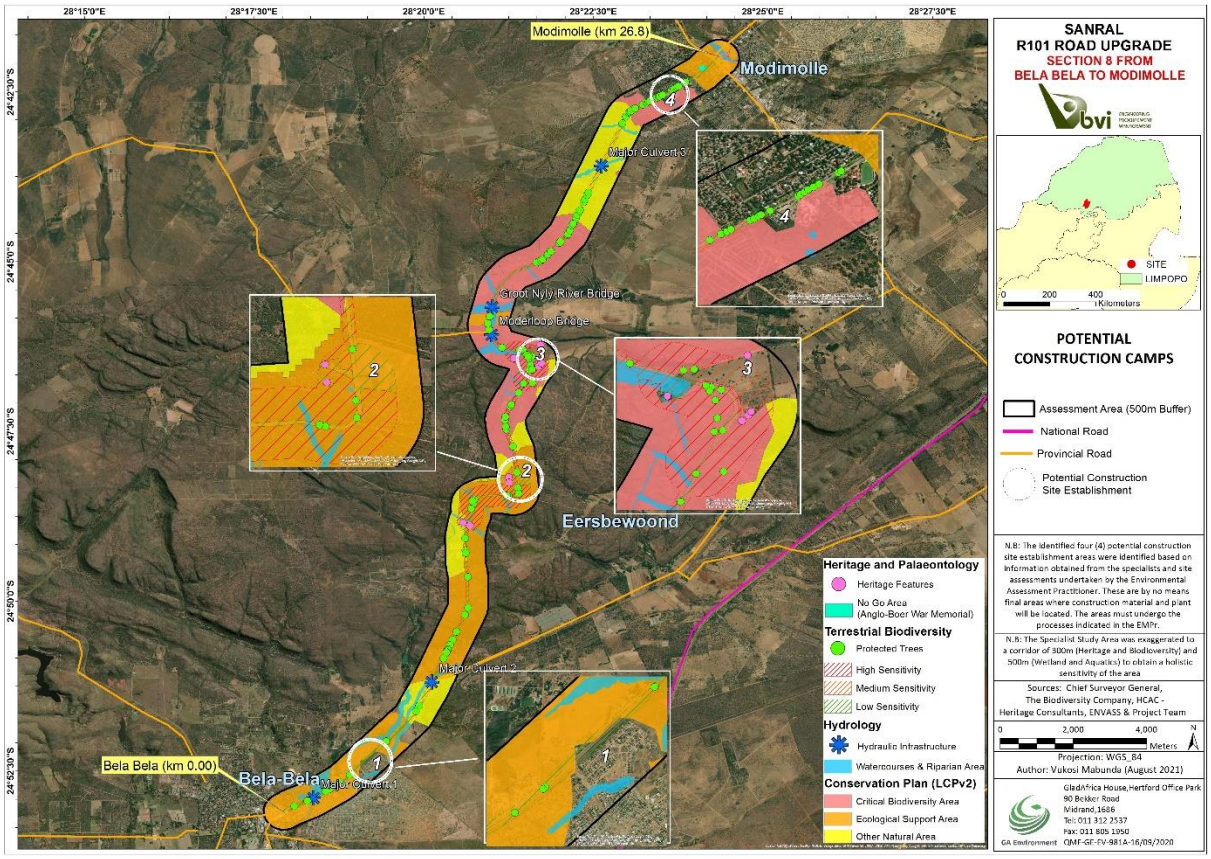

Figure 7: Potential construction camp area to be exploited by the Contractor

Based on information obtained from specialist assessments and site environmental assessments undertaken by the EAP, there are four sites that have been identifies as potential construction camp and material storage areas as indicated in **Figure 7**. It must be noted that these areas were identified based on the review of environmental sensitivity assessments and site observations. The areas are by no means the final nor only potential construction camp areas, but are recommended as they have the least environmental sensitivity. It is recommended that the Contractor consider these areas for construction camps and material storage areas. It must be noted that the final construction camp and material storage areas must be approved by the ECO prior site establishment.

1.5.9 Existing Services

The road upgrade starts at the intersection of Voortrekker Road and R101 which has similar pedestrian walkway as the ones associated with the proposed upgrade (**Figure 8**). The site was found to have

poor drainage as surface water ponding from the tributaries of the Bad se Loop and Klein Kariba was noted along the road in Bela Bela at km 0.5 (**Figure 9**). Majority of the major culverts along the route are dilapidated and have insufficient carrying capacity (**Figure 10**). It is one objective of this project to replace and repair the culverts accordingly. The road intersects with a number of river crossing such as the Modderloop and Groot Nyl Rivier via bridges (**Figure 11**) and these will be demolished and replaced. There are street lights in the urban areas of Bela Bela and Modimolle which will be improved (**Figure 12**). There is a railway line parallel to the study area (approximately 15m from the edge of the road) as observed at km 1 (**Figure 13**).

Figure 8: Pedestrian walkway at the start of the project

Figure 9: Road section with poor drainage

Figure 10: Major culverts to be revamped

Figure 11: Existing bridges to be replaced

Figure 12: Landscape street trees and street lights in Bela Bela urban area

Figure 13: Railway line parallel to R101 at km 1.0

1.5.10 Need and Desirability for the proposed project

In terms of 3(1)(f) of Appendix 1 of NEMA 2014 EIA Regulations, as amended, a Basic Assessment must include a discussion of the need and desirability for a proposed project. Needs and desirability support the Environmental rights as set out in Section 24 of the Constitution, as well the relevant municipal plans such as Municipal Integrated Development Plans (IDP), Spatial Development Frameworks (SDF) and Environmental Management Frameworks (EMF). Needs and desirability supports Sustainable development by ensuring that the proposed activity is ecologically, economically and socially sustainable.

Road R101-8 is defined as a mobility road, connecting development centres over long distances. It also connects other collector roads and can therefore be classified as a Class 2 rural major arterial. Furthermore, according to Table 1 of TRH4, Road R101-8 falls within the interurban collector and rural roads category and can therefore be classified as a Category B Road. This road category is seen as strategically important and is expected to deliver a good Level of Service (LOS) to its users.

Access Roads in the Waterberg District Municipality are adequately connected with National, Provincial, and District Roads. The primary route network includes the N1, N11, R518, R572, R33, R510, R516, and the R101. There is concern on the rapid degradation of many roads due to the increasing economic activities in the District (increase in heavy vehicles with mining materials), and a lack of maintenance and rehabilitation. In addition to the above roads, the local access roads are gravel and predominantly utilised by buses and taxis. The conditions of these roads are below standard as they require upgrading, improved storm water management, lighting, parking, and other road infrastructure. Some of Internal access roads in towns and villages within the Waterberg in are also in a bad state. It is anticipated that once major roads have undergone general upgrading, attention can be given to the upgrading the minor roads. Therefore, the upgrade of R101-8 could unlock future road developments in the area.

In terms of visual condition, Road R101-8 can be classified as fair to poor with the sections from km 2.3 to km 5.5, km 18.5 to km 19.0 and km 23.5 to km 26.3 being the most distressed with structural failures such as rutting, crocodile cracking, undulation and pumping. The road currently has poor drainage as the associated infrastructure such as culverts have insufficient capacity and/or are

blocked. The upgrade will address the stormwater issues associated with the road. In addition, the proposed road upgrade will also alleviate the current vehicle traffic pressure and congestion within the Bela Bela and Modimolle urban areas.

In terms of safety concerns, there are various traffic calming and road safety measures put in place to ensure safety of motorists, pedestrians and residents in the area including improved lighting in the urban areas, higher guardrails, visible road signs, a service road to reduce the number of intersections as part of the access management plan and dedicated pedestrian crossings.

It is the intention of SANRAL to construct the road to accommodate increased traffic in the area and help reduce traffic congestion and accident rates around the proposed development site.

1.6 Applicable NEMA Listed Activities

In terms of section 24(2) of NEMA, the Minister and or any MEC in concurrence with the Minister may identify activities which 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 and consist of the following:

- *Regulation 982* provide details on the processes and procedures to be followed when undertaking an Environmental Authorisation process;
- *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 an Environmental Impact Assessment (EIA) process. If activities from both R 983 and R 984 are triggered, then an EIA process will be required.
- *Listing Notice 3* (Regulations 985) define certain additional listed activities for which a Basic Assessment process would be required within identified geographical areas.

The above regulations were reviewed to determine whether the proposed project will trigger any of the above listed activities, and if so, what Environmental Authorisation Process would be required. The triggered listed activities are presented in **Table 9** and the proposed road upgrade requires an authorisation in terms of GNR 983 Listing Notice 1 and GNR 985 Listing Notice 3 of the NEMA EIA Regulations (2014), as amended. A Basic Assessment process will be required to be undertaken in line with all the requirements of the NEMA EIA Regulations, 2014, as amended.

Table 9: Listed Activities in terms of NEMA EIA Regulations, 2014 as amended

Government Notice & Activity No	Activity in writing as per Listing Notice 1 (GN No 983) & Listing Notices 3 (GN No 985)	Applicability
NEMA EIA REGULATIONS, 2014 as amended		
GNR 983 – Listing Notice 1		

Government Notice & Activity No	Activity in writing as per Listing Notice 1 (GN No 983) & Listing Notices 3 (GN No 985)	Applicability
Activity 9	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water with an internal diameter of 0,36 metres or more; or with a peak throughput of 120 litres per second or more.	Storm water drainage infrastructure will be required for the proposed project including on new road sections outside of the existing road reserve.
Activity 12	The development of infrastructure or structures with a physical footprint of 100 square metres or more. where such development occurs: (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	The upgrading of the road will include the replacement of two existing bridges and six culverts as well as other infrastructures with a physical footprint greater than 100 square meters where such activities will be undertaken within a watercourse and within 32m of a watercourse.
Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	The proposed upgrade will require the replacement of existing bridges and culverts. Construction activities such as dredging, excavation, infilling of material within or in close proximity to the watercourse will occur.
Activity 24	The development of a road where no reserve exists where the road is wider than 8 metres.	A service road of approximately 7.5m is proposed parallel to the existing R101 in Bela Bela. The proposed upgrade also includes the development of realignment roads wider than 8 meters where no road reserve exists.
Activity 30	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	The study area falls within priority biodiversity areas including critical biodiversity areas and ecological support areas as well as protected areas.
Activity 56	The widening of a road 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	Sections of the proposed road upgrade will have dual carriage ways in either direction which will be more than 6 metres and more than 1 kilometre which triggers the widening of a road threshold.
GNR 985 – Listing Notice 3		
Activity 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. e. Limpopo:	A service road of approximately 7.5m is proposed parallel to the existing R101 in Bela Bela and there are sections of the road which are proposed to be

Government Notice & Activity No	Activity in writing as per Listing Notice 1 (GN No 983) & Listing Notices 3 (GN No 985)	Applicability
	(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or	realigned along CBAs, ESAs and sensitivity environment.
Activity 12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. e. Limpopo i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans.	Clearing of indigenous vegetation will be required in some areas identified as endangered and/or important ecosystems and biodiversity areas.
Activity 14	The development of infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs (a) within a watercourse; (c) if no development setback has been adopted, within 32 meters of a watercourse. e. Limpopo i. Outside urban areas: (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 within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.	The upgrading of the road will include the replacement of two existing bridges and six culverts as well as other infrastructures with a physical footprint greater than 10 square meters where such activities will be undertaken within a watercourse and within 32m of a watercourse.
Activity 18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. e. Limpopo i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (hh) Areas within a watercourse; or within 100 metres from the edge of a Watercourse.	Sections of the proposed road upgrade will have dual carriage ways in either direction which will exceed the 4 meter threshold.
Activity 23	The expansion of (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more. Where such expansion occurs (a) within a watercourse. e. Limpopo	The upgrading of the road will include the replacement of two existing bridges and six culverts and associated storm water

Government Notice & Activity No	Activity in writing as per Listing Notice 1 (GN No 983) & Listing Notices 3 (GN No 985)	Applicability
	i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	infrastructure. The expansion is within close proximity to the watercourse and likely to be more than 10 square meters.

1.7 The objectives of the Basic Assessment Process

The main objectives of the Basic Assessment, in terms of the regulatory requirements stipulated in *Appendix 1* of the 2014 NEMA EIA Regulations, are to:

(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
(b) identify the alternatives considered, including the activity, location, and technology alternatives;
(c) describe the need and desirability of the proposed alternatives;
(d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to
determine—

(i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
(ii) 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; and

(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—

(i) identify and motivate a preferred site, activity and technology alternative;
(ii) identify suitable measures to avoid, manage or mitigate identified impacts; and
(iii) identify residual risks that need to be managed and monitored.

1.8 Structure of the Basic Assessment Report

This report has also considered the requirements outlined in Appendix 1 of the NEMA EIA Regulations 2014, as amended regarding the content of the Basic Assessment Report (BAR hereafter). In addressing these requirements, this BAR is divided into **10 Chapters**, the contents of which will be presented as follows in this report:

- **Chapter 1** introduces the background to the development proposal and profiles its proponents. Furthermore, this chapter provides an indication of the BA process that will be followed as well as providing insights into the legislative requirements that have resulted in the need for this process;

- **Chapter 2** provides the legislative framework for the BA process and the context of the proposed development. The legislative framework includes national and provincial legislation as well as planning framework which will have to be considered in the BA process;
- **Chapter 3** is a detailed description of the adopted Basic Assessment Methodology for the project;
- **Chapter 4** is a description of the receiving environment associated with the proposed activities;
- **Chapter 5** is a description and comparative assessment of the alternatives that were considered for the project;
- **Chapter 6** details the Public Participation Process undertaken for the project. It also summarises key outcomes of the process;
- **Chapter 7** discusses the Impact Assessment Methodology;
- **Chapter 8** is a description and assessment of environmental impacts; and
- **Chapter 9** provides the Environmental Impact Statement conclusion to the report as well as recommendations.
- **Chapter 10** presents a Bibliography for the report.

1.9 Project Team

This section of the BAR provides contact details, of the key stakeholders (Applicant's representative), Environmental Assessment Practitioner and the Project Reviewer. These details are outlined in **Table 10** below.

Table 10: Application details

Applicant's representative	Environmental Impact Practitioner	Responsible Environmental Assessment Practitioner
Name: Riaan Oerlemans **Designation**: Project Manager Design and Construction Tel: Available on request **e-mail:** Available on request	**Name:** Vukosi Mabunda **Designation**: Environmental Impact Assessment Practitioner **Tel:** 011 312 2537 **Fax:** 011 805 1950 **e-mail:** environment@gaenvironment.com/ vukosim@gaenvironment.com	**Name:** Andrew Woghiren **Designation**: Executive: Environmental Management **Tel:** 011 312 2537 **Fax:** 011 805 1950 **e-mail**: andrew@gaenvironment.com

This BAR was compiled and prepared by Vukosi Mabunda under the guidance of Nkhensani Khandlhela and Andrew Woghiren. **Vukosi Mabunda,** currently a Geographic Information Systems (GIS) Specialist and Environmental Assessment Practitioner with 4 years' working experience. He is one of the few dual registered professionals with SACNASP as a Certified Geospatial Scientist and Certified Environmental Scientist. He is currently in the process of acquiring his third professional registration, with the South African Geomatics Council for a GISc Technologist. Vukosi has dual professional

background in Geographic and Environmental Sciences having academic qualifications which focused on these disciplines as well as work experience gained from previous organizations. He has extensive GIS knowledge and application skills with a Master's Degree in Geography focusing on the applications of GIS on groundwater and having worked within a GIS environment (ArcGIS) for 8 years and a post-graduation GIS experience of 4 years.

1.10 Specialist studies

In accordance with the requirements of Appendix 6 of the NEMA EIA Regulations, 2014 as amended, the recently published Government Notice 320 (dated 20 March 2020) and Government Notice 1150 (dated 30 October 2020) in terms of NEMA and the National web-based environmental screening tool, the following specialist studies indicated in **Table 11** have been commissioned for the proposed development:

Table 11: Specialist Studies and contact details

Specialist Study	Company Name	Contact Person	Contact Details
The Terrestrial Biodiversity Impact Assessment	The Biodiversity Company	Andrew Husted	Available on request
Freshwater Assessment: Wetland Delineation and Impact Assessment	Environmental Assurance (Pty) Ltd	Wayne Westcott	Available on request
Heritage Impact Assessment	Heritage Contracts and Archaeological Consulting CC (HCAC)	Jaco van der Walt	Available on request
Paleontological Impact Assessment (Phase I)	Heritage Contracts and Archaeological Consulting CC (HCAC)	Jaco van der Walt	Available on request
Detailed Desktop Agricultural Impact Assessment, Remedial Measures and Implementation Measures	Afzelia Environmental Consultants	Andrew Batho	Available on request

The specialist reports are attached as **Appendix F** of this report**.**

1.11 Assumptions, Gaps and Limitations

The following key gaps, assumptions and limitations were made when conducting the DBAR:

- The application is limited to the proposed road upgrade section (R101 Section 8) from Bela Bela (km 0.0) to Modimolle (km 26.8);
- Specialists' assessments study area were exaggerated at the realignment areas to assess a larger area than the actual proposed upgrade area. The aim of this process was to obtain a holistic environmental sensitivity in the case that the realignments were to slightly deviate.

- It is assumed that all project related information provided by BVi Consulting Engineers Western Cape (Pty) Ltd and specialist is true and accurate;
- The information provided by the applicant is accurate, adequate, and unbiased, and no information that could change the outcome of the BA process has been withheld;
- The information obtained from the specialist studies undertaken for this project is accurate and objective and sufficient for the level of assessment required;
- Environmental assessment studies are limited to scope, time and budget. The proposed mitigation measures are based on reasonable and informed assumptions based on the recommendations of the appointed specialists as well as deductive reasoning aligned with the scope of work;
- The realignment areas are highly sensitive environments, and the applicant will limit the activities to only the road and servitude area to minimize the impacts;
- In accordance with the Protection of Personal Information Act (Act 4 of 2013), personal information (emails, contact numbers, address) have been blanked out and excluded from Public Participation section and will only be provided to DFFE officials;
- Personal information of I&APs made available to the competent authority shall only be used by the authorities to confirm or obtain information regarding this specific project;
- Thus far, the Public Participation Process has been undertaken in line with the directions regarding the measures to address, prevent and combat the spread of the COVID-19 relating to the National Environmental Management Permits and Licenses. All protocols have been observed to ensure these regulations are upheld whilst the public is afforded an opportunity to comment and participate in the Basic Assessment Process.

Thus, it can be concluded that other than the gaps in knowledge, assumptions provided above, and the information presented in various sections of this report, the information used in this report was adequate for the purposes of the current impact assessment.

2 LEGISLATIVE FRAMEWORK

This section of the Draft Basic Assessment Report (DBAR) discusses applicable legal provisions and the legal context for the proposed road upgrade. It provides a review of legislation, regulations, policies and guidelines, which are applicable to, or have implications, for the proposed project. The contents of this report are based on a review of the information that was available at the time of the compilation of the report. The discussion in this chapter is by no means an exhaustive list of the legal obligations of the applicant in respect of environmental management for the proposed development. This DBAR specifically focused on key Environmental legislation or legislation that includes an environmental component. These are:

- 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);
- National Forest Act, 1998 (Act 36 of 1998);
- The South African National Roads Agency Limited and National Roads Act, 1998 (Act 7 of 1998);
- Waterberg District Environmental Management Framework;
- Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003); and
- Limpopo Province Spatial Development Plan 2015;
- Limpopo Biodiversity Conservation Plan;
- Protection of Personal Information Act (Act 4 of 2013); and
- Promotion of Access to Information Act, 2000 (Act No. 2 of 2000).

2.1 National Legislation

2.1.1 Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)

The environmental right is mentioned in Section 24 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996). This states the following:

"...everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

The State must therefore respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities. The Constitution therefore recognises that the environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must cooperate with, consult and support one another if the State is to fulfil its constitutional mandate.

The issuing of an environmental authorisation or other permits or licence for any aspect of the proposed road will ensure that the environmental right enshrined in the Constitution contributes to the protection of the biophysical and socio- economic environment. The abovementioned authorisations, permits, or licences will be largely based on the legislation outlined in this Chapter.

2.1.2 National Environmental Management Act, 1998 (Act No. 107 of 1998)

In order to bring section 24 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) into realisation, the National Environmental Management Act, 1998 (NEMA) (Act No. 107 of 1998) was promulgated to serve to *'provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith'.* NEMA is main Environmental Legislation in South Africa and other Specific Environmental Management Acts (SEMA's) support its objectives.
Examples of SEMA's include the following:

- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004); and
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

Some specific Environmental Management Legislation is also discussed in **Sections 2.1.3 and 2.1.4**. The key principles of NEMA as outlined in Section 2 can be summarised as follows:

- sustainability must be pursued in all developments to ensure that biophysical and socio-economic aspects are protected or;
- there must be equal access to environmental resources, services and benefits for all citizens including the disadvantaged and the vulnerable. Adverse environmental impacts shall be distributed fairly among all citizens;
- environmental governance must include the participation of all Interested and Affected Parties who must be catered for to allow their effective participation;
- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- The polluter pays principle must be applied in all cases where any person has caused pollution or undertaken any action that led to the degradation of the environment.

a) National Environment Management Act, 1998

The National Environmental Management Act (Act No. 107 of 1998) has been amended numerous times to better meet its overall objective of the protection of the environment.

The amendments to NEMA include but are not limited to:

- National Environmental Management Act, (Act No. 56 of 2002);
- National Environmental Management Act (Act No. 8 of 2004);
- National Environmental Management Act (Act No. 46 of 2003);

b) NEMA Environmental Impact Assessment Regulations

In terms of section 24(2) of NEMA, the Minister and or any MEC in concurrence with the Minister may identify activities which require authorisation as these activities may negatively affect the environment. The Act requires that in such cases the impacts must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity. The NEMA EIA Regulations guide the processes required for the assessment of impacts of Listed Activities.

The requirement for the undertaking of Environmental Impact Assessments and Basic Assessments began in 1997 with the promulgation of the EIA Regulations under the Environment Conservation Act, 1989 (ECA) (Act No. 73 of 1989). These were followed by the 2006, 2010 and 2014 regulations. **Table 12** is a summary of the progression of the EIA regulations to date.

Table 12: Summary of the South African EIA regulations from inception to date

EIA Regulations	Government Gazette
EIA Regulations promulgated in terms of the ECA, Act No 73 of 1989	GNR 1182 & 1183: Government Gazette No 18261, 5 September 1997
Amendment of the ECA EIA Regulations	GNR 670 and GNR 672 of 10 May 2002, Government Gazette No 23401
2006 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 385, 386 and 387 Government Gazette No 28753, Pretoria, 21 April 2006
2010 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 543, 544, 545 and 546 Government Gazette No 33306, Pretoria, 18 June 2010
2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 982, 983, 984 and 985 Government Gazette No 38282, Pretoria, 04 December 2014
Current Amendment of the 2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 982, 983, 984 and 985 Government Gazette No 40772, Pretoria, 07 April 2017

The Basic Assessment process for the proposed road is undertaken in terms of the NEMA EIA Regulations, 2014, as amended. These came into effect on the 07th April 2017. The triggered activities in terms of these regulations have already been discussed in **Section 1.6.**

c) Department of Forestry, Fisheries and Environment Screening Tool

On 5 July 2019, The Department of Forestry, Fisheries and Environment issued a Notice of the requirement to submit a report generated by the National Web-based Environmental Screening Tool in terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended. The submission of this report is compulsory when submitting an application for environmental authorisation in terms of Regulation 19 and Regulation 21 of the Environmental Impact Assessment Regulations, 2014 effective from 4 October 2019. The DFFE

Screening Tool Report was generated on the 9th of March 2021. The Screening report is provided in **Appendix I** of this report. The main findings to be discussed from the screening report are listed below.

d) Proposed Development Area Sensitivity

The following summary of the study area's environmental sensitivities were identified in the Environmental Screening Report. The environmental sensitivities for the proposed development footprint are indicated on **Table 13**.

Table 13: Environmental Sensitivity of Project Area

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme		X		
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

e) Specialist Assessment Identified

Based on the environmental sensitivities of the proposed project area summarised in **Table 13**, the following list of specialist assessments were identified by the Environmental Screening Report. **Table 14** provides the Specialist studies identified in the Screening report. A motivation by the EAP has been provided where a study has not been undertaken.

Table 14: Specialist Assessments Identified

No	Specialist Assessment	EAP Motivation
1	Agricultural Impact Assessment	The study was undertaken as the area is known to host agricultural activities. A Desktop Soils and Agricultural Impact Assessment been undertaken. The report is attached to **Appendix F5**.
2	Landscape/Visual Impact Assessment	The proposed project will be an upgrade of an existing road and will tie into existing roads/intersections. The character of the area will not be changed as the R101-8 is an existing road. As such, the EAP suggested that a Landscape/Visual Impact Assessment will not be required.
3	Archaeological and Cultural Heritage Impact Assessment	A Heritage Impact Assessment has been undertaken. The report is attached to **Appendix F2**.
4	Palaeontology Impact Assessment	A Palaeontology Impact Assessment has been undertaken the report is provided in **Appendix F3**.
5	Terrestrial Biodiversity Impact Assessment	A Terrestrial Assessment (Fauna and Flora) has been undertaken. The report is provided in **Appendix F1**.
6	Aquatic Biodiversity Impact Assessment	An Aquatic Assessment has been undertaken. The report is provided in **Appendix F4**.

7	Noise Impact Assessment	The proposed roads will tie into existing roads within the study area. In cases where the road will be constructed adjacent to private landowners and game farms, the trees and vegetation natural noise barriers will be used. As such, the EAP suggested that a Noise Impact Assessment will not be required.
8	Traffic Impact Assessment	A Traffic Impact Assessment was undertaken by BVi Consulting Engineers. The findings of the assessment have been included in the PDR. The relevant chapter of the report has been included in **Appendix F7** of this report.
9	Geotechnical Assessment	A preliminary Geotechnical Assessment has already been undertaken by BVi Consulting Engineers. A detailed Geotechnical Investigation has been commissioned by BVi Consulting Engineers. The Preliminary report is attached to **Appendix B1**.
10	Socio-Economic Assessment	In terms of land use change, it is not anticipated that the proposed road will lead to a drastic land use change as the proposed activities will blend with the existing activities within the study area. The proposed roads will also relieve the traffic pressure on surrounding link roads. There is a likelihood of temporary employment during the construction phase of the project. It is the opinion of the EAP that a Socio-Economic Assessment is not deemed necessary.
11	Ambient Air Quality Impact Assessment	As previously discussed, the proposed road will tie into existing roads within the study area. It is not anticipated that there would be an increase in carbon emissions as the proposed roads will be relieving traffic pressure within the surrounding areas. Dust generation during the construction phase of the project will manged according to the dust suppression measures provided in the approved EMPr. The EAP therefore suggests that an Ambient Air Quality Assessment is not necessary.
12	Plant Species Assessment	A Terrestrial Biodiversity Impact Assessment as been undertaken. The report is provided in **Appendix F1**.
13	Animal Species Assessment	A Terrestrial Biodiversity Impact Assessment has been undertaken. The report is provided in **Appendix F1**.

2.1.3 National Environmental Management: Waste Act 59 of 2008 (Act No. 59 of 2008)

This Act aims to regulate waste management to protect human health and the environment by putting measures in place to prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources. The Applicant shall ensure compliance with this Act by implementing practical measures to avoid or reduce unnecessary generation of waste and where the waste is generated measures such as re-using, recycling and recovery of waste shall be encouraged. These general principles of responsible waste management are also incorporated in the EMPr to manage waste related activities during construction. The waste generated during the construction related to the upgrade of the SANRAL R101 Section 8 must be disposed at a registered landfill. The project is conveniently located between Bela Bela and Modimolle

and both these towns have registered landfills that could be used for disposal of waste. Although the Modimolle Local Municipality Landfill site was still under construction during the compilation of this report, it is anticipated that when construction commences around April 2022, the landfill will be operational.

2.1.4 National Environmental Management: Biodiversity Act (Act 10 of 2004): National Threatened or Protected Species Regulations and Species Lists, 2015

The objective of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) is to provide for the management and conservation of South Africa's biodiversity within the framework of NEMA; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith. The objectives of NEM: BA are:

- Within the framework of the National Environmental Management Act, to provide for:
  - the management and conservation of biological diversity within the Republic and of the components of such biological diversity;
  - the use of indigenous biological resources in a sustainable manner; and
  - the fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources;
- To give effect to ratified international agreements relating to biodiversity which are binding on the Republic;
- To provide for co-operative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

Chapter 4, Part 2 of the National Environmental Management: Biodiversity Act (NEMBA; Act 10 of 2004) provides for the listing of Threatened or Protected Species (TOPS). Species listed as such, in terms of the TOPS Regulations (2015) and the TOPS Lists of Species (2015), are further classified as Threatened (Critically Endangered, Endangered and Vulnerable) or Protected. The Act defines these classes as follows:

- *Critically Endangered species*: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future;
- *Endangered species*: any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species;
- *Vulnerable species:* any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species; and
- *Protected species*: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The TOPS Regulations (2015) further regulate the permit system set out in NEMBA as it applies to restricted activities involving specimens of listed threatened or protected species, where restricted activities involve those activities that have a direct impact on listed species such as hunting, catching, collecting, picking, chopping off, damaging or destroying, importing and export from Republic, possessing, keeping or exercising physical control over, breeding or propagating, conveying or translocating, selling or buying, receiving or donating or any other prescribed activity involving a TOPS specimen.

According to the Terrestrial Assessment undertaken by the Biodiversity Company (2021), the project area is situated within the savanna biome. The savanna vegetation of South Africa represents the southernmost extension of the most widespread biome in Africa. The savanna biome comprises many different vegetation types. The project area is situated within the Central Sandy Bushveld, Springbokvlakte Thornveld and Waterberg Mountain Bushveld. The Central Sandy Bushveld is classified as vulnerable, the Springbokvlakte Thornveld is classified as endangered and the Waterberg Mountain Bushveld is least conserved. In the areas of the realignments, one avifauna and seven mammal species of conservation concern are known to occur. This habitat is mostly mountain bushveld that is in pristine condition. Two different types of protected trees were also observed in the area. The ecological integrity, importance and functioning of the ecosystem is still intact.

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

The objective of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) is to introduce an integrated system for the management of national heritage resources. The identification, evaluation and assessment of any cultural heritage site, artefact or find in South Africa is required by this Act. Section 38 of this Act pertains to Heritage resources management and Section 38(1) states the following

Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—
(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
(b) the construction of a bridge or similar structure exceeding 50 m in length;
(c) any development or other activity which will change the character of a site—
(i) exceeding 5 000 m^2 in extent; or
(ii) involving three or more existing erven or subdivisions thereof; or
(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or
(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

According to the heritage specialist, the potential impacts to heritage resources are generally considered to be of low significance after mitigation and no fatal flaws are expected and the project will result in a socio-economic benefit. In addition, based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would occur in the area. The detailed findings of the heritage impact assessment are provided in **Section 4.1.5**.

2.1.6 National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)

The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) provides for a range of protected areas: protected environments, special nature reserves and natures reserves. South Africa has much valuable biodiversity outside of protected areas, but this is disappearing at an alarming rate. It has been recognised that in order to effectively conserve South Africa's biodiversity, conservation efforts must focus outside of formerly protected reserves, considering 80% of the country's most scarce and threatened habitats are privately owned. It is clearly not possible for government to purchase all the land identified as high priority in terms of habitat or threatened ecosystems to add it to our system of state-owned protected areas.

This requires a new approach to conservation extension and a shift away from reactive extension (i.e. responding to problems and enforcing regulations and permitting procedures) to proactive extension (i.e. engaging with a landowner before a problem is created) where stewardship is encouraged. For these purposes, extension officers need to be better equipped with people skills relating to relationship building, conflict resolution, land negotiation, as well as hands-on knowledge, in the form of practical guidelines for managing natural ecosystems.

According to the Terrestrial Assessment undertaken the Biodiversity Company, the study area is not located within a National Protected Areas Expansion Strategy (NPAES) Focus Area. The closest NPAES is the North West / Gauteng Bushveld which is 23 km from the project area.

2.1.7 National Forests Act, 1998 (Act No. 84 of 1998): Protected Tree Species, 2017

In terms of the National Forests Act (Act No. 84 of 1998) certain tree species can be identified and declared as protected. According to this Act, protected tree species may not be cut, disturbed, damaged or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold except under a licence granted by the Department of Agriculture, Forestry and Fisheries (DAFF) or a delegated authority. Applications for such activities should be made to the responsible official in each province. Each application is evaluated on merit (including site visits) before a decision is taken whether or not to issue a licence (with or without conditions). Such decisions must be in line with national policy and guidelines. An updated list of protected tree species was published under section 12(1) (d) of the National Forests Act (Act No 84 of 1998) on 8 September 2017.

According to the Terrestrial Assessment undertaken by the Biodiversity Company, two protected tree species were recorded within the study area. *Sclerocarya birrea subsp. caffra* (Marula), a large deciduous tree with a rounded crown. The Marula is widespread throughout Africa, where it is found from Ethiopia to South Africa. It naturally occurs in woodlands in sandy soils. The second protected tree species is the *Combretum imberbe* (Leadwood), a medium to large, semi-deciduous tree, which

grows up to 20 m in height. *Combretum imberbe* is the tallest of all the South African combretums. It has a spreading canopy and is extremely slow growing. They are produced from November to March. Therefore, a protected tree search and rescue plan must be undertaken by a qualified ecologist before the construction phase to ensure that all protected trees are accounted for and managed in the best environmentally friendly manner.

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

The National Water Act, 1998 (Act No. 36 of 1998) aims to provide for management of the national water resources in order to achieve sustainable use of water for the benefit of all water users. This act requires that the quality of water resources is protected as well as the integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved and managed in ways which take into account:

- Meeting basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest; facilitation social and economic development;
- Providing for the growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and drought.

In pursuit of these objectives, Chapter 4 of the act regulates water use, while Section 21 lists eleven water use types that are regulated [Section 21 (a) – (k)]. Watercourses and wetlands are protected in terms of this section, as both are regarded as water resources. Due to the location of the site within the 500m radius from a wetland which is one of the DWS' regulated areas, a Water Use Authorisation may be required. The list of the regulated areas inclusive of the 500m distance, but specific to the delineated boundary are as follows:

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

According to the wetland and aquatic biodiversity impact assessment undertaken by Environmental Assurance (2021), the proposed road widening will predominantly take place in already infilled and transformed areas directly adjacent to the existing R101 roadway within the existing road reserve. However, small areas of wetland habitat will be lost during the widening of the R101. A Water Use Authorisation is therefore, required for the proposed project.

2.1.9 The South African National Roads Agency Limited and National Roads Act (Act 7 of 1998)

The Act makes provision of a National Roads Agency to manage and control the country's National Roads system and take charge amongst others, of the development, maintenance and rehabilitation of National Roads within the framework of government policy. National Road R101 Section 8 between Bela Bela and Modimolle fall under SANRAL's maintenance.

2.1.10 Other National Legislation concerning or related to the environment / project

Various other laws regarding the protection of the environment that are relevant to this BA include:

- Environment Conservation Act, 1989 (Act No. 73 of 1989) (as amended);
  - The road upgrade must ensure the protection of ecological processes, natural systems and the natural beauty as well as the preservation of biotic diversity in the natural environment.
- Hazardous Substances Act, 1973 (Act No. 15 of 1973);
  - The project team must ensure the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and the control of certain electronic products if applicable.
- Land Administration Act, 1995 (Act No. 2 of 1995);
  - Applicant must ensure the delegation, powers and the assignment of the administration of laws regarding land matters are officially obtained and reported to the provincial authority for the realignment area.
- Water Services Act, 1997 (Act No. 108 of 1997); and
  - The project should ensure it does not negatively affected the water sources in the area through severe water contamination emanating from the road upgrade. A Water Use Application is currently underway.
- Occupational Health and Safety Act, 1993 (Act 85 of 1993).
  - All personnel must undertake the necessary basic environmental, health and safety training and issued with adequate personal protection equipment before commencement of the project.
- Protection of Personal Information Act, 2013 (Act 4 of 2013).
  - The Protection of Personal Information Act (or POPI Act) sets some conditions for responsible parties (called controllers in other jurisdictions) to lawfully process the personal information of data subjects (both natural and juristic persons).
  - To comply with the requirements of this Act, all personal information (emails, contact numbers, address) have been blanked out and excluded from Public Participation section and will only be provided to DFFE officials who do not require consent to receive such information in the performance of their official duties.
- Promotion of Access to Information Act, 2000 (Act No. 2 of 2000).
  - This Act gives effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights.

- To comply with the requirements of this Act, all documents relating to the BA Process will be made available to the public and relevant authorities at the different spheres of Government.

2.2 Provincial Legislation

This Chapter of the report presents provincial legislation applicable to the proposed development.

2.2.1 Limpopo Environmental Management Act No. 7 of 2003

The Limpopo Environmental Management Act (LEMA), Act No. 7 of 2003, makes provision with respect to the protection and conservation of the environment in the Limpopo Province. It makes provision for a wide variety of matters regarding the environment including: protected areas; hunting of wild and exotic animals; the establishment of Wildlife Councils; inland fishing and the protection and aquatic systems; the protection of indigenous plants; the application of CITES; restrictions on development and environmental impact reports; declaration and protection of mountain catchment areas; environmental pollution; and the protection of biodiversity in general.

The proposed road development must take into consideration the applicability of LEMA especially Chapter 6 (aquatic biota and aquatic systems), Chapter 8 (indigenous plants) and Chapter 15 (permits, permissions, exemptions and exclusions) of LEMA. The LEMA was studied based on the proposed road upgrade. According to Chapter 6 of LEMA, the road upgrade must ensure that there is no pollution to the existing aquatic systems resulting from the project. Chapter 8 of LEMA stipulates that no indigenous plants and protected plants may be removed or altered without a permit nor can they protected plants be removed or altered from a private property without the owner's consent. The applicant must obtain necessary permits / licenses from the MEC in the province and the permissions to remove or alter the identified protected plants in private properties must be obtained the owner in formal writing.

2.2.2 Waterberg District Environmental Management Framework

The Waterberg District Environmental Management Framework (Waterberg EMF) is an initiative of the National Department of Environmental Affairs (DEA) in partnership with the Limpopo Department of Economic Development, Environment and Tourism (LEDET), and the Waterberg District Municipality (WDM). The Waterberg EMF covers approximately 49 523 km^2. It is the largest district in the Limpopo Province. It contains 6 local municipalities, namely: Bela-Bela, Lephalale, Modimolle, Mogalakwena, Mookgopong, and Thabazimbi. The Waterberg EMF supports decision-making in the Waterberg District Municipality area in order to facilitate appropriate and sustainable development.

Initially the Environmental Management Zones for the Waterberg District EMF were determined through the careful evaluation of the status quo inputs and especially the environmental sensitivity and other priority needs in the area. The following Environmental Management Zones have been identified and are presented on **Table 15** and delineated on **Figure 14**. The table presents only zones that are applicable to the study area.

The study area was assessed and found to fall within Zone 1, Zone 2 and Zone 10 of the Waterberg EMF (**Figure 14**). The study area is generally within Zone 10 of the Waterberg EMF as this zone covers approximately 90% of the study area. The study area is located within high conservation areas and areas zoned for agricultural activities. As mentioned in **Section 2.1.2**, an Agricultural Impact Assessment has been undertaken for this project. Unlike with the Gauteng EMF, the Waterberg EMF does not provide exemption for the process of undertaking an EA process. Therefore, the proposed road upgrade will require an EA process through a BA.

Table 15: Waterberg District Environmental Management Framework Zones

Zone	Description	Conservation	Preferred Activities
Zone 1: Protection of natural vegetation, scenic landscape and rock painting areas, with limited appropriate tourism.	This zone represents areas with a generally high natural, visual and cultural quality that provides the core natural and cultural resource base for the establishment of the Waterberg as a conservation (even wilderness) destination. It is large and unique in form and character. The protection of the area as a whole is important.	Conservation is the priority land-use in this zone and should be promoted as the core activity in every instance.	Conservation of nature in protected areas in terms of the National Environmental Management: Protected Areas Act.
Zone 2: Nature and cultural tourism focus areas within a high quality natural setting.	This zone represents areas with a generally high, natural, visual and cultural quality that has significant potential for the development of nature and/or culture based tourism. It also forms the area from which the conservation use in zone 1 can be explored.	Conservation is the secondary focus of this zone. As such, conservation legislation should be observed and enforced. Conservation areas should be well maintained to encourage further tourism to the zone.	• Conservation of nature in protected areas in terms of the National Environmental Management: Protected Areas Act; and • Tourism facilities that make use of the surrounding natural and cultural environments as the main attractions place.
Zone 10: Agriculture areas with a commercial focus.	This zone represents areas with a strong rural agricultural character and is important for food production, food security and the employment opportunities that are linked to the agricultural activities. Agriculture is the main activity that occurs in these areas.	N/A	• Agriculture activities with an emphasis on dry land as well as irrigated crop cultivation; and • Infrastructure that support agricultural production, including agro-industries.

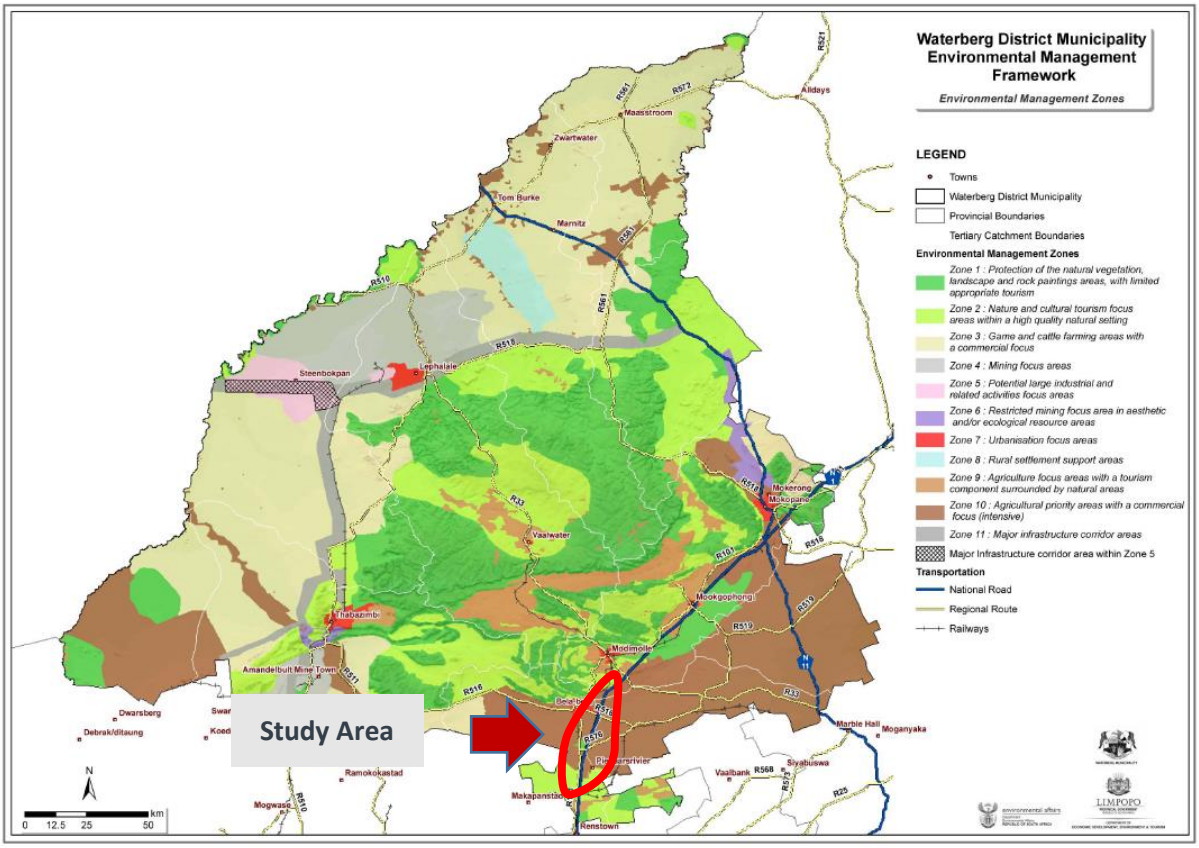

Figure 14: Waterberg EMF Map

2.2.3 Limpopo Province Spatial Development Framework (2012)

The formulation of a Spatial Development Framework, being a macro spatial plan for the Limpopo Province and its municipalities requires some statement on the spatial development objectives which guided the formulation of the macro spatial plan and hierarchy of settlements. The main objective with the provincial SDF was to formulate a spatial framework which would guide and encourage equitable distribution of investment in terms of a functional settlement hierarchy, to achieve spatially balanced development across the Limpopo Province and support investment in sustainable settlements. Other spatial development objectives which guided the formulation of the macro spatial plan as well as policy and strategy formulation for implementation are:

- The review and confirmation of the hierarchy of settlements (both towns and villages) by establishing an optimal and functional spatial pattern for districts and thus the Limpopo Province over time;
- Rationalize and promote the optimal use of land and protection of natural resources by taking into account high/moderate potential agricultural areas, high/moderate environmental sensitivity areas and mining/mineral deposit areas as well as other relevant factors;
- The establishing of a functional spatial pattern with a hierarchy of settlements which provides a sound basis for long term sustainable economic growth to amongst others increase income and employment in both the formal and informal sectors in urban, as well as rural areas;
- Provide guidelines for the development of transportation and utility networks to strengthen the functional linkages between settlements in terms of a hierarchy of settlements; and

- The successful integration of planning on macro (national and provincial) level and micro (district and local municipality) level.

Secondary objectives pertaining to the Environmental aspects and Agricultural potential of soils, namely:

The objectives of adding an environmental perspective to the spatial framework are:

- to ensure that resources in the province are used to their fullest potential in promoting, protecting and managing a sustainable environment;
- To include information contained in available databases to assist with decision making at strategic and project level assist in decision-making;
- To identify areas with high, moderate and low environmental sensitivity in order to assist with the correct placement of proposed developments from a strategic perspective;
- To ensure that environmental issues are identified and adequately addressed from the early planning phases and mitigated to an acceptable level; and
- To determine the environmental approach and studies needed for proposed developments in the different sensitivity areas.

The objectives of the agricultural potential analysis of soils in the Limpopo Province are:

- To provide for the use and preservation of agricultural land, especially high potential agricultural land by means of a soil potential map for the Limpopo Province and prescribe criteria (guidelines);
- To assist individuals (farmers, consultants) or groups (municipalities) who consider applying for a change of land use from agricultural to non-agricultural uses;
- To further refine the current guidelines created by Schoeman (2004) concerning prime or unique agricultural land.
- To create a workable soil potential map for each district municipality with regards to development in specific development nodes (municipal growth points) and areas outside the nodes; and
- To develop a set of prescribed guidelines for each soil potential class identified and mapped earlier, with specific reference to development nodes like growth points.

The proposed road upgrade must ensure that it is in alignment with the Limpopo Province SDF especially with issues pertaining the environmental sensitivity and agricultural and soils impacts.

2.2.4 Limpopo Biodiversity Conservation Plan

The Limpopo Conservation Plan, Version 2 (LCPv2), was completed in 2018 for the Limpopo Department of Economic Development, Environment & Tourism (LEDET) (Desmet *et al*., 2018). The purpose of the LCPv2 was to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas and associated land-use guidelines). The previous LimpopoConservation Plan (LCPv1) was completely revised and updated (Desmet *et al.,* 2018). A Limpopo Conservation Plan map was produced as part of this plan and sites were assigned to the following CBA categories based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:

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

- Protected Area (PA); and
- No Natural Remaining (NNR).

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (Desmet and Cowling, 2004).

Ecological Support Areas (ESA's) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services (SANBI, 2017). Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

Other Natural Areas (ONAs) consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (Desmet and Cowling, 2004).

Areas with No Natural Habitat Remaining (NNR) are areas in poor ecological condition that have not been identified as CBAs or ESAs. They include all irreversibly modified areas (such as urban or industrial areas and mines), and most severely modified areas (such as cultivated fields and forestry plantations). A biodiversity sector plan or bioregional plan must not specify the desired state/management objective or provide land-use guidelines for NNR areas (Desmet and Cowling, 2004).

According to the C-Plan, the study area falls within important biodiversity areas as it transects through both CBAs and ESA (**Table 16** and **Figure 15**). Important areas are potentially sensitive areas that are important for the conservation of biodiversity in the region. A site visit undertaken by the Environmental Assessment Practitioner (EAP) indicated that the proposed realignment areas are located within a natural ecosystem and low disturbed agricultural and/or game farms. The road upgrade will also include road widening which will potentially affect the mostly intact terrestrial and aquatic biodiversity areas. The road upgrade will therefore require clearing of indigenous vegetation located within priority biodiversity areas to accommodate the road realignment and overall upgrade. The clearance will trigger NEMA EIA Regulations. A summary of the important biodiversity within the study area is presented on **Table 16**.

Table 16: Summary of Important Biodiversity Areas along R101 Section 8

C-Plan Area	Road Chainage	Environmental Implication
Critical Biodiversity Area	km 12.5 – 16.9; km 17.6 – 20.7; and km 24 – 25.9.	GNR 985 Listing Notice 3 - Activity 12
Ecological Support Area	km 00 – 3.5; km 5 – 12.5; km 17 – 17.5; and km 26.2 – 26.8.	GNR 985 Listing Notice 3 - Activity 12
Other	km 3.6 – 4.9; km 20.8 – 23.9; km 25 – 25.5; and km 26 – 26.2.	N/A

According to the NEMA EIA 2014 Regulations (as amended), 'indigenous vegetation' "*refers to the vegetation consisting of indigenous plant species naturally occurring in the area, regardless of the level of alien infestation and where the topsoil has not been* ***lawfully*** *disturbed during the preceding ten years*". It is apparent from this

definition that the disturbance of indigenous vegetation requires that an Environmental Authorisation process be followed. The clearance of indigenous vegetation for the proposed road upgrade triggers Listing Notice 3, Activity 12. Therefore, the proposed road upgrade requires an environmental authorisation through Basic Assessment process.

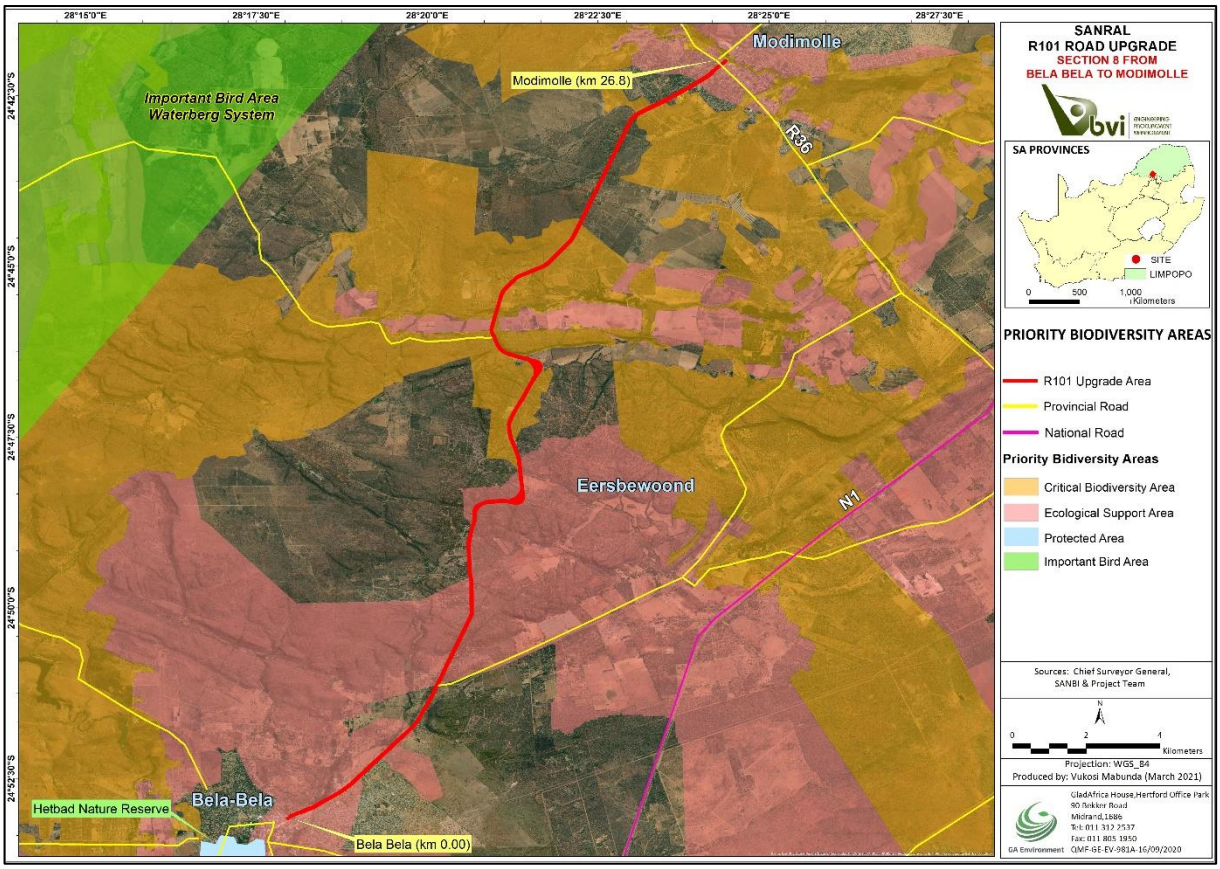

Figure 15: SANRAL R101 Section 8 C-Plan Map

The site's overall sensitivity is also outlined on page 19 of the DFFE Screening Report (**Appendix I**). According to the DFFE Screening Report, the site falls within a very high; CBA 1 and CBA 2, ESA 1 and ESA 2, and a vulnerable ecosystem, South African Protected Areas, as well as very high focus areas for land-based protected areas expansion. Although the existing road area has been disturbed, the road alignment is largely surrounded by areas consisting of intact natural habitats. As a result, an environmental authorisation is required for the proposed site according to NEMA EIA 2014 Regulations, as amended.

3 BASIC ASSESSMENT METHODOLOGY

The NEMA Regulations of 2014, as amended identify three separate administrative processes for EIAs, depending on the nature of the activity. A Basic Assessment (BA) process (Listing Notice 1) is identified for those activities that have less of a possible detrimental impact to the environment. A Scoping and EIA process (Listing Notice 2) is necessary for those activities, which are identified as having more of a possible detrimental impact on the environment, whereas Listing Notice 3 relates to identified activities that would require environmental authorisation through a BA prior to the commencement of those activities in specific identified geographical areas only. The methodology for undertaking of a Basic Assessment Process in line with the NEMA EIA Regulations, 2014 is provided below.

3.1 Pre-Consultation with the Competent Authority

Due to the known nature of the project being an upgrade of an existing road, the EAP determined that a pre-consultation meeting with the Competent Authority (DFFE) was not necessary as indicated on the pre-application meeting form submitted together with the public participation plan. The public participation plan was approved by DFFE on the 11th of March 2021. The approval is attached in **Appendix D2** of this report.

3.2 Registration of the Application with the Competent Authorities

An Application Form for Environmental Authorisation was completed and will be submitted together with the DBAR to DFFE for review and consideration.

3.3 Public Participation Process

A Public Participation Process (PPP) consistent with Chapter 6 of the NEMA EIA Regulations 2014, as amended (Government Notice R. 982 in Government Gazette No. 40772 of 07 April 2017) was followed for the project. In addition to Chapter 6 of the NEMA EIA Regulations, 2014 as amended, on the 5th of June 2020, the Minister of Environment, Forestry and Fisheries issued directions regarding the measures to address, prevent and combat the spread of the COVID-19 relating to the National Environmental Management Permits and Licences. A Public Participation Plan was submitted to the DFFE on the 10th March 2021, the plan was approved on the 11th of March 2021. The Public Participation Plan and correspondence with the DFFE is attached to **Appendix D2**. The PPP undertaken for the project included the following:

- the identification of Interested and Affected Parties;
- the compilation of an I&AP database;
- the placement of site notices at visible and accessible locations close to the site (undertaken in March and April 2021);
- the placement of a newspaper advertisement in a local newspaper;
- the distribution of Notification Letters to adjacent land owners and other parties on an on-going basis since the notification period commenced in March 2021; and
- the draft basic assessment report (Revision 0) public review period was between 15th June and 16th July 2021.

The details of the PPP undertaken to date is discussed in detail in **Chapter 6** of this report.

3.4 Revised Draft Basic Assessment report

As already mentioned, this draft Basic Assessment report was re-issued for public review due to additional information provided by the Engineering team regarding to construction methodology that will be used especially during the demolition and construction of the existing bridges. The Revised Draft Basic Assessment Report has been compiled and will be issued out for Public and Authority review for the legislated period of at least 30 days. It is important to highlight that the review period was determined in line with the reckoning of days as defined in Regulation 3 of the NEMA EIA Regulations, 2014, as amended. The following commenting authorities and institutions will be provided with a copy of the report in electronic format and/or hardcopy format if requested:

- Waterberg District Municipality;
  - Environment, Social and Disaster Department;
  - Infrastructure Development Department; and
  - Planning Department and Economic Development.
- Bela Bela Local Municipality;
  - Technical Services (Roads and Stormwater);
  - Planning and Economic Development;
  - Roads and Infrastructure;
  - Town Planning; and
  - Bela Bela Local Municipality Library.
- Modimolle Local Municipality;
  - Technical Services (Roads and Stormwater);
  - Planning and Economic Development;
  - Roads and Infrastructure;
  - Town Planning; and
  - Modimolle Local Municipality Library.
- Limpopo Provincial Government:
  - Department of Agriculture and Rural Development;
  - Department of Economic Development Environment and Tourism;
    - Biodiversity Management; and
    - Environmental Impact Management,
  - Department of Transport;
  - Public Works, Roads and Infrastructure Department; and
  - Limpopo Provincial Heritage Resources Authority (LIHRA)
- Roads Agency Limpopo (RAL);
- South African Heritage Resources Agency (SAHRA); and
- Department of Water and Sanitation (DWS) - Limpopo Regional Office.

SMS, e-mail notifications and telephone calls will be utilised to notify all registered I&AP's about the availability of the report and the changes within the report.

3.5 Other Supporting Documents to the Basic Assessment

As part of the Basic Assessment process, an Environmental Management Programme (EMPr), Alien Invasive Management Plan, Erosion and Soil Management Plan, and Rehabilitation Plan have been compiled in line

with Appendix 4 of the NEMA EIA Regulations, 2014, as amended. The EMPr provides guidelines to SANRAL as the Project Developers, the Contractor as well as various other members of the technical team on how best to implement the mitigation measures for the proposed activity the site in order to avoid adverse environmental impacts. Refer to **Appendix G** of this Basic Assessment Report for the Environmental Management Plans including the Environmental Management Programme (EMPr).

3.6 Issuing of the Environmental Authorisation

Following the review of the Final Basic Assessment Report, DFFE will issue the applicant with their decision on the application, which could either be the rejection of the application or an approval for which an Environmental Authorisation (EA) will be issued in terms of Section 24 of NEMA. This Environmental Authorisation will be issued to SANRAL as the applicant. It should be noted that the EA may state that the activity may not commence before certain conditions are complied with. The EA may also include any other conditions that DFFE considers necessary for the protection of the environment.

3.7 Appeal Period

After a decision has been reached by DFFE, Chapter 2 of the National Appeal Regulations 2014 makes provision for any affected person to appeal against the decision. Within 20 days of being notified of the decision by DFFE, the appellant must submit the appeal to the appeal administrator. An appeal panel may be appointed at the discretion of the delegated organ of state to handle the case. The appeal panel will then submit its recommendations to that organ of state for a final decision on the appeal to be reached. GA Environment will communicate the decision of the DFFE and the manner in which appeals should be submitted to the Minister and to all I&APs as soon as reasonably possible after the final decision has been received.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This Chapter serves to describe the environmental setting of the area identified whilst the environmental issues that were identified to be of significance are discussed in **Chapter 8** of this report. The Chapter will also provide a description of the overall character and other sensitivities that were identified in the surrounding environment. It must be highlighted that only aspects that are relevant to the project in terms of the environmental setting as well as the nature of the proposed activities are discussed in this section of the report. This Chapter will present both the Biophysical and the Socio-Economic Conditions of the site and its geographical setting.

4.1 Biophysical aspects

4.1.1 Climate and Topography

Climate is an important element for the project due to the following key factors:

- To plan for the construction phase as climate (particularly rainfall) can impact on project progress as noted in sources such as Ballesteros-Pérez (2017) & Freeman (2017);
- To establish the viability of the proposed realignment areas for proposed agricultural activities and/or game farming.

The climate of the Waterberg District varies. The northern and western regions of the area experience hot and semi-arid climate. The southern and eastern regions are more humid and slightly cooler. The Waterberg District receives summer rainfall. **Table 17** provides a summary of the climate along the study area which is described thereafter.

Table 17: Summary of Climate along R101 Section 8

Climate Type	Road Chainage	Characteristics
• Local steppe climate. • BSh Climate	km 00 – 12.4	• Cold winters and warm summers. • Summer rainfall. • Average temperature: 19.6 °C. • Annual rainfall: 636 mm.
• Cwa Climate.	km 12.5 – 26.8	• Mild and warm temperatures. • Summer rainfall. • Average temperature: 19 °C. • Annual rainfall: 696 mm.

According to Climate-Data Org (2021), the prevailing climate in Bela-Bela is known as a local steppe climate and BSh climate. A steppe is a dry, grassy plain that occurs in temperate climates while temperate regions have distinct seasonal temperature changes, with cold winters and warm summers. This climate is considered to be BSh (hot semi-arid climate) according to the Köppen-Geiger climate classification. In Bela-Bela, the average annual temperature is 19.6 °C and average annual rainfall is 636 mm. The driest month is July with 3 mm of precipitation. Most of the precipitation in the area falls in December, averaging 127 mm.

According to Climate-Data Org (2021), the climate in Modimolle is mild, and generally warm and temperate. In winter, there is much less rainfall in Modimolle than in summer. This location is classified as Cwa (humid

subtropical climate) by Köppen and Geiger. In Modimolle, the average annual temperature is 19.0 °C and average annual rainfall is 696 mm. Precipitation is the lowest in July, with an average of 3 mm. With an average of 139 mm, the most precipitation falls in December.

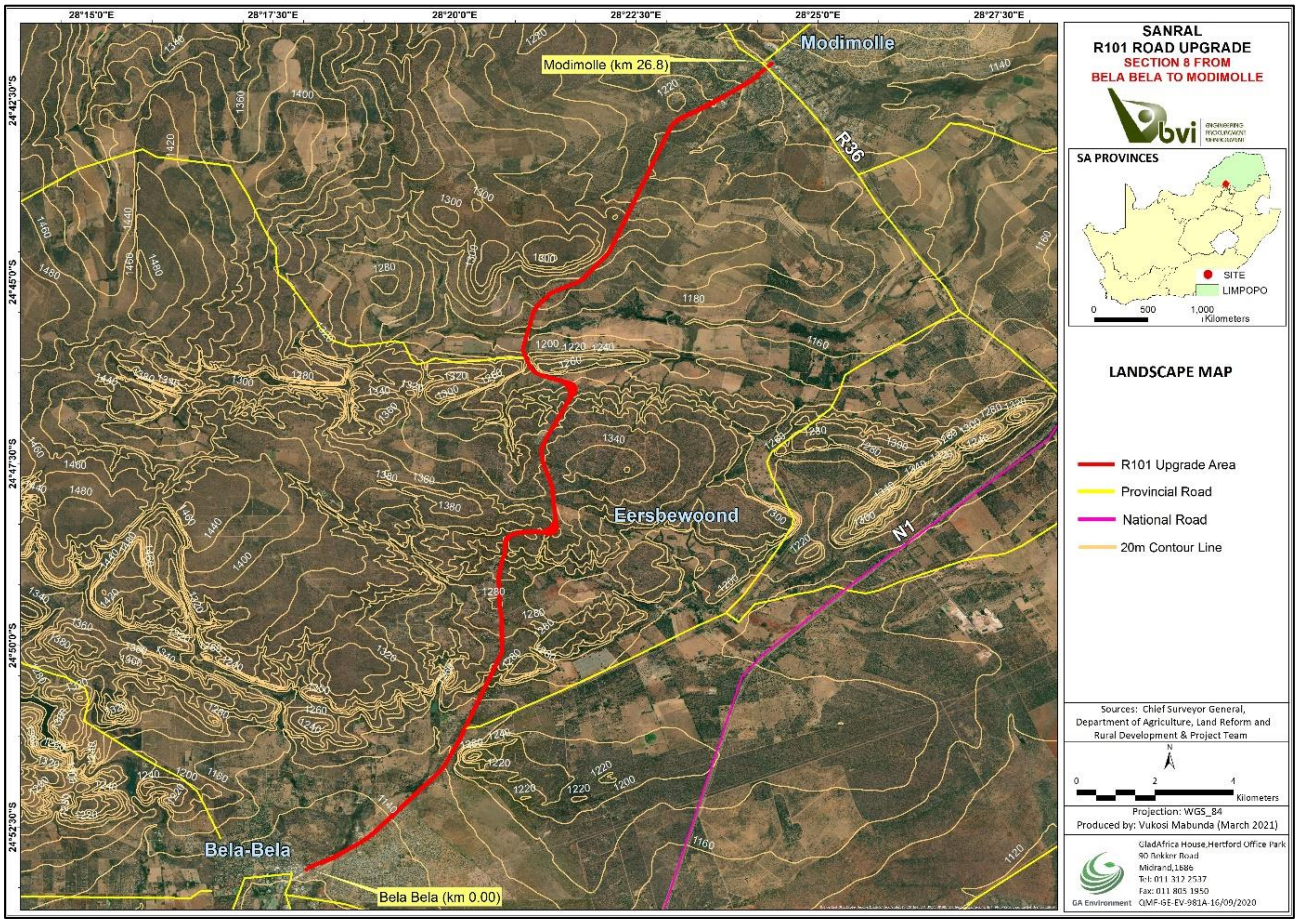

Figure 16: Topography of the study area

The landscape of the Waterberg District is a unique feature that distinguishes it from any other place in South Africa. There are four main landscape features in the Waterberg District, namely the Waterberg Plateau, the Transvaal Plateau Basin, the Pietersburg Plain and the Limpopo Depression. The general topography of the proposed road upgrade area begins with gentle slopes in Bela Bela averaging 1140m above mean sea level then gently steepens northwards towards Eersbewoond where there are valleys and ridges. The landscape then gently steepens towards Modimolle to 1160m above mean sea level (**Figure 16**). The overall landscape if relatively flat with the exception of the central parts that has uneven surfaces of ridges / koppies and valleys. Climate and landscape are not anticipated to be problematic to the proposed development.

4.1.2 Geology and soils

a) Geology

The geology of the Waterberg District forms the foundation for the development of the landscape, soils and vegetation cover that developed upon it over millions of years. It is also the source of minerals that form the backbone of the economy of the district. The simplified geology of the Waterberg District can be classified into five distinct geology types, namely the Transvaal Super Group, Karoo Super Group, Waterberg Group, Bushveld

Igneous Complex, and the Archaean Granite/Gneiss and Swazian Complex. The Karoo Super Group contains coal deposits while Bushveld Igneous Complex harbours important sources of platinum and chromium. The Waterberg Group contains no minerals of economic value. The Transvaal Super Group has iron ore deposits. There are four dominant rock types within the study area as indicated on **Figure 17**.

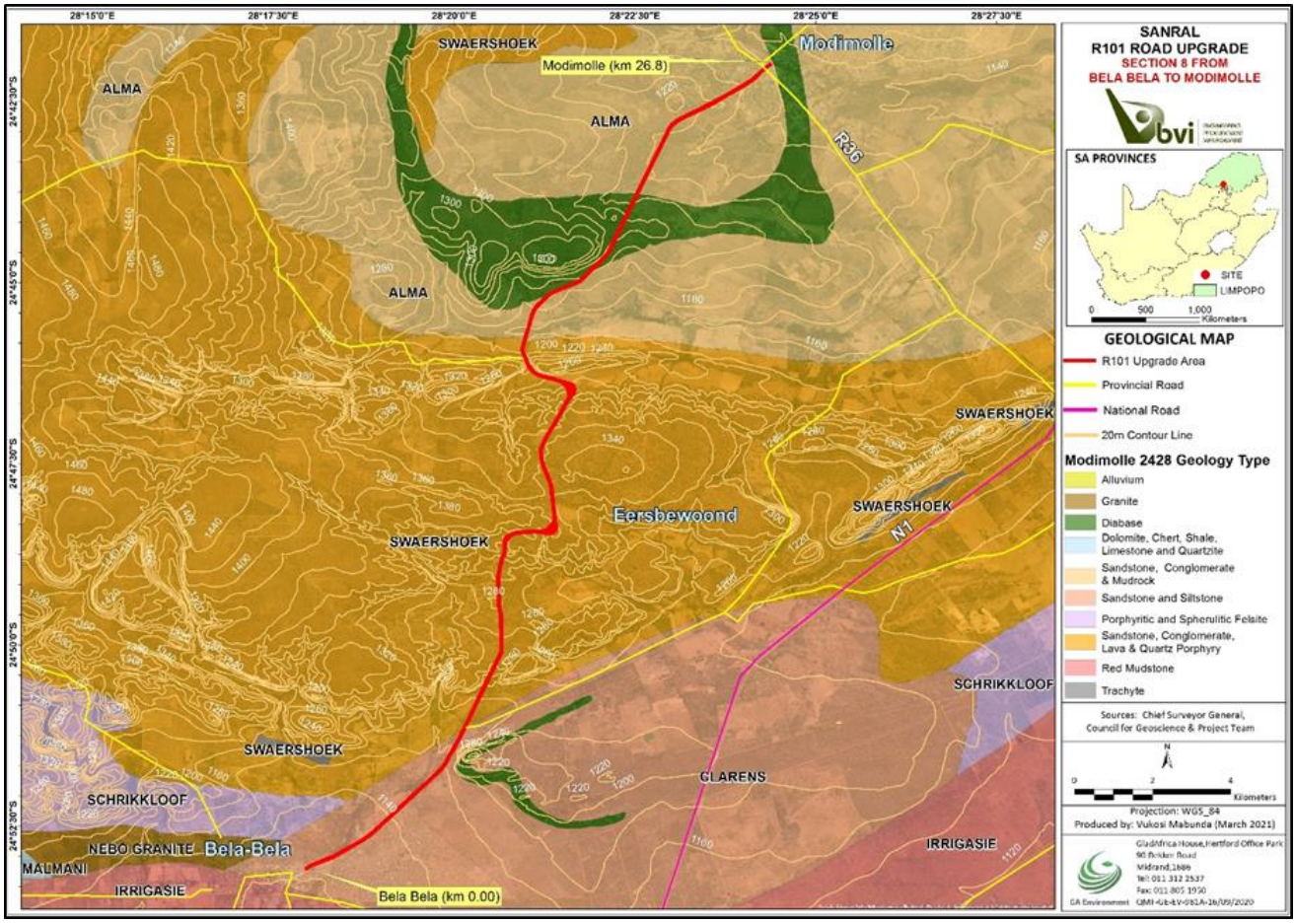

Figure 17: Lithology of the Study Area

A GIS based assessment on information from the Council for Geoscience and Department of Agriculture, Land Reform and Rural Development was undertaken. According to the 1:250 000 Nylstroom (Modimolle) 2428 Geological Map Sheet, the study area was assessed to be underlain by: Diabase; Sandstone and Siltstone of the (Stormberg Group, Karoo Supergroup); Sandstone, Conglomerate, Lava and Quartz Porphyry of the Swaershoek Formation (Waterberg Group, Transvaal Supergroup); Sandstone, Conglomerate and Mudrock of the Alma Formation (Waterberg Group, Transvaal Supergroup). The geology along the study area can be categorized into the Waterberg Group geology, the Stormberg Group geology and the diabase (dolerite dykes and sills intrusions) as represented in **Figure 17** and **Table 18**.

The Waterberg Group rocks are chemically resistant and very hard, they produce spectacular cliffs and mountainous topography (McCarthy and Rubidge 2006). The Swaershoek Formation extends over the entire Nylstroom syncline and the northern slopes of the Swaershoekberge and the Hoekberge. It overlies the Rooiberg Group of the Transvaal Supergroup (Kent 1980). This formation forms the base of the Waterberg Group with a maximum thickness of 2500 m (Visser, 1989). While the Karoo Supergroup is renowned for its fossil wealth (Kent 1980, Visser 1989). Three formations overlie the Beaufort Group, they are the Molteno,

Elliot and Clarens Formations. The Clarens Formation has a maximum thickness of 250 m in the south. Pink and yellow sandstone is fine and never coarse. Cave and cliff formation are common. Fossils are scarce, but dinosaurs are found with the fish *Semionotus capensis* (Norman and Whitfield 2006, Snyman 1996, Visser 1998).

Table 18: Summary of Geology along R101 Section 8

Rock Type	Road Chainage	Parent Rock	Characteristics	Considerations / Requirements
Clarens - Sandstone and Siltstone	km 0.0 – 5.1.	Stormberg Group - Karoo Supergroup	• Sedimentary Rock. • Soft to hard based on composition. • Weathering properties depend on composition	• No anticipated geological constraints for the proposed road upgrade. • Enhanced engineering designs and techniques may be required.
Diabase	km 18.5 - 22.2.	Karoo dolerite dykes and sills	• Igneous Rock. • Extremely hard. • Resistant to weathering	• No anticipated problem for the proposed road upgrade. • Enhanced engineering designs and techniques may be required.
Swaershoek - Sandstone, Conglomerate, Swaershoek - Lava and Quartz Porphyry	km 5.2 – 17.3.	Waterberg Group - Transvaal Supergroup	• Sedimentary Rock. • Soft to hard based on composition. • Weathering properties depend on composition • Igneous Rock. • Hard to extremely hard. • Usually resistant to weathering.	• No anticipated geological constraints for the proposed road upgrade. • Enhanced engineering designs and techniques may be required.
Alma - Sandstone, Conglomerate and Mudrock	km 17.4 – 20; km 22.1 – 26.8;	Waterberg Group - Transvaal Supergroup	• Sedimentary Rock. • Soft to hard based on composition. • Weathering properties depend on composition. • Mudrocks are nondurable.	• Mudrocks are problematic soft rocks. • Geotechnical investigations and engineering designs will be required to overcome any possible constraints associated with the mudrocks within the study area.

According to the PDR, from a regional perspective, the road section under discussion is located on sediments associated with the Nylstroom Subgroup of the Waterberg Group. Although detail geotechnical investigations are were currently underway at the time of compilation of this report, the PDR confirmed the geological occurrences indicated above. A copy of the PDR is attached to **Appendix B.** The undertaking of the Geotechnical Investigation does not form part of the Environmental Scope of Work and is undertaken as part of the Engineering Scope.

b) Soils

According to the Agricultural and Soils Assessment undertaken by Afzelia Environmental Consultants, this section of the R101 traverses soils of the Central Sandy Bushveld Ecosystem of the central Bushveld Bioregion of the Savanna Biome. These are generally poor soils whose agricultural potential is also challenged by a relatively low rainfall during hot, subtropical summers. The study area can be categorised into two parts, the

northern and southern portions. Soils in the southern half are likely to have a depth of 1 m or more, to have a poor water holding capacity and a moderate to high erosion hazard. Red soils will have a good yield potential but due to seasonal factors will require irrigation water In contrast to this soils in the northern portion of the route will be mainly shallow and steep with a very poor yield potential.

The soils map is presented on **Figure 18**. The arrows on the map below indicate the locality of the two soil parent materials along the route. The dark yellow area indicated by the upper arrow which is intrusive dolerite approximately 200 million years old. This is probably deep, red, high yield potential soil. The pale yellow area indicated by the lower arrow reflects soil parent material of sedimentary origin of the Waterberg and Soutpansberg Groups, approximately 1800 million years old. These are likely to be deep sandy soils with a moderate too poor yield potential.

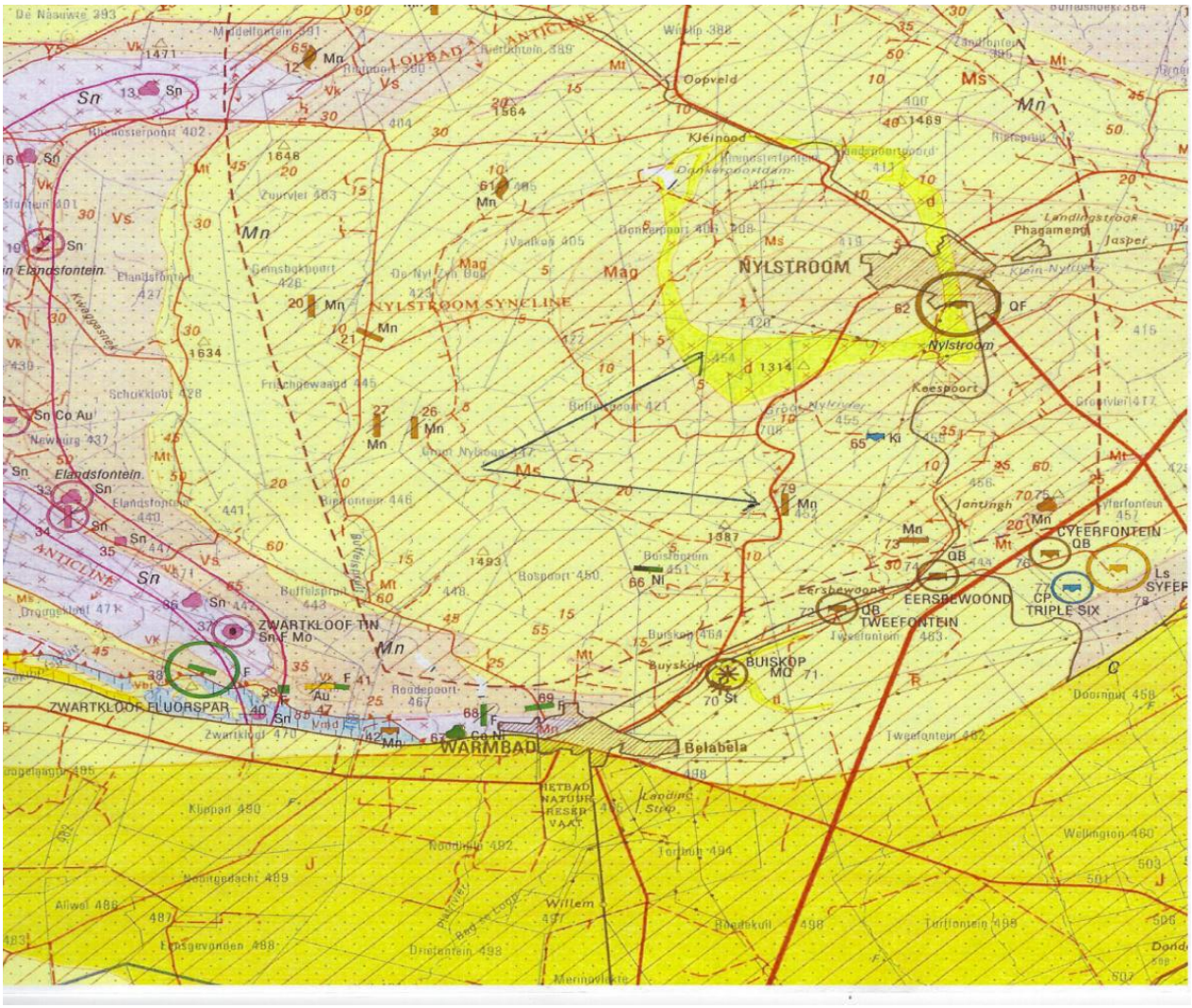

Figure 18: Soils map of the study area (Afzelia, 2021)

4.1.3 Regional Vegetation and Conservation Plan Area

This section describes the vegetation present, including each habitat unit associated with the study area.

a) Conservation Plan Area

The objectives of the Conservation Plan have already been discussed in **Section 2.2.4** of this report. Sections of the study are located with CBAs and ESAs (**Figure 14**).

b) Vegetation Types

According to the Terrestrial Biodiversity Assessment undertaken by the Biodiversity Company (2021), the vegetation that occurs within the study area is the Central Sandy Bushveld, Springbokvlakte and the Waterberg Moist Mountain Bushveld as indicated on **Table 19** below.

Table 19: Summary of Vegetation Types along R101 Section 8

Vegetation Unit	Road Chainage	NEMBA Protection Status	Environmental Implication
Springbokvlakte Thornveld	• km 0.0 – 5.3.	• Endangered. • Protected ecosystem.	GNR 985 Listing Notice 3 - Activity 12
Central Sandy Bushveld	• km 5.4 – 6.2; • km 7.2 – 9.1; • km 11.8 – 14.9; • km 15.5 – 16.3; and • km 17.2 – 26.8.	Not Protected	Environmental Management Programme
Waterberg Moist Mountain Bushveld	• km 6.3 – 7.1; • km 9.2 – 11.7; • km 15 – 15.4; • km 16.4 – 17.1; and • km 20 – 21.4.	• Not Protected. • Part of Waterberg Biosphere Reserve (UNESCO conservation project).	Environmental Management Programme

According to Mucina & Rutherford (2006), the Springbokvlakte Thornveld vegetation is found in the north north-eastern parts of South Africa occurring in Limpopo, Mpumalanga, North West and Gauteng Provinces. The vegetation type is characterised by open to dense, low thorn savanna dominated by Acacia species or shrubby grassland with a very low shrub layer. Occurs on flat to slightly undulating plains. This vegetation type is considered to be 'endangered' (Driver *et al*., 2005 and Mucina & Rutherford, 2006). However, as according to the NEMBA 2004, the Springbokvlakte Thornveld vegetation is listed as a 'vulnerable ecosystem' essentially not triggering GNR 985 Listing Notice 3. Nevertheless, this vegetation unit is protected under Act No. 10 of NEMBA 2004.

The Central Sandy Bushveld vegetation type is located in undulating terrain, occurring mainly from the Pilanesberg in the west to GaMasemola in the east (Mucina & Rutherford (2006). The habitat conforms to low undulating areas, sometimes between mountains, sandy plains and. The Central Sandy Bushveld endemic grass species include *Mosdenia leptostachys* and *Oxygonum dregeanum* subsp. *canescens var. dissectum*. This vegetation type is regarded 'vulnerable' with less than 3% statutorily conserved in nature reserves (Mucina and Rutherford, 2006). However, according to NEMBA 2004, the Central Sandy Bushveld vegetation is not a listed ecosystem and does not trigger GNR 985 Listing Notice 3. Approximately 24% of the vegetation area is transformed, comprising of 19% cultivated and 4% urban and built-up areas. Much of the unit is heavily populated by rural communities.

The last vegetation unit consists of plains that have three types of habitats that include wetlands, sour bushveld, and mountain slopes. This vegetation unit is referred to as the 'Waterberg Moist Mountain Bushveld

and forms part of the Waterberg Biosphere Reserve (UNESCO conservation project). Habitats are sufficiently represented to ensure that the current high biodiversity is maintained in this Biosphere. The Waterberg Moist Mountain Bushveld vegetation is a landscape that exhibits rugged mountains with vegetation grading from bushveld on higher slopes through broad-leaved deciduous bushveld on rocky mid and foot slopes to savanna in the lower lying valleys as well as on deeper sands of the plateaus. The grass layer is moderately developed or well developed. Contrary to the Waterberg Biosphere Reserve, the Waterberg Moist Mountain Bushveld vegetation is regarded as 'least threatened ecosystem' with about 9% statutorily conserved in Nature Reserves (Mucina and Rutherford, 2006). In addition, this vegetation unit is not a listed nor protected ecosystem and does not triggering GNR 985 Listing Notice 3 (NEMBA, 2004). This is primarily due to the low human population density in the area. The vegetation area is mainly transformed by cultivation. **Figure 19** presents the spatial distribution of the vegetation units along the study area.

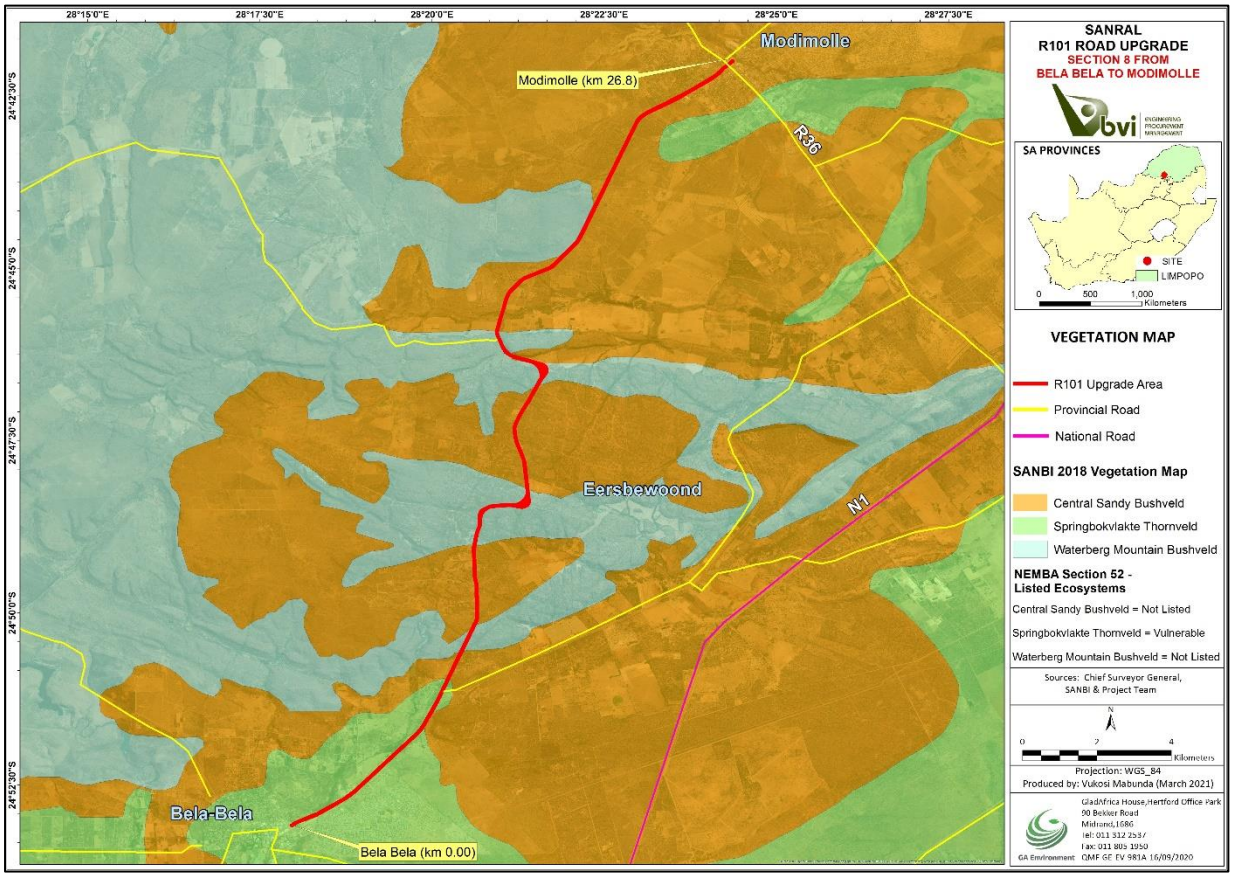

Figure 19: Vegetation types along the study area

c) Habitat Units

A Terrestrial Biodiversity Assessment (Fauna and Flora) undertaken by the Biodiversity Company for the proposed project is attached to **Appendix F1** of this report. According the specialist assessment, four habitat units were identified within the study area namely; mountain bushveld, savanna bushveld, riparian vegetation, and transformed habitat (**Figure 20**). It must be noted that the specialists assessments study area was exaggerated at the realignment areas to assess a larger area than the actual proposed upgrade area. The aim of this process was to obtain a holistic environmental sensitivity in the case that the realignments were to slightly deviate.

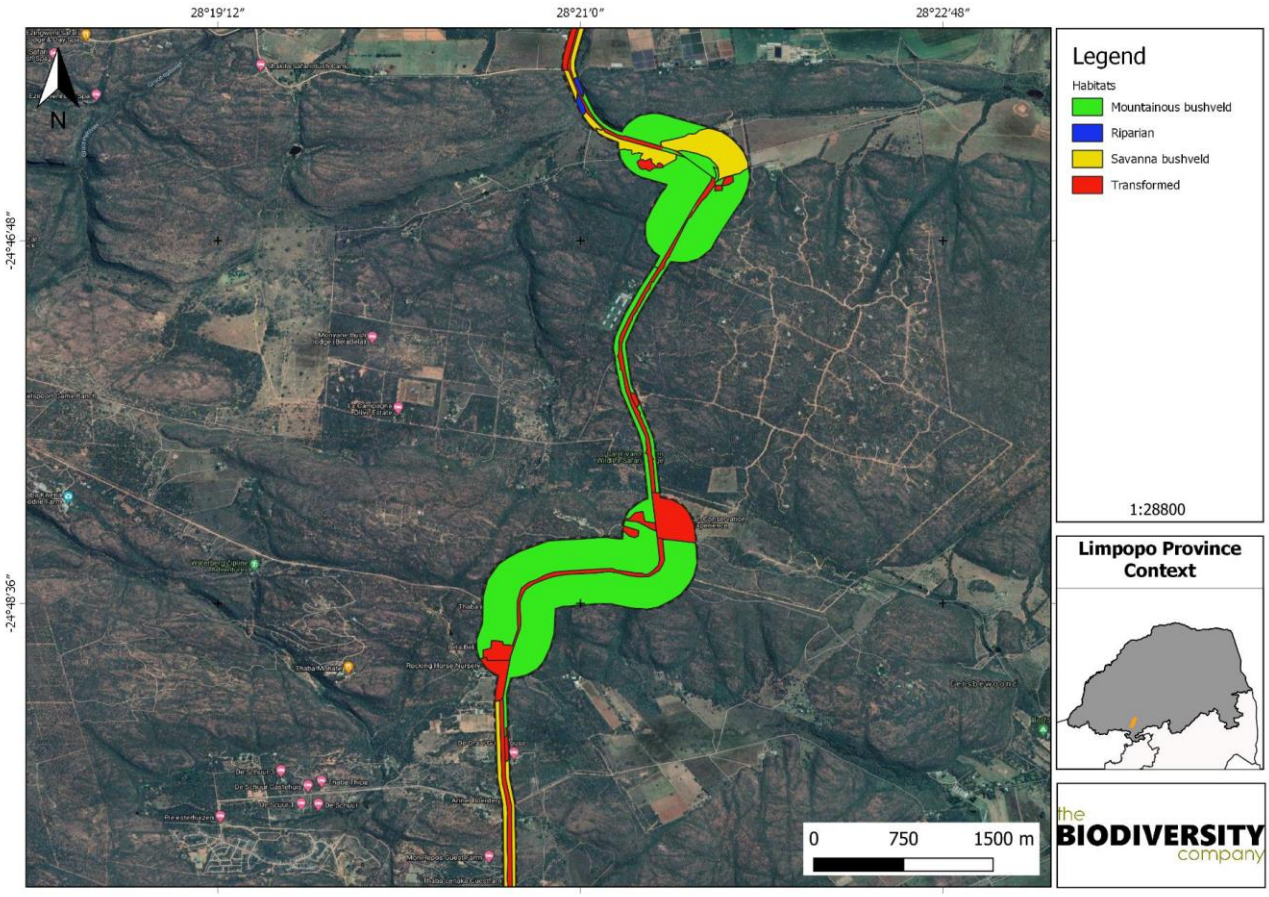

Figure 20: Habitat units identified within the study area (Biodiversity Company, 2021)

A description of these habitat units is provided in **Table 20.**

Table 20: Habit Units Identified Within the Study Area

Habitat Unit	Description
Mountain Bushveld Habitat Unit:	One of the two main habitat types recorded on site which consisted of a variation of Waterberg Mountain Bushveld. This habitat is mainly intact with few disturbances, mainly due to their remoteness and unsuitability for agricultural practices. From a species composition and richness perspective, this habitat type exhibited a large number of expected species, indicating a more natural habitat type. Variations within this habitat type cantered around rockiness and slopes, both of which created micro-environments. **Figure 21A** presents the image of this habitat.
Savanna Bushveld Habitat	Whereas the mountain bushveld is found mainly in the higher grounds, in lower lying areas more open Savanna bushveld associated with *Burkea Africana-Terminalia sericea* on deeper sands of the plateaus is found. This habitat unit is more accessible to livestock and farming activities and as a result, suffered. The lower lying sandy areas are mainly impacted by bush clearing for agricultural practices as well as grazing by livestock. Nevertheless, this habitat still exhibited a large percentage of expected species. Variations within this habitat type was mainly due to severity of land use

	impacts, with areas cleared of vegetation being a transformation to a grassland plans habitat type. **Figure 21B** presents the image of this habitat.
Riparian Habitat Unit	This habitat is found specifically at the river crossings where bridge upgrades are planned. Even though disturbed, the ecological integrity, importance and functioning of these areas play a crucial role as a water resource system and an important habitat for various fauna and flora. The preservation of this system is a crucial aspect to consider for the proposed development, even more so due to the scarcity of water in the area. This habitat needs to be protected and improved due to the role of this habitat as a water resource. **Figure 21C** presents the image of this habitat.
Transformed habitat unit	This habitat unit represents all areas of urban development, homesteads, agricultural areas and the associated tar and secondary roads and road reserves. This habitat is regarded as transformed due to the nature of the modification of the area to an extent where it would not be able to return to its previous state. Due to the transformed nature of this habitat, it is regarded as having a low concern sensitivity. The road reserves did exhibit a number of *Sclerocarya birrea* protected tree species, which were left intact during road construction. **Figure 21D** presents the image of this habitat.

Figure 21: Images representing the habitats in the area (A) Mountain Bushveld, (B) Savanna Bushveld (C) Riparian and (D) Transformed

Floral Species of Conservation Concern identified by the specialist in the respective habitat units are provided in the next section.

d) Floral Species of Conservation Concern

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, 840 plant species have the potential to occur in the project area and its surroundings (Biodiversity Company, 2021). Of these 840 plant species, two (2) species are listed as being Species of Conservation Concern (SCC), *Cleomaceae* and *Apocynaceae*. The first preference will be to conserve these species as far as possible followed by the second option of mitigating the impacts onto this species. According to the Terrestrial Assessment undertaken by the Biodiversity Company, two protected tree species were recorded within the study area, *Sclerocarya birrea subsp. caffra* (Marula) and *Combretum imberbe* (Leadwood) as discussed in **Section 2.1.7**.

e) Faunal Habitat and Species

According to the Terrestrial Assessment undertaken by the Biodiversity Company (2021), 341 bird species have the potential to occur in the vicinity of the project area. Of the potential bird species, 13 species are listed as SCC either on a regional or global scale. Seven species have a low likelihood of occurrence in the project area due to a lack of suitable habitat. There are five species with a high likelihood of occurrence on site as indicated on **Table 21.**

Table 21: List of SCC Bird species that may occur in the area

Species	Common Name	Conservation Status		Occurrence likelihood
		SANBI 2016	UICN 2017	
Alcedo semitorquata	Kingfisher, Half-collared	NT	LC	Moderate
Aquila verreauxii	Eagle, Verreaux's	VU	LC	Low
Ciconia abdimii	Stork, Abdim's	NT	LC	Low
Ciconia nigra	Stork, Black	VU	LC	Low
Coracias garrulus	Roller, European	NT	LC	High
Falco biarmicus	Falcon, Lanner	VU	LC	High
Glareola nordmanni	Pratincole, Black-winged	NT	NT	Low
Gyps africanus	Vulture, White-backed	CR	CR	High
Gyps coprotheres	Vulture, Cape	EN	EN	High
Leptoptilos crumeniferus	Stork, Marabou	NT	LC	Low
Mycteria ibis	Stork, Yellow-billed	EN	LC	Low
Sagittarius serpentarius	Secretarybird	VU	VU	Low
Torgos tracheliotus	Vulture, Lappet-faced	EN	EN	High

The International Union for Conservation of Nature (IUCN) Red List Spatial Data (IUCN, 2017) lists 98 mammal species that could be expected to occur within the project area. Species limited to nature reserves in South Africa was removed from the expected species list. Seventeen species of conservation concern have a potential to occur in the project area (**Table 22**). Seven species have a low likelihood of occurrence, mainly as a result of lack of suitable habitat.

Table 22: List of SCC Mammal species that may occur in the area

Species	Common Name	Conservation Status		Occurrence likelihood
		SANBI 2016	UICN 2017	
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Atelerix frontalis	South Africa Hedgehog	NT	LC	High
Cloeotis percivali	Short-eared Trident Bat	EN	LC	Moderate
Crocidura mariquensis	Swamp Musk Shrew	NT	LC	Low
Crocuta crocuta	Spotted Hyaena	NT	LC	Moderate
Dasymys incomtus	African Marsh rat	NT	LC	Low
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Low
Felis nigripes	Black-footed Cat	VU	VU	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Low
Leptailurus serval	Serval	NT	LC	High
Neamblysomus julianae	Juliana's Golden Mole	EN	EN	Low
Panthera pardus	Leopard	VU	VU	High
Parahyaena brunnea	Brown Hyaena	NT	NT	High
Pelea capreolus	Grey Rhebok	NT	NT	High
Poecilogale albinucha	African Striped Weasel	NT	LC	High
Redunca fulvorufula	Mountain Reedbuck	EN	LC	High
Rhinolophus blasii	Blasius's horseshoe bat	NT	LC	Moderate
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Atelerix frontalis	South Africa Hedgehog	NT	LC	High
Cloeotis percivali	Short-eared Trident Bat	EN	LC	Moderate
Crocidura mariquensis	Swamp Musk Shrew	NT	LC	Low
Crocuta crocuta	Spotted Hyaena	NT	LC	Moderate
Dasymys incomtus	African Marsh rat	NT	LC	Low

One of most significant impact on terrestrial biodiversity that has been identified is the blasting that will be undertaken at the three realignment areas. Disturbance and mortalities of fauna species including species of conservation concern due to blasting and destruction activities, further loss and fragmentation of the vegetation community including sensitive ridge habitat are anticipated. Such impacts will definitely result in the destruction and fragmentation of intact and functional CBA areas, areas rated “Very High”.

4.1.4 Hydrological and Aquatic Characteristics

The proposed study area falls within Apies/Pienaars and Mogalakwena Sub-Water Management Areas (WMA). According to the 2018 National Biodversity Assessment data from SANBI, the study area trasects the ripariran areas of Bad se Loop, Klein Kariba and Groot Nyl River as indicated on **Figure 22**. Wetland/Riparian delination

Assessment undertaken by Environmental Assurance confirmed the aforementioned riparian areas (**Figure 23**). A copy of the Wetland/Riparian delination Assessment report is attached to **Appendix F4**.

According to the study, the proposed road widening will predominantly take place in already infilled and transformed areas directly adjacent to the existing R101 roadway within the existing road reserve. However, small areas of wetland habitat will be lost during the widening of the R101. A Water Use Authorisation will be undertaken for the proposed project.

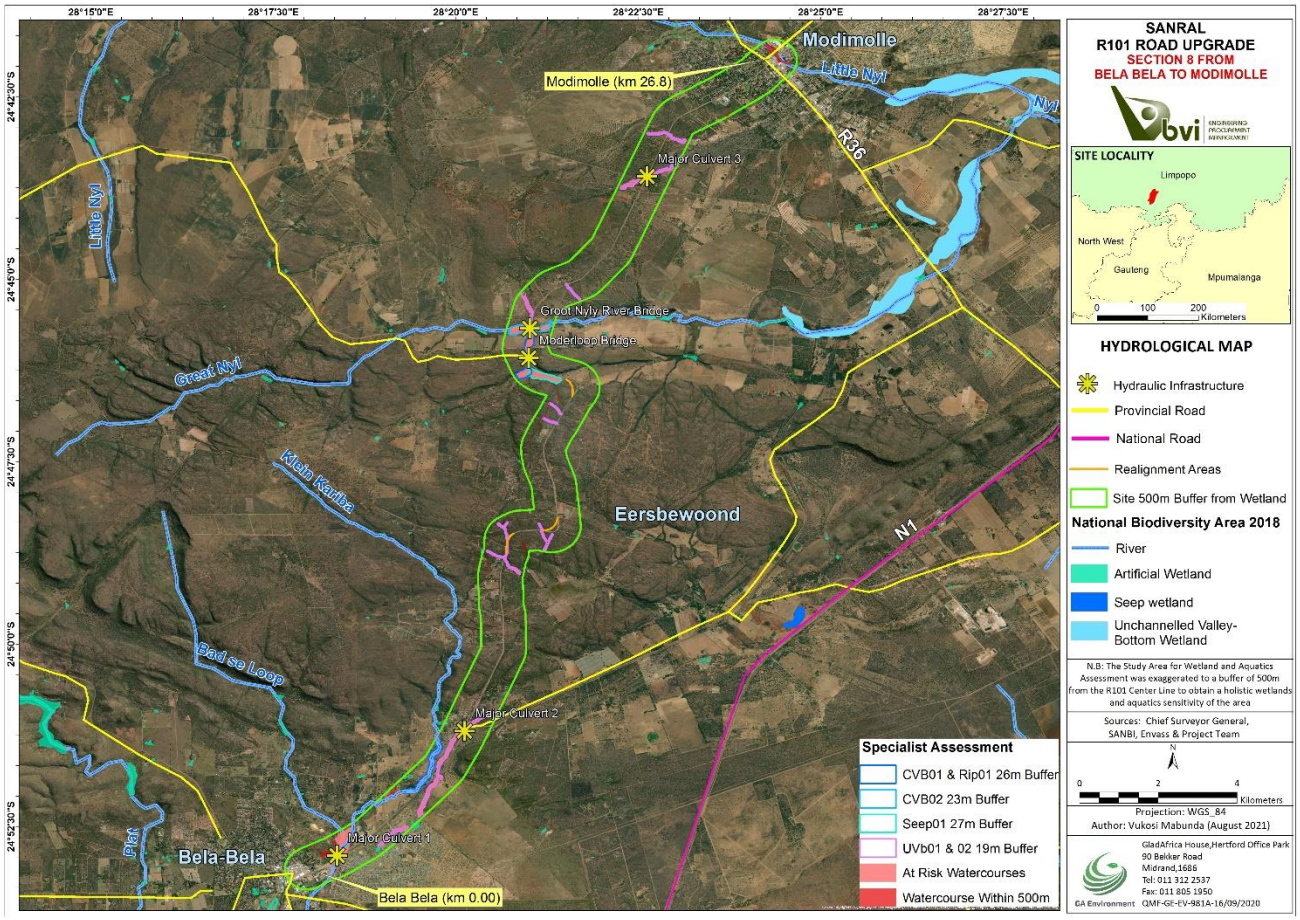

Figure 22: NBA 2018 Hydrological Map

The study further entails that the northern portion of the proposed development will traverse a Fish Sanctuary and a small portion of the center of the proposed development will traverse a Phase 2 Freshwater Ecosystem Priority Area (FEPA). Fish sanctuaries are rivers that are essential for protecting threatened freshwater fish that are indigenous to South Africa. The entire sub-quaternary catchment associated with the river is indicated as a Fish Sanctuary. There should be no further deterioration in river condition in fish sanctuaries and no new permits should be issued for stocking invasive alien fish in farm dams in the associated sub-catchment.

Seven (7) natural and nine (9) artificial wetlands are located within the 500 m assessment radius around the proposed development (**Figure 22**). However, of the wetlands identified only three (3) areas indicated as natural wetlands by National Freshwater Ecosystem Priority Area (NFEPA) will be traversed by the proposed development. The study found that only one (1) of these areas contained wetland habitat. The remaining two (2) natural wetlands indicated by the NFEPA dataset did not contain wetland habitat and were determined to

be associated with a riparian area. The proposed development also traverses two (2) rivers which are indicated by the NFEPA rivers layer. These include the ephemeral Bad se Loop River and the perennial Groot Nyl River. Field investigation undertaken by the specialist determined that the habitat associated with both rivers at the proposed development crossing areas is considered to be more representative of wetland rather than riparian habitat.

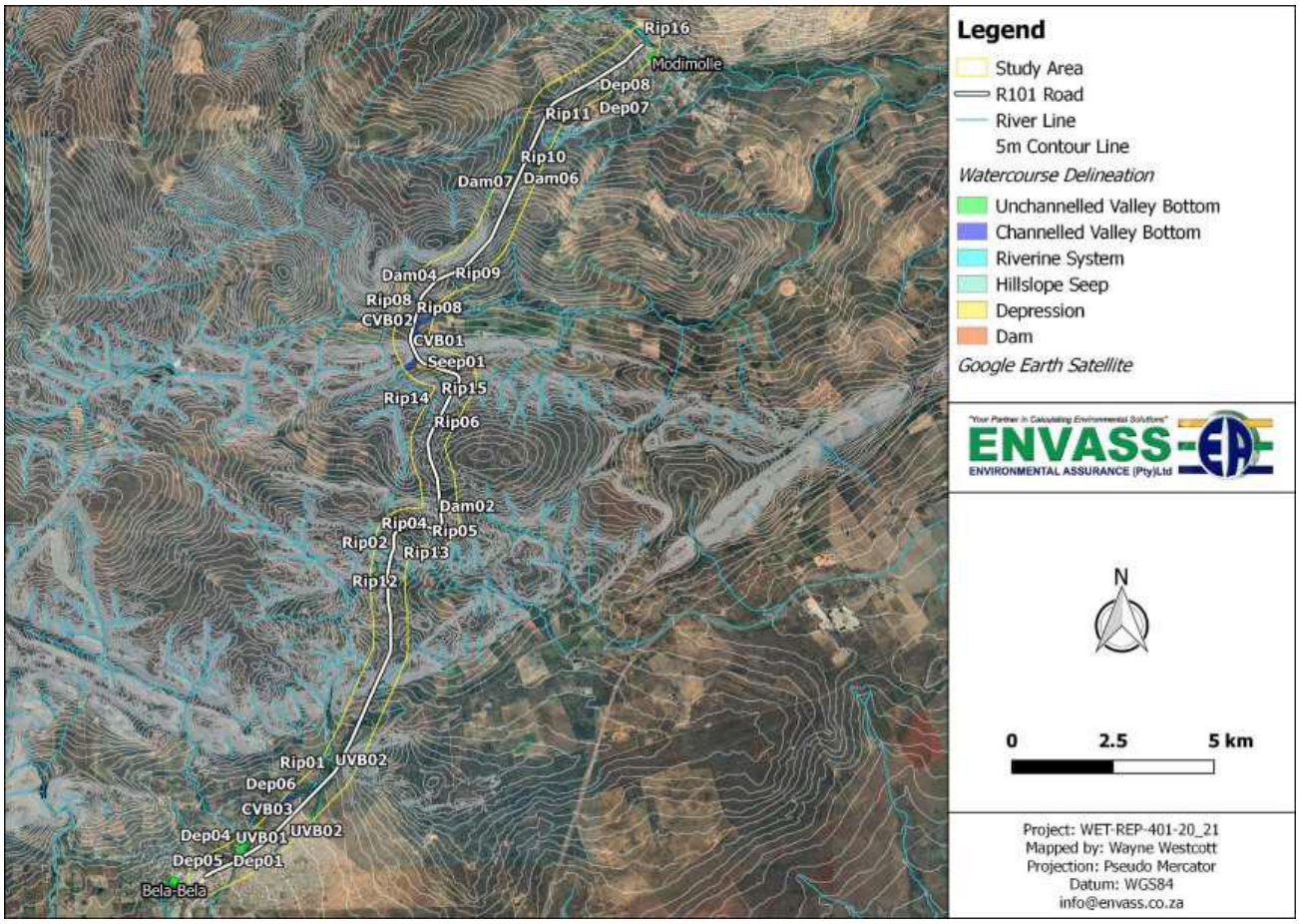

Figure 23: Wetland/Riparian Delineation Map (Environmental Assurance, 2021)

The majority of the wetlands within the study area were determined to have been moderately to seriously degraded as a consequence of current and historic disturbance recorded in, and/or around their outer boundaries. However, two unchannelled valley-bottom wetlands fall within the Vulnerable Central Bushveld wetland vegetation group and are located within an ESA. Furthermore, two channeled valley-bottom wetlands and a seep wetland fall within the Endangered Central Bushveld and Critically Endangered Central Bushveld wetland vegetation group. These wetlands form part of an important migratory corridor which connects upstream areas with the downstream Nylsvley Ramsar Site. All wetland features were therefore calculated to fall within a high ecological importance category with exception of one unchannelled valley-bottom wetland which has been seriously modified and which was calculated to fall within an intermediate ecological importance category. Considering the above, all wetlands are considered to be of a high overall ecological importance and sensitivity.

At risk riverine systems associated with the proposed development were assessed utilizing the Rapid Index of Habitat Integrity (IHI) tool. Due to the at-risk watercourses exhibiting flow conditions that were not conducive

to the implementation of the Stream Assessment Scoring System (SASS 5) (Dickens & Graham, 2002) and integrated habitat assessment system (IHAS) (McMillan, 1998). The SASS 5 programme was developed by the River health programme (under the DWS) was used to assess the quality of aquatic systems. The IHI and PES scores were recorded as the baseline for the at-risk riverine systems. The assessment revealed that the aquatic ecosystems are affected by increased flow volumes and unseasonal flow regimes due to urban transformation of the site. The instream and riparian zone PES scores were calculated to be 58.76 % and 72.80 %, respectively, which fall within the Class D (largely modified) and Class C (moderately modified) PES score categories, respectively.

The wetland and aquatic biodiversity impact assessment revealed that the present ecological scores of the watercourses within a 500m radius of the site ranged between Moderately Modified (C) and Seriously Modified (E). The overall ecological importance and sensitivity for these watercourses were 'High'. The assessment found that the proposed road upgrade, bridges and culverts replacement will predominantly take place in already infilled and transformed areas directly adjacent to the existing R101 roadway within the existing road reserve. The main activities of concern will be blasting, demolition, temporary diversions of flow, and excavations during the construction phase. The aforementioned activities will negatively impact the water quality, the aquatic biota and wetland habitats. These activities were assessed to be of 'High' and "Medium' impact significance prior to mitigations and "Medium' and 'Low' post mitigations. However, small areas of wetland habitat will be lost during the widening of the R101. Although wetland habitat will be permanently lost, the intensity of the impact has been reduced by recommending means of improving the currently degraded state of the at-risk watercourses to a condition better than the baseline data presented herein. The natural processes within the remainder of the wetlands will continue post-development. The impact prior to the implementation of mitigation measures was therefore calculated to be of a medium (negative) significance after the implementation of mitigation measures.

It is recommendation of the Aquatic specialists that the Water quality assessments and biomonitoring (upstream and downstream of the construction activities) must be undertaken before and after the construction phase. During the construction phase, weekly water quality assessment and biomonitoring both upstream and downstream sites at construction activities within watercourse (i.e. at the two (2) major bridges and three (3) major culverts (if inflow)) must be undertaken. The parameters to be monitored should include as a minimum; pH, EC, TDS, Total Suspended Solids (TSS), Turbidity, DO (mg/l), DO (%) and in situ temperature. Hydrocarbon monitoring utilised Total Petroleum Hydrocarbons (TPH) as the parameter measured should also be conducted on a 2-weekly basis (i.e., twice a month). The period and frequency of monitoring required post-construction must be determined by a suitably qualified aquatic ecologist and approved by the ECO

The monitoring of the watercourses will be essential for the maintenance and/or improvement of the PES scores that were calculated for the at-risk watercourses and the natural terrestrial biodiversity of the study area. Water quality and biomonitoring (upstream and downstream of the construction activities) must be undertaken at regular intervals and/or when necessary. The monitoring should ideally describe the present water quality and impact on aquatic biota in reference to the conditions of the water quality and standard of aquatic biota prior the construction phase. The monitoring process should provide necessary steps to be followed to maintain good water quality or address depreciating water quality based on the outcome of the assessments.

4.1.5 Heritage Features

A Heritage Impact Assessment was undertaken by Heritage Contracts and Archaeological Consulting (HCAC), a copy of the report is attached to **Appendix F2.** The study revealed that the existing road servitude and associated construction activities of the national road would have impacted on surface evidence of heritage features if any ever existed in the servitude. The two bridges (Modderloop and Groot Nyl River) which will be demolished and replaced are both less than 60 years and are of no heritage significance. Heritage resources within the larger area consist of Stone Age finds, Later Iron Age settlements, graves and structures older than 60 years, some which dates to the Anglo Boer War. The potential impacts to heritage resources are generally considered to be of low significance after mitigation and no fatal flaws are expected and the project will result in a socio-economic benefit.

Iron Age sites, Middle Stone Age artefacts, as well as bridges and structures were identified by the specialist within the broader geographical area (**Figures 24** to **26**). These features are located away from the study area (**Figure 27**) and no impact is expected on these features but provides context to the cultural landscape in which the project is located. In Modimolle, a large Anglo Boer war concentration camp cemetery and memorial (**Figure 28**) are located adjacent to the proposed project and will require management measures to be safeguarded during the development Phase of the project. The Modderloop and Groot Nyl River bridges south of Modimolle will be altered during the project. These bridges date to 1965 and 1966 (**Figure 29** and **30**) respectively based on inscription on the bridges corroborated by the PDR, these bridges are therefore not older than 60 years and not protected by NHRA.

Figure 24: Middle Stone Age Core (HCAC, 2021)

Figure 25: Ephemeral Iron Age walling outside of realignment area 3 (HCAC, 2021)

Figure 26: Historical house foundation outside realignment area 3 (HCAC, 2021)

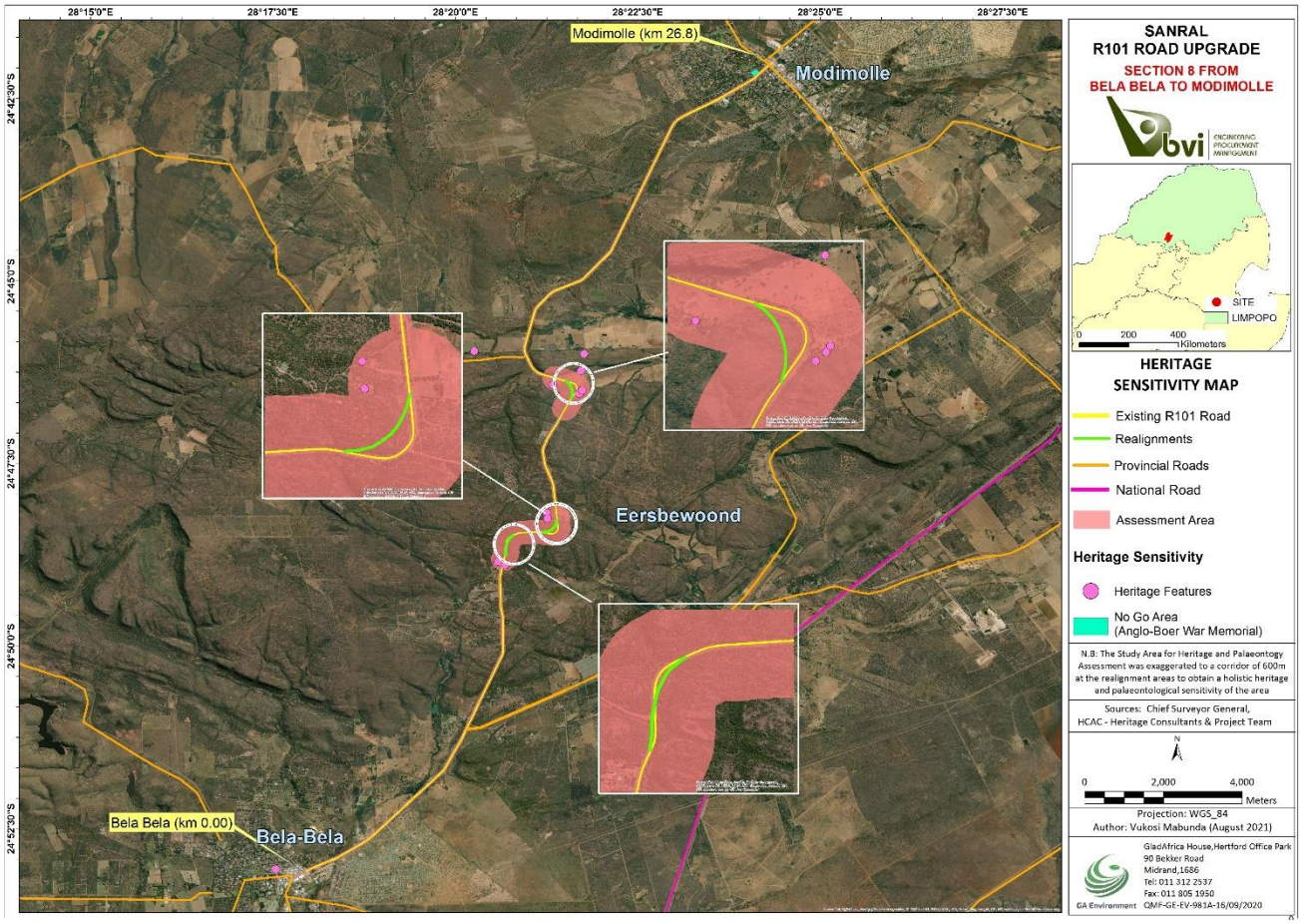

Figure 27: Location of heritage features

Figure 28: Anglo Boer War Memorial Site (HCAC, 2021)

Figure 29: Modderloop Bridge (HCAC, 2021)

Figure 30: Groot Nyl River Bridge (HCAC, 2021)

A Phase 2 Heritage Assessment was initially proposed for the project with the anticipation of heritage features within the site. However, as indicated on the HIA (**Appendix F2**), there are sensitive or features of cultural and heritage importance within the development area, therefore a Phase II Heritage Assessment will not be undertaken for this project. The Draft Basic Assessment Report including the Heritage Impact Assessment will be submitted to SAHRA and LIHRA for comment.

4.1.6 Palaeontological Features

A Palaeontological Impact Assessment was undertaken HCAC in May 2021. A copy of the report is attached to **Appendix F3**. According to the Assessment, the existing road route lies on the Alma and Swaershoek Formations (Nylstroom Subgroup, Waterberg Group) in the northern and central sections from Modimolle southwards. These rocks are indicated as moderately sensitive because microbial mat structures have been recorded from younger rocks of the Waterberg Group in the main Waterberg Basin, but not in the Nylstroom Basin. The route passes over the Clarens Formation (Stormberg Group, Karoo Supergroup) in the southern part near Bela-Bela. Fossil vertebrates and plants have been found in this stratum but in the Main Karoo Basin so it is indicated as highly sensitive in the SAHRIS palaeo-sensitivity map. Therefore, a Fossil Chance Find Protocol should be added to the EMPr.

According to the specialist report, based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would occur in the northern section, the Nylstroom Subgroup, and very unlikely be preserved in the sandstones of the Clarens Formation. Therefore, it is recommended that no palaeontological site visit is required unless fossils are found once excavations and drilling commence.

4.2 Socio economic conditions

The study area falls within Bela Bela Local Municipality Wards 2, 6 and 7 and within Modimolle Local Municipality Wards 2, 6, 11 and 12. Considering that the roads traverses through several wards and two local municipalities, this report will focus on the Socio-Economic Conditions of Waterberg District Municipality as a whole. According to Statistics South Africa (StatsSA) 2011, the district has an area coverage of 45.3 square kilometres and a population of 745 758.

The information presented in this section and pertaining to these aspects was obtained from StatsSA 2011 census collated by Wazimap and has been contextualised for the proposed road upgrade. It is important to note that the 2011 census data were used in this report because, according to StatsSA, the latest census data available is that of 2011 and the next census data generated will be for 2021. It must further be highlighted that while Stats SA desires to undertake a Census after every five years, (meaning that after the 2011 census, another census was supposed to have been undertaken in 2017), this was not undertaken due to the lack of capacity.

a) Key Demographics

According to the 2011 census, the population of Waterberg District was 745 758 which was less than a fifth of the provincial population. Majority of the population consisted of Black African (91%), followed by Whites with 8% as depicted in **Figure 31**. Of the total population 24% were 9 years or younger, teenage group amounted to 19% while those 50 years and older were only 14% (Census, 2011).

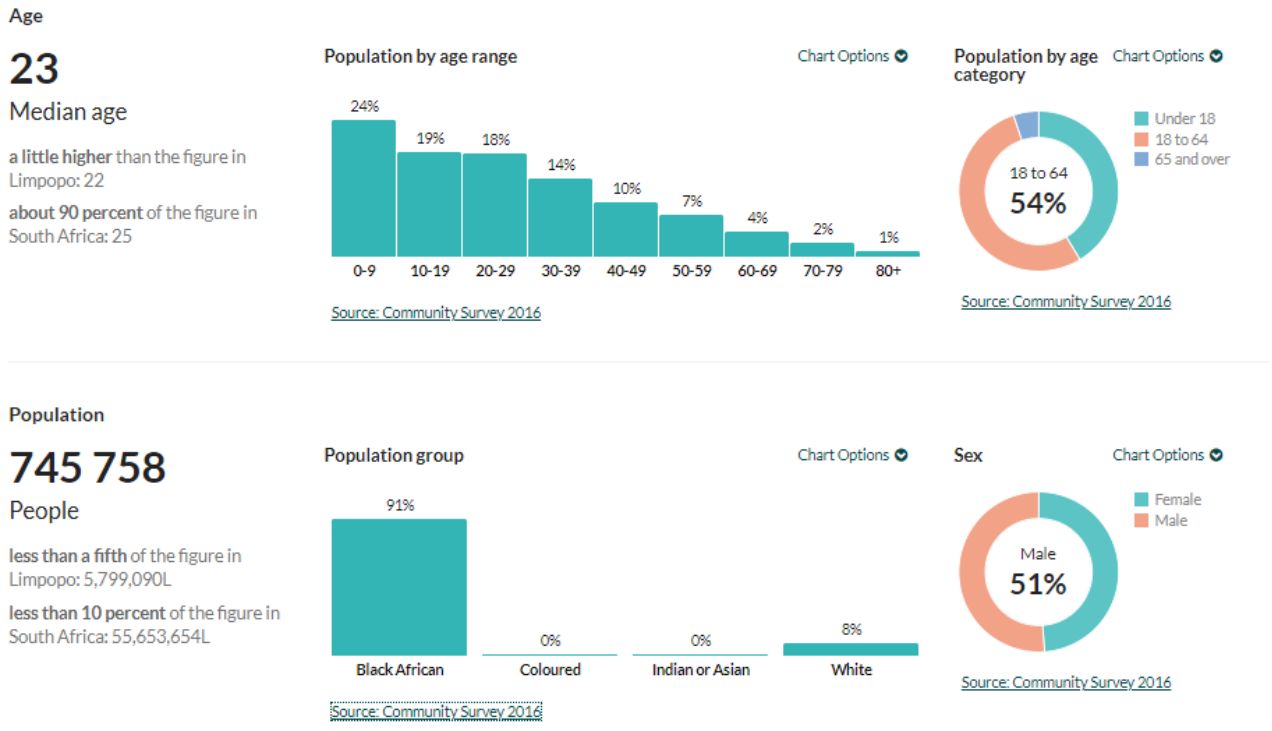

Figure 31: Waterberg District Municipality Demographics (https://wazimap.co.za/profiles/district-DC36-waterberg/)

b) Employment levels

In 2011, only 38.4% of the community members within the district were employed with 68% of these employed in the formal sector. Although the employment rate was low in this district, it was greater than the provincial employment rate and about the same as the national employment rate as 27.4% and 38.87% respectively. The average annual income was R 30 000 which was the same the overall Limpopo Provincial annual income rate as well South African average annual income rate. (Census, 2011; Stats SA, 2018); as presented in **Figure 32** below.

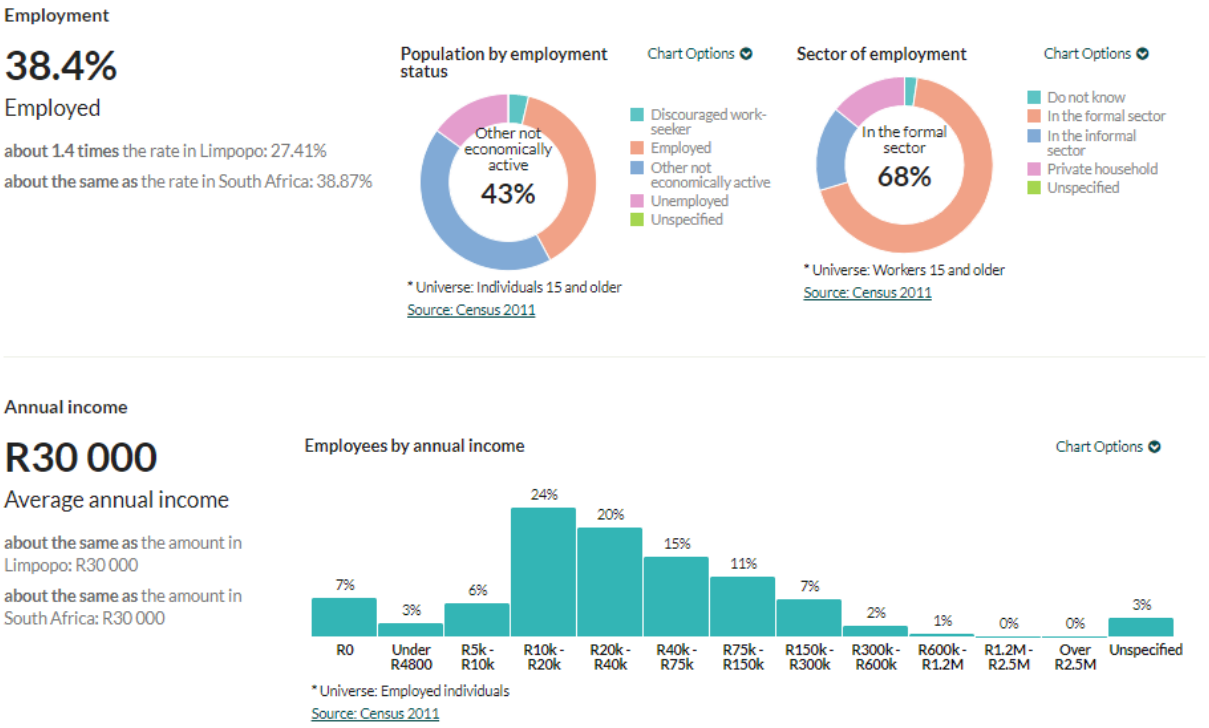

Figure 32: Waterberg District Municipality Employment and Income Statistics (https://wazimap.co.za/profiles/district-DC36-waterberg/)

c) Service Delivery

Overall, Waterberg District Municipality has a low service delivery based on statistics from Census 2011. Water is considered as the most important basic need, the water service level in the district was just lower than 75% in 2019. 40% of the water was obtained from piped sources and 62% had a service provider (**Figure 33**). The electricity supply was at an unacceptably 8.5%. Over 90% of the Waterberg population did not have access to electricity in 2011. However, the electrical supply was almost double that of provincial level and approximately 20% more compared to national supply. Ablution facilities are significantly important for the health and environmental state of the community. In 2011, the national rate of population with ablution facilities was at 63% while the Waterberg District had 48.8% of the population with ablution facilities. Slightly less than half of that population had flushing toilets (**Figure 33**).

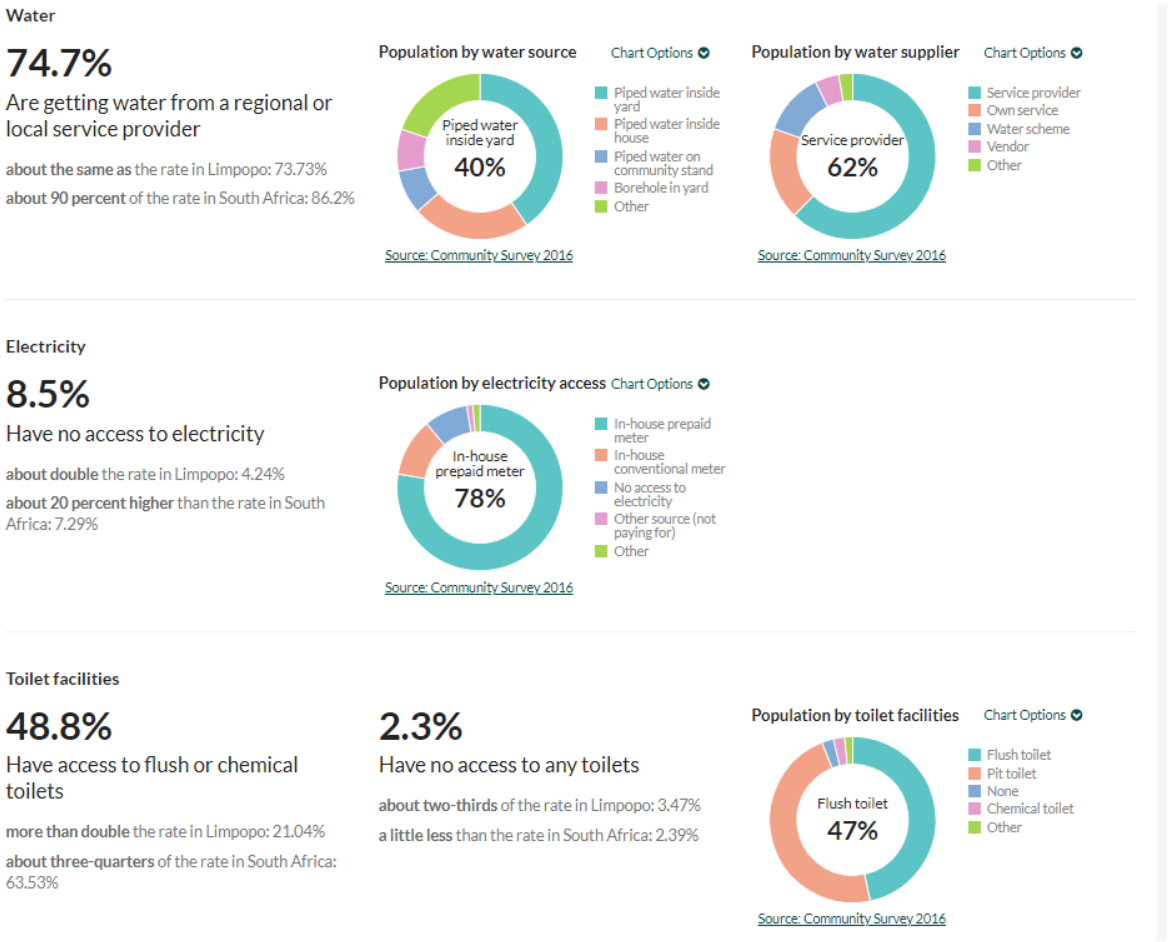

Figure 33: Waterberg District Municipality Service Delivery (https://wazimap.co.za/profiles/district-DC36-waterberg/)

5 ALTERNATIVES

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended in 2017, feasible and reasonable alternatives must be identified and considered within the Basic Assessment process. According to the above-mentioned, an alternative is defined as *"…in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:*

(a) property on which or location where it is proposed to undertake the activity;
(b) type of activity to be undertaken
(c) design or layout of the activity;
(d) technology to be used in the activity;
(e) operational aspects of the activity; and
(f) Includes the option of not implementing the activity."

The purpose of alternatives as defined in the Department of Environmental Affairs and Tourism's (now Department of Forestry and Fisheries and Environment (DFFE), 2004 Integrated Environmental Information Series on the Criteria for determining alternatives in EIA, ' *is to find the most effective way of meeting the need and purpose of the proposal, either through enhancing the environmental benefits of the proposed activity, and or through reducing or avoiding potentially significant negative impacts.'*

In terms of Section 24 of NEMA, the proponent is required to demonstrate that alternatives have been described and investigated in sufficient detail during the BA process. It is important to highlight that alternatives must be practical, feasible, reasonable and viable to cater for an unbiased approach to the project and in turn to ensure environmental protection.

The role of alternatives is to find the most effective way of meeting the need and purpose of the proposal, either through enhancing the environmental benefits of the proposed activity, and or through reducing or avoiding potentially significant negative impacts.

In order to ensure full disclosure of alternative activities, it is important that various role players contribute to their identification and evaluation. Stakeholders have an important contribution to make during the Basic assessment Process and each role is detailed as follows:

The role of the environmental practitioner is to:

- encourage the proponent to consider all feasible alternatives;
- provide opportunities for stakeholder input to the identification and evaluation of alternatives;
- document the process of identification and selection of alternatives;
- provide a comprehensive consideration of the impacts of each of the alternatives; and
- document the process of evaluation of alternatives.

The role of the proponent is to:

- assist in the identification of alternatives, particularly where these may be of a technical nature;

- disclose all information relevant to the identification and evaluation of alternatives;
- be open to the consideration of all reasonable alternatives; and
- be prepared for possible modifications to the project proposal before settling on a preferred option.

The role of the public is to:

- assist in the identification of alternatives, particularly where local knowledge is required;
- be open to the consideration of all reasonable alternatives; and
- recognise that there is rarely one favoured alternative that suits all stakeholders and that alternatives will be evaluated across a broad range of criteria, including environmental, social and economic aspects.

The applicability of each alternative type to the proposed project is outlined in **Table 23**. It must be highlighted that the alternatives presented in the table are derived from both the the EIA Regulations (2014) as amended as well as the Department of Environmental Affairs and Tourism's (now DFFE) 2004 Integrated Environmental Information Series on the Criteria for determining alternatives in EIA. Where the alternative is applicable to the project, it will be further discussed in this report.

Table 23: Alternatives types

ALTERNATIVE	COMMENT
No-go Option	This alternative must be discussed on all projects as it allows for an assessment of impacts should the activity not be undertaken. Refer to **Section 5.1**.
Activity alternatives	These are at times referred to as project alternatives which in the case of this project entails the construction of a road. There are no other alternatives to this activity as this will defer to the no-go option which is discussed in **Section 5.1.** Therefore, activity alternatives will not be discussed in this report.
Location/ property alternatives	Since the project is linear, routing alternatives have been assessed. Refer to **Section 5.2**.
Process alternatives	These are also known as technological and equipment alternative and will be discussed as they are applicable to the removal of vegetation required. These are discussed in **Section 5.4.**
Demand alternatives	This is applicable to the demand for a product or service. An example of this would be where there is a need to provide more drinking water. Examples of alternatives can be through managing demand through various methods or providing additional drinking water. Specific to the proposed project, alternatives regarding the demand for the road are not applicable as this is an upgrade of an existing road. **T**herefore, these alternatives will not be discussed in this report.
Scheduling alternatives	Scheduling alternatives are also known as sequencing or phasing alternatives. This alternative is not applicable to the project.
Input alternatives	Not applicable to the project but mainly to industries where inputs and in turn outputs are crucial to operations.
Routing alternatives	Consideration of alternative routes generally applies to linear developments such as power lines, transport and pipeline routes. The prosed project is a linear, hence the proposed route alternatives are discussed in **Section 5.2.**

ALTERNATIVE	COMMENT
Site layout alternatives	The prosed project is linear; hence design alternatives were considered and are discussed in **Section 5.2**.
Scale alternatives	The nature of the proposed project is linear, hence for this reason, scale alternatives will not be discussed in this Report.
Design alternatives.	This entails the consideration of different designs for aesthetic purposes or different construction materials in an attempt to optimise local benefits and sustainability would constitute design alternatives. The following design alternatives will be discussed in this report: • Pavement design • Intersection

5.1 The No-Go Option

The no-development alternative would entail a situation where the proposed road upgrade will not occur. As a result of this, road will continue to deteriorate, the poor and/or insufficient stormwater drainage will continue affecting the surrounding area, the traffic will increase with time and the accidents occurring at the sharp bends will continue to rise. Based on the above, the no-go option is therefore not feasible and is not preferred.

5.2 Routing Alternatives

As aforementioned, according to the PDR, there are three possible route designs as part of the proposed upgrade. The route designs follow the same path as the existing road and are not anticipated to influence the overall length of Road R101 Section 8. The only difference between the route alternatives and existing road is that the route alternatives will slightly deviate from the existing road between km 10 and km 11 (realignment area 1), between km 11 and km 12 (realignment area 2) and between km 15 and km 16 (realignment area 3). It must be noted that although there are three realignment areas, the route alternatives are the same for all of the three realignment areas. The routes deviate at the aforementioned road chainage and link back to the existing road as indicated on as well as **Figure 34**. Overall, the route alternatives are limited to the realignment areas (sharp curves) located within the rural section of R101 Section 8 and are based on maximum permissible speeds.

5.2.1 Preliminary design route (Green line)

The proposed route has an 'open up' parabola shape with a lower curve angle. The proposed route alignment has the highest permissible speed of 100km/hr, is much flatter and slightly longer than the two other routes (**Figure 34**). Although the cut and fill material that will be generated is similar to that of route alternative one, realignment to accommodate a 100 km/h horizontal design speeds will generate sufficient quantities of material which is intended to be utilised for construction of the Selected Subgrade. In addition, this alternative will allow the curves to meet the speed standard of the road. Therefore, this alternative emerged as the **Preferred Option.**

5.2.2 Route Alternative 1 (Blue line)

Route alternative one follows a similar path to the preliminary design route. Route alternative 1 has the median permissible speed of 90km/hr, has much sharper bend than and shorter than the preferred route. This alternative is not preferred as these sections of the road will still not meet required road speed standard.

5.2.3 Route Alternative 2 (Yellow line)

The last alternative has the 80km/hr speed restriction and is the shortest as well as the most bent. This route alternative also follows a similar path to the existing route and the two other alternatives. This alternative is not preferred as these sections of the road will still not meet required road speed standard. The route comparison of the route alternatives is presented on **Table 24.**

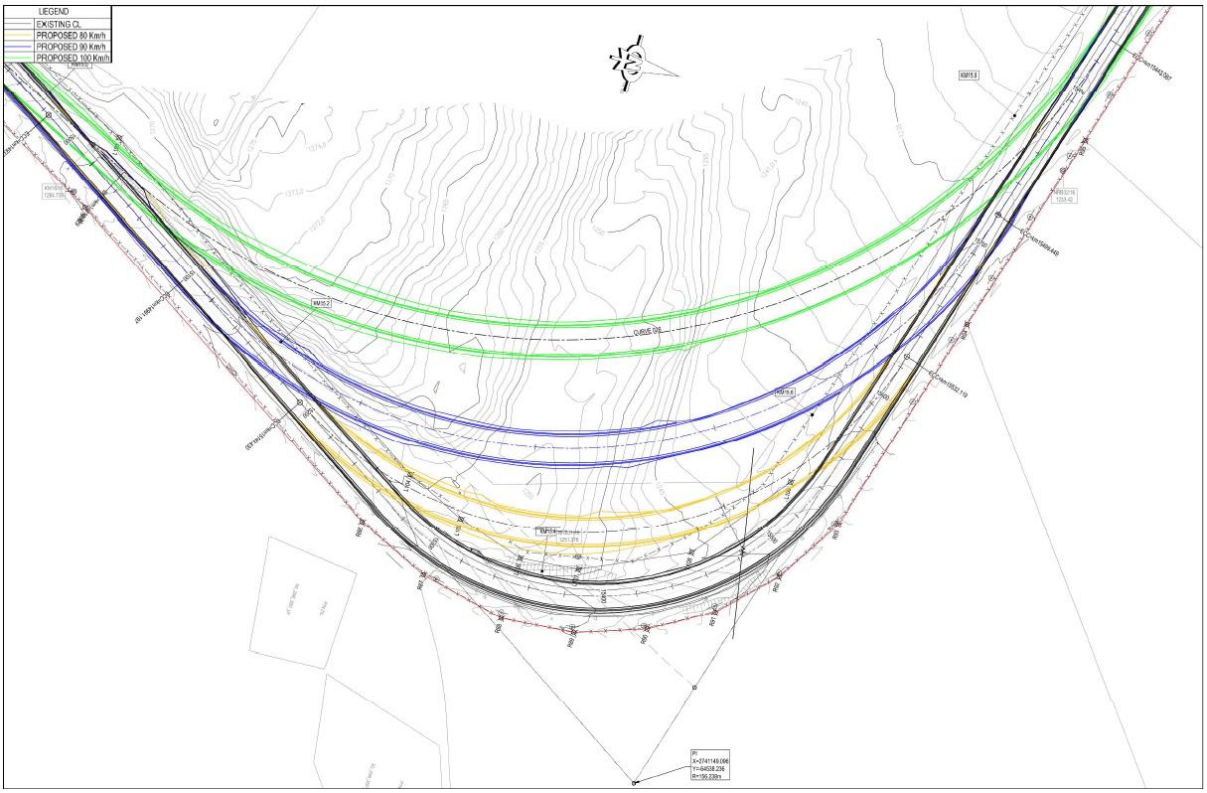

Figure 34: Route Alternatives Assessed (realignment area 3)

Table 24: Advantages and disadvantages of the route alternatives

Alternative	Advantages	Disadvantages
Preliminary Design (Preferred)	• The vertical alignment of the road is compliant to the future dual carriageway as per the SANRAL design standards; • The realignment will provide safer driving conditions;	• This route is the longest, therefore more road works and expenses may be required; • Due to the increased linear extent of the preliminary design, larger designated CBA and ESA areas and overall habitat will be impacted than

	• Cut and fill material that will be generated is similar to that of route alternative one; • Realignment to accommodate a 100 km/h horizontal design speeds will generate sufficient quantities of material which is intended to be utilised for construction of the Selected Subgrade.	should Alternative 1 be implemented.
Alternative Route 1	• Similar to preliminary design, but shorter, resulting in lesser environmental impacts and costs; • The realignment will somewhat correct the existing problems at the curves.	• Design speed does not correct the S-curve at Area 1 and this will pose a safety risk along this area; • The route may in future require straightening to meet the 100km/hr standard; and • The cut and fill generated for this route will be similar to that or preliminary design even though this alternative is shorter.
Alternative Route 2	• Similar to preliminary design and alternative 1, but shorter, resulting in lesser environmental impacts and costs.	• Design speed does not correct the S-curve at Area 1 and this will pose a safety risk along this area; and • The route may in future require straightening to meet the 100km/hr standard.

Based on the above information, the preliminary design is the Preferred Option.

5.3 Design Alternatives

This section addresses the design alternatives assessed for intersection types and pavement design.

5.3.1 Intersection Types

Based on the findings of the traffic analysis as provided in the Preliminary Design Report (PDR), in order to improve the overall system capacity, mobility and road safety, intersection upgrades have been proposed. The intersections/accesses were assessed in the field in November 2019. Based on the sight distances and access spacing, the intersections/accesses were then categorized as either “retain”, “re-align/relocate” or “close” as indicated on **Table 3** (**Section 1.5.2**) which provides a summary of the findings. The proposed plan as per the PDR is that all affected accesses that need to be consolidated or closed have to be communicated with the affected property owners. A meeting with Municipalities will also be arranged by BVi Engineers as part of SPLUMA to present and consider their input regarding the access management plan and project scope works in general. The locations and proposed actions of the intersections are provided on **Table 25**.

Table 25: Future Status of intersection/access

Access No.	Location (km)	Property ID	Proposed Action
2 (LHS)	0.08	Het Bad 465-KR	Close van der Merwe Street intersection, as the intersection spacing of 800 m is not met.
5 (LHS)	0.39	Buiskop 464-KR PTN 28	Close access, as spacing is insufficient. Rather use Voortrekker Rd or Mile St intersection to gain access to Road R101.
6 (LHS)	0.70	Buiskop 464-KR PTN 42	Add northern leg to this intersection. Formalize bell mouths and add edge beam.
7 – 9 & 11 – 15	1.24 – 1.41, and 1.57 – 1.88	Buiskop 464-KR PTN 42 & 43	Close accesses as spacing is insufficient. Properties to gain access to Road R101 via the new proposed T-junction at km 1.50 or the full intersection at km 2.82 (urban/ industrial edge).
16	2.33	Buiskop 464-KR PTN 34	Close access. Property to use proposed full intersection at km 2.82 to gain access to Road R101.
20	3.56	Buiskop 464-KR PTN 137	Close access as spacing is insufficient and only one major access per property is allowed.
24	4.31	Buiskop 464-KR PTN 14	Close off access as there are two accesses situated on the same property and spacing between them is insufficient.
26	5.43	Farm 849 PTN 0 & Buiskop 464-KR PTN 17	Add turning lanes to this intersection.
28	6.15	Buiskop 464-KR PTN 29	Close access as spacing is insufficient and only one major access per property is allowed.
29	6.59	Buiskop 464-KR PTN 29	Close off access. It seems the access that was there previously, is deserted.
31	7.50	Farm 849 PTN 0	Remove gate to Klein Kariba. Only one major access per property allowed. Use main access at km 5.43.
33	7.58	Valencia 449-KR PTN 12	Close access alternative access from road at km 8.30 (access no. 36) is possible.
35	8.27	Buisfontein 451-KR PTN 15	Relocate access to side road, as the spacing between accesses no. 35 and 36 is insufficient.
37	8.39	Buisfontein 451-KR PTN 14	Relocate access to side road, as the spacing between accesses no. 36 and 37 is insufficient.
38	8.71	Buisfontein 451-KR PTN 11	Close access as accesses no. 38 and 40 are situated on the same property and the spacing between these accesses is insufficient.
39	8.72	Buisfontein 451-KR PTN 13	Close access as accesses no. 39 and 41 are situated on the same property and the spacing between these accesses is insufficient.
44 (LHS & RHS)	9.59	Buisfontein 451-KR PTN 33 (LHS) & PTN 35 (RHS)	Close off accesses on both sides of the R101. These accesses are unused. Also remove the excess gravel on the northern side of Road R101.
46	10.05	Cussonia 712-KR PTN 0	Formalize bell mouths. Add 60 m right-turn lane and right-turn refuge lane to this intersection.
47	-	Verloren 787-KR PTN 213	Access needs to be relocated, due to the realignment of Road R101. It is suggested that the access be relocated to km 11.00.
48	11.64	Verloren 452-KR PTN 3	Relocate access to km 11.70. Formalize bell mouths and add edge beam treatment.
50	12.31	Verloren 787-KR PTN 213	Close access. The earth drain prevents vehicles from accessing Road R101 at this point. It is therefore assumed that this access is unused.

53	12.96	Verloren 787-KR PTN 213	Close access as this access is situated on the same property as accesses no. 51 and 52.
55	13.75	Sussensvale 708-KR PTN 51	Close access as the access spacing between accesses no. 55 and 56 is insufficient.
57	13.96	Sussensvale 708-KR PTN 51	Close access, as only one major access per property is allowed.
58	-	Verloren 787-KR PTN 213	Access needs to be relocated due to the realignment of Road R101. It is suggested that the access be relocated to km 14.60.
62	16.61	Sussensvale 708-KR PTN 35	Add 60 m right-turn lane and right-turn refuge lane to this intersection. Formalize bell mouths and add edge beam treatment.
63	16.93	Sussensvale 708-KR PTN 33	Close off access as accesses no. 63 and 64 are situated on the same property.
65	17.91	Sussensvale 708-KR PTN 26	Close access as accesses no. 65 and 66 are situated on the same property and the spacing between them is insufficient.
66	17.96	Sussensvale 708-KR PTN 26	Relocate access to comply with spacing requirement of major accesses. Formalize bell mouths and add edge beam treatment.
69	18.67	Sussensvale 708-KR PTN 26	Close access as spacing is insufficient and only one major access per property is allowed.
72	19.62	Rheno 418-KR PTN 28	Relocate access to comply with spacing requirement of major accesses. Formalize bell mouths and add edge beam treatment.
75	21.14	Rheno 418-KR PTN 26	Relocate access to comply with spacing requirement of major accesses. Formalize bell mouths and add edge beam treatment.
77	21.46	Rheno 418-KR PTN 25	Relocate access to side road, as spacing is insufficient.
79	21.63	Streepje 420-KR PTN 2	Close access as spacing is insufficient.
80	21.85	Streepje 420-KR PTN 1	Relocate access to comply with spacing requirement of major accesses. Formalize bell mouths and add edge beam treatment.
85	24.14	Nylstroom Town and Townlands 419-KR PTN 74	Close access as there are future properties that will be built on both sides of Road R101 and driveways are not permitted.
86	24.15	Nylstroom Town and Townlands 419-KR PTN 164	Close access as there are future properties that will be built on both sides of Road R101 and driveways are not permitted.
87 (2x LHS)	24.24	Nylstroom Town and Townlands 419-KR PTN 121 ERF 1515 & 1516	Close accesses as driveways off Road R101 are not permitted. These properties are accessible via Bontebok Street.
89 (2x LHS)	24.46	Nylstroom Town and Townlands 419-KR PTN 121 ERF 1557	Close accesses as driveways off Road R101 are not permitted. This property is accessible via Olienhout Avenue.
91 (LHS & RHS)	24.68	Nylstroom Town and Townlands 419-KR PTN 0 ERF 1029 (LHS) & PTN 106 (RHS)	Close southern access, as access is no longer being used. The main access to this property is situated at km 24.79 (access no. 92).

93	24.76	Nylstroom Town and Townlands 419-KR PTN 0 ERF 1026	Close access as driveways off Road R101 are not permitted. This property is accessible via Emma Street.
98	25.25	Nylstroom Town and Townlands 419-KR PTN 51	Close Boshoff St connection to Road R101, as spacing is insufficient. Gain access to Road R101 via De Beer St (access no. 95) or Odendaal St (access no. 102).
97 - 100	25.13, 25.32 and 25.41	Nylstroom Town and Townlands 419-KR PTN 104	Close accesses as direct property access off Road R101 is not permitted. Discussion with the Nylstroom High School body corporate needed, to determine the use of this access.
101 (LHS)	25.52	Nylstroom Town and Townlands 419-KR PTN 74	Close street opposite Colin St. Vehicles can utilise accesses no. 95 (De Beer St) and Odendaal St (access no. 102) to access Road R101.
104 and 105	25.87 and 25.94	Nylstroom Town and Townlands 419-KR PTN 74	Close access. Use main access at km 26.01 (access no. 106) to access Road R101.
107	26.03	Nylstroom Town and Townlands 419-KR PTN 0	Close connection to Road R101, as spacing is insufficient. Kroep St will function as a culde-sac.
110	26.26	Nylstroom Town and Townlands 419-KR PTN 0	Close street. Access to fuel station to be proposed just west of this street at appropriate spacing.

5.3.2 Pavement Design

The analysis and evaluation of the existing pavement structure showed that the existing structure is approaching the end of its structural life and will not provide adequate capacity for the 20 year design period. Therefore, rehabilitation/strengthening is required. Three rehabilitation designs to strengthen the existing pavement structure as well as to add new surfaced shoulders were evaluated for the rural section km 5.44 to km 24.00. Furthermore, new pavement structures for additional lanes along urban sections as well as realignment areas were also evaluated.

Three rehabilitation alternatives to improve the existing pavement structure as well as to add surfaced shoulders along rural section (km 5.44 to km 24.00) were identified and investigated:

i) Pavement Rehabilitation 1:

Using a 250 mm G7 USSG and 200 mm G4 subbase for shoulder widening, adding 100 mm of G2 to the existing base and cement stabilizing to a 250 mm C4 base across the lane and shoulder and construct Cape seal.

ii) Pavement Rehabilitation 2:

Rip and compact existing shoulder material for shoulder LSSG. Rework existing base and macadam material and add G6 material where needed to build a 150 mm USSG across lane and shoulder, construct a 250 mm C4 subbase across the lane and shoulder, construction of a 150 mm G1 base and Cape seal. Due to the pavement being lifted by approximately 300 mm, this rehabilitation option will improve drainage issues along Road R101-8 and furthermore it will allow the required geometric improvements to be carried out. Pavement rehabilitation 2 allows for a two-way traffic

accommodation at all times during construction. This is a requirement due to the high traffic volume along Road R101-8.

iii) Pavement Rehabilitation 3:

Reuse existing base material for shoulder USSG, adding 50 mm G2 to the existing subbase and cement stabilizing to a 250 mm C4 subbase across the lane and shoulder, construction of a 150 mm G1 base and Cape seal. With this option the existing road levels are maintained. Pavement rehabilitation 3 can only be constructed using half widths (stop and go) traffic accommodation. However, a two-way traffic accommodation is a requirement due to the volume of traffic using Road R101-8.

The evaluation of rehabilitation alternatives showed that the Rehabilitation 1 does not provide adequate structural capacity for the 20-year design period and Pavement Rehabilitations 2 and 3 provide adequate structural capacity for the improvement and addition of surfaced shoulders along the section from km 5.44 to km 24.00 over the 20-year design period. Based on the discussion on pavement rehabilitation 2 and 3, the advantages of pavement rehabilitation 2 outweigh those of pavement rehabilitation 3, therefore, **pavement rehabilitation 2 is preferred**.

Pavement designs for the new lanes in Bela Bela urban section (km 0.00 to km 5.44) as well as the sections along realignment areas were identified and investigated. The proposed pavement structure for the realignment areas will be used for the additional lanes in Modimolle as the traffic class is the same. Traffic will be accommodated along the existing road while the new pavement structures along the urban sections and realignment areas are constructed.

5.4 Process Alternatives for Vegetation Clearing

Process alternatives are also known as technological and equipment alternatives that can be implemented for the required removal of vegetation. The process alternatives can be either *mechanical (physical)*, *chemical or biological* and must be suitable to the specific type of plant intended for clearing.

5.4.1 Cross section alternatives

As discussed in **Section 1.5.6**, the preferred cross section in the PDR is Option 2. Both options are hybrid cross sections and are more suitable than the initially proposed three cross sections. The two hybrid cross sections options have similar designs indicated in **Section 1.5.6** with the only difference being the additional climbing lanes at specific sections for Option 2. The proposed hybrid cross-sections were analyzed for cost and economic viability using the rates from recently completed projects. The analysis shows that Cross Section Option 1 using Cape seal surfacing for rural section (km 5.44 to km 24.00) and asphalt surfacing for urban sections has the highest economic internal rate of return (IRR), while Cross Section Option 2 has a lower IRR. It is therefore recommended that Cross Section 1 (with asphalt in urban and Cape seal in rural) be carried into the Detail Design and implemented for improvement of Road R101-8.

5.4.2 Mechanical (physical)

The mechanical clearing of vegetation can either be undertaken by uprooting (by hand or by machinery) or by the cutting of plants to the natural ground level. The **key** advantages and disadvantages of each of these are discussed in **Table 26.**

Table 26: Comparison of mechanical removal of plant

Mechanical (Hand Pulling)	Mechanical (Machinery)
Advantages • Labour intensive and therefore desirable for job creation; Disadvantages • Not suitable for large plants or plants with strong root systems and • Time consuming	Advantages • Allows for quick removal of vegetation Disadvantages • High costs associated with the hiring or purchasing of equipment; • Reduces the likelihood of the creation of jobs as the method is not labour intensive • Large machinery is not suitable for sensitive areas such as the riparian area; • Alien plant species on machinery may be transported to other sites should the machinery not be washed after the removal of alien plant species • Causes adverse environmental impacts as the machinery is highly likely to drive over indigenous plant species not intended for removal.

Based on the analysis presented in **Table 26**, it is clear that various methods be used based on their suitability for vegetation type, the environmental sensitivity of the area where vegetation clearing is planned and the need for job creation on the project. Overall, the use of machinery must be avoided, where possible.

5.4.3 Chemical Methods

Chemical Methods for the clearance of vegetation. This includes the application of chemicals such as herbicides by spraying, painting, injecting etc. The intention of chemical methods is to remove plants through an alternative method to the Mechanical Method discussed above. However, a plant that has been subjected to chemical method may still need to be removed mechanically depending on factors such as location (e.g. uprooting is discouraged along the banks of the watercourse as the fluvial geomorphology of the watercourse will be severely affected) and size (e.g. it is easier to uproot grass than to uproot a mature tree). The advantages and disadvantages of chemical methods are discussed below.

Advantages of the use of Chemical Methods

- Likelihood of plant regrowth is lower with the use of chemicals than mechanical methods as chemicals can be applied to a part of a plant that will result in more effective eradication;

- Does not require specialist equipment (e.g. TLB) or high levels of manpower in comparison to mechanical methods;
- Can be applied prior to the commencement of the construction period to allow for their effectiveness to set in and allow for quick removal immediately prior to the commencement of construction activities.

Disadvantages of chemical methods include but are not limited to the following:

- Specialist expertise is required for the application of chemicals in terms of application area on a plant, suitability of chemical for the eradication of a specific plant, quantities of chemicals to apply to apply, frequency of application, timing of application, etc.;
- The effectiveness of the chemical can be affected by the application method on a plant;
- Unintentional spread to land in turn affecting the surrounding environment such as soils, non-target flora, fauna, humans, the surrounding watercourse etc. The surrounding watercourse may be further affected through contaminated soils introduced by humans, fauna etc. or through movement of contaminated stormwater or directly should the chemically treated plant be located in close proximity to the watercourse. Cumulative adverse impacts that will arise from polluted water will include the killing of aquatic flora and fauna, pollution of downstream watercourses and the overall loss of ecosystem services from the polluted water.
- May require re-application due to the resistance of the plant to the chemical and in turn cumulative adverse impacts on the environment;
- Time will need to set aside to allow the effects of the chemical to set in prior to the complete eradication;
- Chemicals can be extremely costly; and
- Reduces the likelihood of labour-intensive methods.

Based on the above assessment, the disadvantages of chemical methods greatly outweigh the advantages. For this reason, mechanical methods are preferred above chemical methods.

8.1.1. Biological Methods

Biological control entails the introduction of natural enemies to a plant to eradicate it. Biological methods include mites, insects, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant e.g. either reproductive organs such as (flower buds, flowers or fruit) or the seeds after they have dropped from the plant.

Although biological control methods are mainly targeted towards alien plant species, they will however be discussed in this report and are presented in **Table 27.**

Table 27: Advantages and disadvantages of biological methods of plant control

ADVANTAGES	DISADVANTAGES
• Environmentally friendly; • Cost effective; and • Generally do not require long term maintenance	• Not available for all species; • Slow method, especially at the beginning of the process; • Can be affected by chemicals if the biological control is affected by these.

	• Can attack non-target species; • Ease of spreading to non-target species, • Poor commercial availability.

Based on the analysis on **Table 26** above, biological methods are not preferred above Mechanical or chemical methods due to their unpredictable nature and likelihood of spreading. For this reason, biological methods should not be utilised in the clearance of vegetation.

5.5 Bridge Alternatives

Based on the hydrological analysis, both the Modderloop and Groot Nyl River Bridges will have to be replaced. The bridges are located at 24°46'04.34"S; 28°20'59.74"E and 24°45'40.30"S; 28°21'00.58"E respectively. The bridges are Class 3 Road bridges and were constructed in 1936, widened and extended in 1966. The full description, status quo and proposed upgrades of the bridges are represented in **Table 4**. There are four alternatives to the proposed upgrade of bridges. The alternatives and their advantages and disadvantages is provided in **Table 28**.

Table 28: Advantages and disadvantages of bridge upgrade options

Aspect	Modderloop Bridge	Groot Nyl River Bridge
Bridge Number	B375	B447
Location	• R101-Section 8 km 16.83 • 24°46'04.34"S; 28°20'59.74"E	• R101-Section 8 km 17.62 • 24°45'40.30"S; 28°21'00.58"E
Bridge Upgrade Options		
	Option 1: Rehabilitation <u>Advantages</u> • Affordable; and • Low impact on the environment; <u>Disadvantages</u> • Does not address the ageing infrastructure; and • Siltation likely to reoccur.	**Option 1: Rehabilitation** <u>Advantages</u> • Affordable; and • Low impact on the environment; <u>Disadvantages</u> • Does not address the ageing infrastructure; and • Siltation likely to reoccur.
	Option 2: New Deck <u>Advantages</u> • The new deck will increase the lifespan of the bridge; and • Raising the deck will reduce the risk of flooding; <u>Disadvantages</u>	**Option 2: Raise Existing Deck** <u>Advantages</u> • Raising the deck will reduce the risk of flooding; and • Lower environmental impact as there is no demolition. <u>Disadvantages</u>

Aspect	Modderloop Bridge	Groot Nyl River Bridge
	• Demolition to affect to surrounding environment; • Does not address the overall ageing infrastructure; and • Siltation likely to reoccur.	• The deck is approaching the end of its lifespan and will have to be replaced shortly after this upgrade; • Does not address the overall ageing infrastructure; and • Siltation likely to reoccur.
	Option 3: Raise Existing Deck <u>Advantages</u> • Raising the deck will reduce the risk of flooding; and • Lower environmental impact as there is no demolition. <u>Disadvantages</u> • The deck is approaching the end of its lifespan and will have to be replaced shortly after this upgrade; • Does not address the overall ageing infrastructure; and • Siltation likely to reoccur.	**Add Additional Spans** <u>Advantages</u> • Additional spans will increase the lifespan of the bridge; and • Lower environmental impact as there is no demolition. <u>Disadvantages</u> • The deck is approaching the end of its lifespan and will have to be replaced shortly after this upgrade; • Does not address the overall ageing infrastructure; and • Siltation likely to reoccur.
	Option 4: New Bridge (Preferred) <u>Advantages</u> • New bridge will have a raised deck which will reduce the risk of flooding; • New bridge will have a longer lifespan; • The new bridge will have new and latest infrastructure which may reduce maintenance costs; • New structures will have lesser interference with the natural water flow; • The bridge will aid the overall road to be upgraded from Class 3 to Class 2 road; • The safety and overall standard of the bridge increases. <u>Disadvantages</u> • Most expensive alternative; • High environmental impacts during the demolition and construction; and • Possibility of traffic congestion during construction.	**Option 4: New Bridge (Preferred)** <u>Advantages</u> • New bridge will have a raised deck which will reduce the risk of flooding; • New bridge will have a longer lifespan; • The new bridge will have new and latest infrastructure which may reduce maintenance costs; • New structures will have lesser interference with the natural water flow; • The bridge will aid the overall road to be upgraded from Class 3 to Class 2 road; • The safety and overall standard of the bridge increases. <u>Disadvantages</u> • Most expensive alternative; • High environmental impacts during the demolition and construction; and Possibility of traffic congestion during construction

Based on the advantages and disadvantages listed on **Table 28** above, Option is the preferred alternative.

5.6 Construction Methodology Alternatives for the Major Structures

There are three major culverts and two bridges within this road section of R101. The detailed information regarding the location, condition, type of structures and the nature of the proposed upgrades are **Section 1.5.4**. There are two options for the major culverts construction and only differ based on the temporary diversion of the water flow. **Preliminary Construction Sequence Option 1** (**preferred**) includes the installation of a temporary pipe culvert for minor flow in the dry season. This pipe is provided to mitigate any contamination of the water through contact with the construction site and materials. The alternative, Construction Sequence Option 2, includes a river or stream temporal diversion with a temporary culvert being constructed away from the construction site. Due to the high potential environmental impacts associated with the temporal flow diversion, the high traffic volumes along this road, and substantial delays possible for construction of a temporary bypass, this option is not preferred.

There are two bridges with different hydraulic and geographical conditions. Although the construction sequence for the bridges is slightly different due to the spatial constraints of the Modderloop Bridge, the overall process is similar. The main difference between the two construction methodologies is that a temporary pipe culvert will be installed for minor flow in the dry season rather than a temporal flow diversion for the Modderloop Bridge. This pipe is provided to mitigate any contamination of the water through contact with the construction site and materials. A temporary diversion of the river is not possible due to the constrained space between the two steep hills on either sides of the watercourse. The construction sequence of the Groot Nyl River will however temporarily divert flow. The **preferred construction sequence** (**Preliminary Construction Sequence Option 1**) for the bridges includes the installation of temporary pipe culvert, temporary flow diversion, manual demolitions and construction at half-widths which will allow for traffic flow throughout the construction phase. The alternative would include the use of blasting for demolitions and closure of the roads diverting full traffic through Eersbewoond which would result in higher impacts on the water quality and aquatic biota as well as traffic congestion through the Eersbewoond Road.

6 PUBLIC PARTICIPATION PROCESS

The NEMA (1998) EIA Regulations, 2014, as amended, prescribe that the Environmental Impact Assessment process must include the undertaking of public participation in accordance with the Chapter 6 of the Regulations. The purpose of the Public Participation Process is to provide all potential and / or registered Interested and Affected Parties (I&APs), including the competent authority and any other stakeholder or organ of state, an opportunity to become involved in the EIA process and provide comments during the various phases of the project. Involvement by I&APs is critical, as it contributes to a better understanding of the proposed project among I&APs, raises important issues that need to be assessed and provides local insight that will enhance the EIA process. This chapter of the report provides details on the Public Participation Process followed during the public participation for the proposed upgrade of National Road R101 Section 8.

6.1 Identification of Interested and Affected Parties

Interested and Affected Parties (I&APs) were identified through various means from the inception phase of the project. These means included the placement of an advertisement in a local newspaper the placement of Site Notices and the distribution of Notification Letters. Each of these are discussed below.

6.2 Notification Letters

Regulation 41(2)(b) of the NEMA (1998) EIA Regulations, 2014, as amended requires that written notification be given to various parties who include the following:

> *(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*.

The Notification Letter that was compiled for the proposed development is attached as **Appendix E2.** The document provided a background on the project, the proposed activities as well as information on how one can register as an Interested and Affected Party (I&AP) on the project in order to be able to be kept abreast of all developments. Notification letters were compiled and distributed to all adjacent landowners on the 31st of March and 1st of April 2021. Knock and Drop Registers were completed for all I&APs that received a notification letter on the aforementioned dates. The knock and drop registers are attached to **Appendix E8**. Electronic version of the notification letters have also been sent to I&APs and is currently ongoing.

6.3 Newspaper Advertisement

Regulation 41(2)(c) and (d) of the NEMA (1998) EIA Regulations, 2014, as amended requires that PPP includes the placement of a Newspaper Advertisement to notify all potential I&AP's about the proposed project and to invite them to register as I&APs, provide comments on the project as well as the availability of the DBAR. A newspaper advertisement was placed in the local newspaper (Die Pos / The Post) for the week ending 4th April 2021 edition calling for registration with the project and comments. Proof of the newspaper advertisement is attached in **Appendix E1** of this report.

6.4 Notice Boards/Site Notices

In accordance with the NEMA (1998) EIA Regulations, 2014, as amended, a notice board detailing the proposed activity as well as the contact details of the EAP was placed on site. A2, A3 and A4 site notices presenting the project were erected on site and at visible and accessible locations close to the site on the 31st of March and 1st April 2021 at the following locations indicated on **Table 29** and **Figure 35**:

Table 29: Placement of site notices

NR.	Address/Place	Latitude	Longitude	Size
1.	Checker Bela Mall	24°53'42.60"S	28°17'40.13"E	A4
2.	McDonalds Bela Bela	24°53'43.20"S	28°17'46.25"E	A2
3.	Bela Bela Library / Municipality	24°53'4.94"S	28°17'28.24"E	A3
4.	Spar Supermarket Bela Bela Police Station	24°53'4.75"S	28°17'33.90"E	A3
5.	Post Office Bela Bela	24°53'4.84"S	28°17'38.08"E	A3
6.	Bela Bela Police Station	24°52'42.16"S	28°17'38.09"E	A2
7.	Bela Bela Traffic Department	24°52'46.24"S	28°17'41.45"E	A4
8	Shell Garage Bela Bela	24°53'5.56"S	28°17'54.45"E	A4
9.	Project Start (km 0.0). Corner Chris Hani Drive & R101	24°53'5.16"S	28°17'56.99"E	A2
10.	Jacob Zuma View Informal Settlement. Corner R101 & Mile Street	24°52'56.67"S	28°18'19.73"E	A2
11.	Thusanang School for the Handicapped	24°52'51.51"S	28°18'43.21"E	A4
12.	Jacob Zuma View Informal Settlement. Corner Street 6 & Street 4 Street	24°52'56.12"S	28°18'40.89"E	A2
13.	R101. Jacob Zuma View Informal Settlement / Extension 6B Bela Bela	24°52'26.38"S	28°19'3.44"E	A2
14.	R101. Ronwel Holiday Resort Entrance	24°52'1.67"S	28°19'28.74"E	A2
15.	R101. Opposite Springbok Boma Pub & Restaurant	24°51'49.87"S	28°19'42.42"E	A2
16.	R101. ATKV Klein Kariba. Intersection of R101 & Eersbewoond	24°51'3.94"S	28°20'10.49"E	A2
17.	R101. Emmerentia Geldenhuys Sending Sentrum Entrance	24°50'49.21"S	28°20'18.14"E	A2
18.	R101. Mon Repos Guest Farm	24°49'56.27"S	28°20'37.97"E	A2
19.	R101. Arinel Boerdery	24°49'36.36"S	28°20'38.55"E	A2 + A3

20	R101. Bela Bela Lodge	24°48'48.98"S	28°20'39.00"E	A2
21.	R101. ZA Cheetah Conservation Cheetah Experience	24°48'14.03"S	28°21'22.80"E	A2
22.	R101. Verloren Estates Africa	24°47'35.03"S	28°21'16.04"E	A2
23.	R101. Poultry Farm	24°47'6.51"S	28°21'16.02"E	A2
24.	R101. Silver Rock Caravan Park & Safari Lodge Access Gravel Road	24°45'56.88"S	28°20'56.91"E	A2
25.	R101. Theo Aries Access Gravel Road	24°45'15.76"S	28°21'12.35"E	A2
26.	R101. Intersection of Hans Campher Driveway & Strydom Street (R101) Modimolle	24°42'36.15"S	28°23'24.09"E	A2
27.	R101. Intersection of Boshoff & Thabo Mbeki Drive (R101) Modimolle	24°42'21.25"S	28°23'51.25"E	A3
28.	Hoerskool Nylstroom. 29 Tamsen Street, Modimolle, 0510	24°42'27.92"S	28°23'57.52"E	A3
29.	R101. Nylstroom Konsentrasiekamp Kerkhof	24°42'10.79"S	28°24'8.42"E	A3
30.	Project End (km 26.8). Corner Thabo Mbeki Drive (R101) & Nelson Mandela Drive (R33)	24°42'0.36"S	28°24'20.90"E	A2
31.	Modi Mall Entrance	24°41'46.32"S	28°24'21.89"E	A3
32.	Modimolle Department of Transport Entrance. Corner Limpopo Street & Hagen Street	24°41'55.20"S	28°24'35.77"E	A3
33.	Modimolle Library	24°42'11.49"S	28°24'24.20"E	A3
34.	Spar Supermarket Modimolle. Nelson Mandela Drive, Modimolle	24°42'7.14"S	28°24'27.96"E	A3
35.	Modimolle Police Station	24°42'22.93"S	28°24'29.98"E	A3

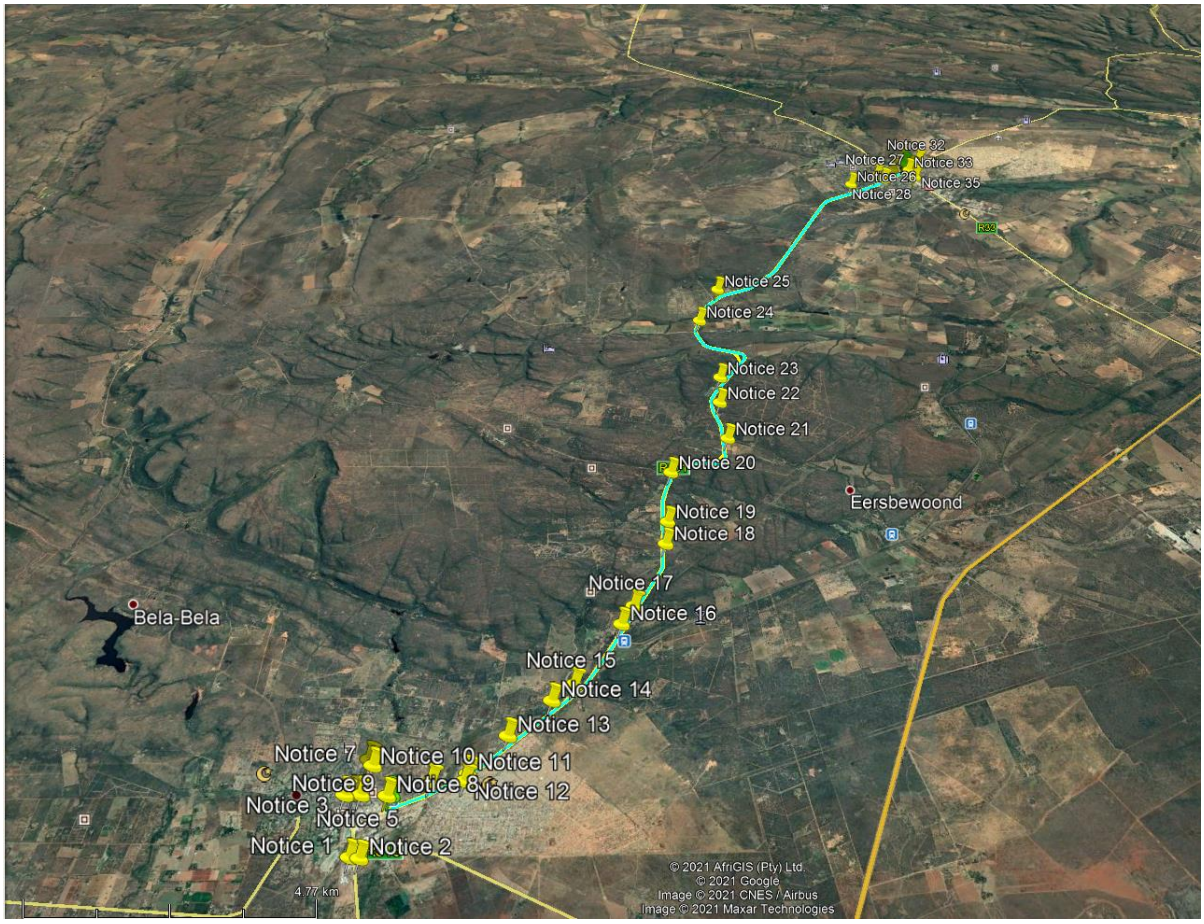

Figure 35: Location of Site Notice Boards

Refer to **Appendix E3** for a copy of the Site Notice and proof of placement.

6.5 Availability of Draft Basic Assessment Report for review

a) Draft Basic Assessment Report Revision 0

A Public Participation Plan was submitted to DFFE on the 10th of March 2021, the plan was approved on the 11th of March 2021. The availability of the DBAR is according to the Public Participation Plan attached to **Appendix D2**. Based on Regulation 40(1) of the NEMA (1998) EIA Regulations, 2014, as amended, the Draft Basic Assessment Report (Revision 0) was placed at the public venue (Bela Bela and Modimolle Municipal Libraries) and also on the GladAfrica website for the legislated period of at least 30 days between 15th June and 16th July 2021. It must be noted that it is important to highlight that the review period was determined in line with the reckoning of days as defined in Regulation 3 of the NEMA EIA Regulations, 2014, as amended. The following commenting authorities were provided with a copy of the report in both electronic as well as hardcopy format:

- Waterberg District Municipality;
  - Environment, Social and Disaster Department;
  - Infrastructure Development Department; and
  - Planning Department and Economic Development.
- Bela Bela Local Municipality;
  - Technical Services (Roads and Stormwater);

  - Planning and Economic Development;
  - Roads and Infrastructure; and
  - Town Planning.
- Modimolle Local Municipality;
  - Technical Services (Roads and Stormwater);
  - Planning and Economic Development;
  - Roads and Infrastructure; and
  - Town Planning.
- Limpopo Provincial Government:
  - Department of Agriculture and Rural Development;
  - Department of Economic Development Environment and Tourism;
    - Biodiversity Management; and
    - Environmental Impact Management,
  - Department of Transport;
  - Public Works, Roads and Infrastructure Department; and
  - Limpopo Provincial Heritage Resources Authority (LIHRA)
- Roads Agency Limpopo (RAL);
- South African Heritage Resources Agency (SAHRA); and
- Department of Water and Sanitation (DWS) - Limpopo Regional Office.

SMS, e-mail notifications and telephone calls were used to notify all registered I&AP's about the availability of the report, proof of the notifications is provided in **Appendix E9**. An Interested and Affected Party Register is attached to **Appendix E4.** As per the approved Public Participation Plan, the I&APs were contacted to confirm their email addresses. In instances whereby an I&AP does not have an email address, they were notified by SMS on the availability of the Draft Report.

b) Draft Basic Assessment Report (Revision I)

The same procedure followed during the public review of Revision 0 including the public participation and consultation process, will be followed for this report (Revision 1). The process will in line with the Public Participation Plan approved by DFFE on the 11th of March 2021 (**Appendix D2**). Based on Regulation 40(1) of the NEMA (1998) EIA Regulations, 2014, as amended, the Draft Basic Assessment Report (Revision 1) will be placed at the public venue (Bela Bela and Modimolle Local Municipality Libraries) and also on the GladAfrica website for the legislated period of at least 30 days. The following commenting authorities will be provided with a copy of the report in electronic format and hardcopy format if requested:

- Department of Forestry, Fisheries and Environment:
  - Environmental Impact Assessment Division;
  - Biodiversity and Conservation Unit; and
  - Forestry Management - Limpopo/Mpumalanga Region;
- Waterberg District Municipality;
  - Environment, Social and Disaster Department;
  - Infrastructure Development Department; and
  - Planning Department and Economic Development.
- Bela Bela Local Municipality;
  - Technical Services (Roads and Stormwater);

  - Planning and Economic Development;
  - Roads and Infrastructure; and
  - Town Planning.
- Modimolle Local Municipality;
  - Technical Services (Roads and Stormwater);
  - Planning and Economic Development;
  - Roads and Infrastructure; and
  - Town Planning.
- Limpopo Provincial Government:
  - Department of Agriculture and Rural Development;
  - Department of Economic Development Environment and Tourism;
    - Biodiversity Management; and
    - Environmental Impact Management,
  - Department of Transport;
  - Public Works, Roads and Infrastructure Department; and
  - Limpopo Provincial Heritage Resources Authority (LIHRA)
- Roads Agency Limpopo (RAL);
- South African Heritage Resources Agency (SAHRA); and
- Department of Water and Sanitation (DWS) - Limpopo Regional Office.

SMS, e-mail notifications and telephone calls will be used to notify all registered I&AP's about the availability of the report, proof of the notifications will provided in the final BAR. An updated Interested and Affected Party Register is attached to **Appendix E4.** As per the approved Public Participation Plan, the I&APs were contacted to confirm their email addresses. In instances whereby an I&AP does not have an email address, they will be notified by SMS on the availability of the Draft Report.

6.6 I&APs Register and Comments & response report

From the onset of the project, a database of persons, organizations and organs of state identified as I&APs or registered as I&APs was opened and is updated as and when required. The I&APs register is included in **Appendix E4**. Comments received from various I&APs have been captured in the Comments and Response Report. The Comments and Response report is attached to **Appendix E5**. All comments received during the DBAR Public review, will be captured and addressed in the Final Basic Assessment Report. Correspondence with I&APs have also been included in **Appendix E7**. The comments captured in comments and response report (**Appendix E5**) were obtained during the Notification Phase and during the availability of the Draft Basic Assessment Report (Revision 0). A summary of the comments received is outlined as follows:

- Registering as an interested and affected parties;
- Competent Authority requirements and guidelines;
- Sensitivity of the surrounding environment;
- Specialist studies and methods used;
- Water quality and biomonitoring;
- Biophysical and health impacts;
- Impact mitigations and monitoring;

- Potential construction camps;
- Stormwater infrastructure; and
- Extent of the upgrade area.

All comments received at the time of compilation of this report were included in **Appendix E5** of this report and addressed as adequately as possible. All comments received on the Revised Draft Basic Assessment Report will be included in the Final Comments and Responses Report which will be submitted to DFEE along with the Final Basic Assessment Report.

6.7 Focus Group Meetings/Public Open Day

All key municipal stakeholders were contacted regarding the project. In with the directions from the Minister regarding the combat of COVID, a focus group meeting was held through a virtual platform (Microsoft Teams) with the Bela Bela Municipality Planning Department on the 15th of April 2021 to formally present the project to the municipality as requested by the municipality. No public open days or focus group meetings have been held to date with I&APs. Depending on the comments received during the public review period for the Draft Basic Assessment Report, a public open day/focus group meeting may be arranged accordingly and in line with the Public Participation Plan.

7 IMPACT ASSESSMENT METHODOLOGY

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

In this report, impacts with a low significance are considered to have no influence on the decision to proceed with the proposed development. Impacts with a moderate significance will influence the decision, unless they can be effectively mitigated to a low significance, whereas impacts with a high significance - despite mitigation - would influence the decision to proceed with the proposed development.

7.1. Impact Mitigation Hierarchy

The Impact Mitigation Hierarchy provides steps that must be used in mitigating adverse impacts of a project and in turn ensuring environmental protection. There are various levels of preference for mitigation options with the most preferred method and the first step as avoidance and the least and final method as offset. Refer to **Figure 36** for an illustration of the Mitigation Hierarchy

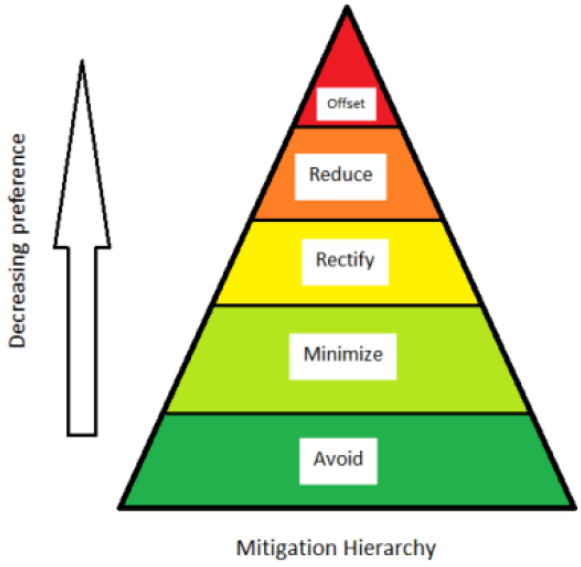

Figure 36: Mitigation hierarchy showing levels of preference (Eco Intelligent, 2016)

Each of the mitigation types will be discussed and contextualised to the proposed R101-8 road upgrade.

Step 1: Avoidance - Although this is the most preferred form of mitigation on projects to avoid adverse environmental impacts. The proposed road upgrade will require the removal of indigenous vegetation as well impacts to the riparian areas of Bad se Loop, Klein Kariba and Groot Nyl Rivers. This is not

suitable to the project as the proposed road will require vegetation to be removed during site establishment. Impacts on the watercourse will be unavoidable as the proposed project requires the demolition and replacement of bridges and major culverts over the riparian areas.

Step 2: Minimisation - This entails the reduction of adverse environmental impacts through various means as it based on the recognition that environmental impacts cannot be fully avoided in the proposed activity. The minimisation of adverse impacts will be adopted for the pre-construction, construction, and operational phase of the proposed project. The Mitigation measures proposed are discussed in **Chapter 8** of this report as well as in the Environmental Management Programme attached as **Appendix G.**

Step 3: Rectification - Where an impact has already taken place, rectification entails the implementation of corrective measures to avoid further adverse environmental impacts. Rectification will apply in cases where Contractors or maintenance employees have not adhered to specific restrictions or when the proposed mitigation measures are not adhered to or unforeseen impacts arise.

Step 4: Reduction - This is applicable where the above-mentioned rectification is not possible. Rectification requires new management practices and/or changes in methodology to ensure environmental protection.

Step 5: Environmental Offset- although this does not occur on the proposed development, it is meant to cater for the effects of the development through compensation of biodiversity losses by measures such as the establishment of new plants on another area outside the study area where it is not possible to avoid the clearance of vegetation or rehabilitate the disturbed areas.

7.2. Impact Assessment Methodology

In accordance with Government Notice R. 982, promulgated in terms of Section 24 of the National Environmental Management Act, 1998 (Act 107 of 1998), the EAP is required to assess the significance of potential impacts in terms of the following criteria:

- Nature of the impact;
- Extent of the impact;
- Intensity of the impact;
- Duration of the impact;
- Probability of the impact occurring;
- Reversibility of impacts; and
- Impact on irreplaceable resources; and
- Cumulative impacts.

Activities within the framework of the proposed development and their respective construction, operation, decommission and rehabilitation phases, give rise to certain impacts. Decommissioning is however not discussed as it is not anticipated that the National Road R101 Section 8 will ever be decommissioned. However, should decommissioning ever take place, an impact assessment for closure

shall be undertaken at that time. For the purpose of assessing these impacts, the project has been divided into three phases from which impacting activities can be identified, namely:

Construction phase:

This phase refers to all the construction related activities on site during closure of the site, until the contractor leaves the site.

Operation phase:

This phase refers to the period in which the proposed road will be operational.

Monitoring:

This includes all activities undertaken to ensure that the environmental integrity of the site is maintained and preserved after Rehabilitation has taken place.

The assessment of the impacts will be conducted according to a synthesis of criteria required by the integrated environmental management procedure. The methodology that will be used comprises of the following four steps:

- Step 1: Identification of positive and negative impacts of the project;
- Step 2: Identification of the significance rating of the impact before mitigation;
- Step 3: Identification of the mitigation measure and the mitigation efficiency; and
- Step 4: Identification of the significance rating of the impact after mitigation;

Activities that will be undertaken to give effect to the proposed development gives rise to certain impacts. For the purpose of assessing these impacts, the project has been divided into the following phases discussed in **Table 30.**

Table 30: Project phases in a development

PHASES OF A PROJECT IN WHICH IMPACTS WILL OCCUR
Status Quo
The study area as it currently exists.
Preconstruction
All activities undertaken before construction phase including specialist studies and assessments
Construction (pre- rehabilitation phase)
All activities on site up to the start of construction, not including the transport of materials, but including the initial site preparations. This also includes the impacts that would be associated with planning.
Rehabilitation phase (closure and rehabilitation phase)
All activities undertaken to ensure the site is restored to its original state as humanely possible.
Monitoring phase (post-closure phase)

PHASES OF A PROJECT IN WHICH IMPACTS WILL OCCUR
All activities after Rehabilitation, including the operation and maintenance of the proposed development.
The activities arising from each of the relevant phases have been included in the impacts assessment tables. The assessment endeavours to identify activities that would require environmental management actions to mitigate the impacts arising from them. The criteria against which the activities were assessed are given in the next section.

7.3. Assessment Criteria

The assessment of the impacts has been conducted according to a synthesis of criteria required by the guideline documents to the EIA regulations (2006) and integrated environmental management series published by the Department of Environmental Affairs and Tourism (DEAT) currently Department of Forestry, Fisheries and Environment (DFFE). In addition to this, it is a requirement of the National Environmental Management Act (NEMA) 2014 Regulations as amended, Appendices 1 and 2 that an Impact and Risk Assessment process be undertaken for the Basic Assessments and Environmental Impact Reporting. The Assessment Criteria is based on the following:

- Nature of impact;
- Extent;
- Duration;
- Intensity;
- Probability;
- Determination of significance; and
- Reversibility of impact.

Each of these are explained in **Table 31** below.

Table 31: Assessment Criteria

ASSESSMENT CRITERIA	SCORING
a) Nature of Impact	
This is an appraisal of the type of effect the proposed activity would have on the affected environmental component. The description should include what is being affected, how and whether the impact is positive or negative	Scoring does not apply, impact will either be positive or negative
b) Extent (E)	
The physical and spatial size of the impact. This is classified as: **i) Site** The impact could affect the whole, or a measurable portion of the site. **ii) Local** The impacted area extends only as far as the activity, e.g. a footprint of the specific activity	 **1** **2**

iii) Regional The impact could affect areas such as neighbouring farms, transport corridors and the adjoining towns. **iv) National** The impact could have an effect on South Africa.	**3** **4**
c) Duration (D)	
The lifetime of the impact; this is measured in the context of the lifetime of the proposed project. **i) Short term** The impact will either disappear with mitigation or will be mitigated through natural processes (less than 1 year). **ii) Medium term** The impact will last up to the end of the phases, thereafter it will be entirely negated (1 to 10 years). **iii) Long term** 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. **iv) Permanent** Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient, thus beyond decommissioning.	 **1** **2** **3** **4**
d) Intensity (I)	
Is the impact destructive or benign? Does it destroy the impacted environment, alter its functioning, or slightly alter it? These are rated as: **i) Low** The impact alters the affected environment in such a way that the natural processes or functions are not affected. **ii) Medium (Moderate)** The affected environment is altered, but function and process continue, albeit in a modified way. **iii) High** Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases. This will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project.	 **1** **2** **3**
e) Consequence of Impact (C)	
The anticipated consequence of the impact is determined using the following formula: **Consequence = Duration + Extent + Intensity** Consequence is rated as:	

i) Negligible An acceptable impact on natural systems, patterns or processes.	3
ii) Low A small impact on natural systems, patterns or processes, where the environment continues to function but in a modified manner and for which mitigation is desirable but not essential	4-5
iii) Moderate A substantial alteration of natural systems, patterns or processes, where environmental functions and processes are altered such that they temporarily or permanently cease. Mitigation will be required.	6-8
iv) High A serious alteration of natural systems, patterns or processes. Impacts may result in the irreversible damage to irreplaceable aspects if mitigation measures are not implemented.	9-10
v) Very High Very high impact on natural systems, patterns or processes, where environmental functions and processes are altered such that could permanently cease, even with mitigation.	11-12
f) Probability (P)	
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:	1
i) Improbable The possibility of the impact occurring is very low, due either to the circumstances, design or experience.	2
ii) Probable There is a possibility that the impact will occur to the extent that provisions must be made.	3
iii) Highly probable It is most likely that the impacts will occur at some or other stage of the development. Plans must be drawn up before the undertaking of the activity.	4
iv) Definite The impact will take place regardless of any prevention plans, and mitigation actions or contingency plans are relied on to contain the effect.	
g) Significance of impact with or without mitigation	

Score		Significance = Consequence x Probability					
Probability	4	Definite	4	8	12	16	20
	3	Highly probable	3	6	9	12	15
	2	Probable	2	4	6	8	10
	1	Improbable	1	2	3	4	5
			Negligible	Low	Moderate	High	Very High
			1	2	3	4	5
		Consequence					

Significance is determined through a synthesis of impact characteristics. Significance is 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. To determine significance of the potential impact/risk, the consequence is multiplied by probability. The classes are rated as follows:

i) No significance The impact is not substantial and does not require any mitigation. Score 1-5	1-3
ii) Low The impact is of little importance but may require limited mitigation. Score 4-6	4-6
iii) Medium (Moderate) The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels. Score 8-10	8-10
iv) High The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Score 12-16	12-16
v) Fatal Flaw The impact presents a fatal flaw and the entire development option or entire project proposal is unacceptable. Score 20	20

h) Reversibility of impact (R)

The extent to which the impacts are reversible

(i) Yes

The impact is reversible within two years after construction.

(ii) No

The impact is reversible within 2 to 10 years after construction.

i) The degree to which the impact can cause irreplaceable loss of resources	
(i) Low The impact results in the loss of resources but the natural, cultural and social processes/functions are not affected. **(ii) Medium** The loss of resources occurs but natural cultural and social processes continue, albeit in a modified manner. **(iii) High** The impact results in irreplaceable loss of resource.	

In order to maintain consistency, all potential impacts that have been identified during the BA process will be listed in impact assessment tables. The assessment criteria used in the tables will be applied to all of the impacts and a brief descriptive review of the impacts and their significance provided in the text of the report. The overall significance of impacts will be determined by considering consequence and probability.

8 DESCRIPTION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

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

The main objective of this section is to provide independent and scientifically sound information on the impacts identified during the Basic Assessment (BA) Process. Based on the requirements of the impact assessment, impacts identified, and issues and concerns raised are assessed with regard to their significance. The impact assessment is aimed at determining the impacts associated with the proposed development and the prescription of mitigation measures. Other impacts associated with the proposed development are discussed in detail in this section. It must be highlighted that the Impact Assessment Methodology discussed in **Chapter 7** of this report was used to assess the identified impacts.

In both themes, the potential impacts for all construction (activities related to rehabilitation) as well as the Monitoring phases of the projects are assessed It must be noted that the Impact Assessment Methodology as presented in **Chapter 7** of this report will be used to assess the impacts in terms of:

- nature, significance and consequences of the impact and risk;
- extent and duration of the impact and risk;
- probability of the impact and risk occurring;
- the degree to which the impact and risk can be reversed;
- the degree to which the impact and risk may cause irreplaceable loss of resources; and
- the degree to which the impact and risk can be avoided, managed or mitigated.

The cumulative impacts of the project will also be discussed.

In this report, impacts with a *low significance* are considered to have no influence on the decision to proceed with the proposed project. Impacts with a *moderate significance* will influence the decision unless they can be effectively mitigated to a low significance, whereas impacts with a *high significance* despite mitigation would influence the decision to proceed with the proposed project. The impacts discussed in this section were identified by the Project Team (including specialists). The potential impacts identified and elaborated on in this chapter have been presented as follows:

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

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

8.1. Theme 1: Impacts on the Biophysical Environment

8.1.1. Loss of Floral Habitat and Species Diversity

Localised loss of floral habitat and diversity may occur within areas of increased ecological sensitivity, **such as the Mountain Bushveld and the Riparian habitat unit due the proposed road alignment** traversing these areas and crossing watercourses in several locations. Clearing of vegetation for construction purposes as well as compaction of soils due to vehicular movement will result in reduced floral habitat availability and re-establishment success during the operational phase.

Table 32 presents an assessment of the impacts associated with floral habitat and species diversity

Table 32: Assessment of impacts related to floral habitat and species diversity

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	3 High	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

The proposed mitigation measures to avoid adverse impacts on the floral habitat and species diversity is provided below:

- The location and extent of areas of increased ecological importance and sensitivity (such as the Mountain Bushveld and Riparian habitat unit should be considered during the pre-construction and planning phases;

- All infrastructure, with specific mention of contractor laydown areas/ site camps, and other temporary infrastructure, are to be placed outside of the aforementioned habitat units or within areas of low ecological sensitivity;
- In planning the project, connectivity between surrounding natural areas on either side of the proposed road should be considered, and it must be ensured that such spatial connectivity is not entirely lost, and by allowing as large areas of unfragmented natural habitat as possible to remain;
- The amount of vegetation, particularly indigenous vegetation cleared should be limited to only what is required;
- Careful planning, demolition and construction at watercourse crossings (bridges and culverts) should take place in order to limit the extent of vegetation disturbance;
- Construction vehicles should be restricted to travelling only on designated roadways, to limit the ecological footprint of the proposed development activities;
- All areas of increased ecological sensitivity outside of the development footprint, that are at risk of being impacted by development activities should be clearly indicated on site, preferably temporarily fenced off during the construction phase and be strictly off limits for construction vehicles and workers; and
- No littering or dumping of waste and construction material within natural areas outside of the development footprint area may be allowed. All excess material must be removed from the construction areas once construction has been completed.

8.1.2. Loss of floral SCC and destruction of protected trees.

According to the Terrestrial Assessment undertaken by the Biodiversity Company (2021), two (2) floral Species of Conservation Concern (SCC), *Cleomaceae* and *Apocynaceae* are located within the study area. The first preference will be to conserve these species as far as possible followed by the second option of mitigating the impacts onto this species. In addition, two protected tree species were recorded within the study area, *Sclerocarya birrea subsp. caffra* (Marula) and *Combretum imberbe* (Leadwood) as discussed in **Section 4.1.3**. Site clearance and removal of vegetation could lead to a direct loss of confirmed floral SCC, and potential floral SCC, including the fragmentation of potential floral SCC populations. Construction of infrastructure and access roads through sensitive habitat could also lead to a loss of potential floral SCC.

Table 33 presents an assessment of the impacts associated with loss of floral SCC.

Table 33: Assessment of Impacts associated with Loss of Floral SCC and destruction of protected trees

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

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

- Floral SCC (*Cleomaceae and Apocynaceae*) encountered within the study area should ideally be conserved in situ. Where the encroachment of the proposed road alignment encroaches upon *Cleomaceae and Apocynaceae* is unavoidable, it is recommended that these plants be relocated under the supervision of a qualified botanist to suitable adjacent habitat;
- A walkdown of the study area within the sensitive environments (should these areas be impacted) and other areas of increased ecological sensitivity be undertaken by an ecologist within the appropriate season prior to commencement of construction. Should any SCC be identified to fall within the proposed construction footprint (road reserve) but will not necessarily be impacted on, these SCC shall be clearly marked and the areas barricaded as a no-go zone.
- Should other floral SCC be noted within the development footprint, the relevant provincial and/or national authorities should be consulted based on the conservation status of such species, and it must be determined whether relocation is possible. Relocation of such species should only be undertaken upon approval by the relevant authorities.
- Environmentally educate and raise the awareness of the Contractor and project employees that includes sensitization regarding sensitive areas and 'No-Go' areas such as rivers, wetlands, undisturbed areas

8.1.3. Destruction, further loss and fragmentation of the vegetation community

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

the disappearance of the affected species from the area. **Table 34** presents an assessment of the impacts associated with loss of faunal habitat

Table 34: Assessment of Impacts Associated with Destruction, further loss and fragmentation of the vegetation community

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

The proposed mitigation measures to avoid adverse impacts associated with loss of faunal habitat are provided below:

- Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.
- All areas outside of the direct footprint that were disturbed by the geological sampling must be rehabilitated and restored to a natural state.
- Rehabilitation of the disturbed areas must be made a priority. Any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.
- All activities must be restricted too within the low/medium sensitivity areas. No unnecessary loss of high sensitivity areas should be permitted.
- All construction/operational and access must make use of the existing roads.
- All laydown, chemical toilets etc. should be restricted to low/medium sensitivity areas. Any

materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded.

- Construction impacts associated with the proposed project must be contained within the footprint of the demarcated areas as indicated on the final approved project layout plan.
- Prior to construction, the final road alignment, road reserve and development footprint area must be demarcated on site to ensure that construction impacts are contained within this area. If necessary, these areas may be fenced or, alternatively, nearby sensitive areas are to be fenced to prevent access.

8.1.4. Displacement of faunal community (Including SCCs) due to habitat loss, direct mortalities

The most significant impacts on terrestrial biodiversity will be encountered during blasting at the three realignment areas. Disturbance and mortalities of fauna species including species of conservation concern due to blasting and destruction, further loss and fragmentation of the vegetation community including sensitive ridge habitat are anticipated. Loss of habitat also means loss of food and nesting resources, cover and movement corridors, which could lead to the disappearance of the affected species from the area. **Table 35** presents an assessment of the impacts associated with loss of faunal habitat due to blasting at the realignment areas.

Table 35: Assessment of Impacts Associated with displacement of faunal community (Including SCCs) due to habitat loss, direct mortalities

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

The proposed mitigation measures to avoid adverse impacts associated with loss of faunal habitat due to blasting at the realignment areas are provided below:

- Blasting can lead to: Ground vibrations, ground deformation (resulting in trees falling and habitat loss) and fly rock.
- Watch For/Monitor Ground Heave, Block Movement;
- Closer Hole Spacing, Smaller Diameter Holes;
- Good perimeter control blasting to minimize over break;
- Use Blasting Mats and weigh down the mats with rocks and soil from the blasting;
- Observe Geology, look for open seams;
- Notify nearby landowners of blasting schedule so they can move sensitive animals out of the nearby areas;
- Mechanical ripping should be used, where possible, to avoid or minimize the use of explosives;
- Ground vibration at sensitive sites should be below 5 mm/s (ppv) for 95 per cent of all blasts;
- Air blast at sensitive sites should be below 115dB for 95 per cent of all blasts;
- Blasting noise must be monitored.
- Blasting can only take place in times of low wind conditions.
- Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.
- All areas outside of the direct footprint that were disturbed by the geological sampling must be rehabilitated and restored to a natural state. Rehabilitation of the disturbed areas must be made a priority. Any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.
- All activities must be restricted to within the low/medium sensitivity areas as far as possible. No unnecessary loss of high sensitivity areas should be permitted. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined project area).
- All construction/operational and access must make use of the existing roads.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species

8.1.5. Loss of fauna migration connectivity

Impacts on animal movements arise directly, via increased mortalities from road traffic, and also indirectly from disturbance and behavioural reluctance to cross alien habitat. The road is already existing with the exception of realignment area. The replacement of bridges and major culverts may impede the movement of faunal species using watercourses as migration corridors. **Table 36** presents an assessment of the impacts associated with faunal migration connectivity.

Table 36: Impacts associated with faunal migration connectivity

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

The proposed mitigation measures to avoid adverse impacts associated with faunal migration connectivity are provided below:

- Movement of faunal species through the study area must be catered for by the provision of drainage culverts, in order to maintain regional metapopulation dynamics and to prevent local extinctions;
- The replacement of bridges and major culverts must allow for ongoing movement of faunal species and disturbance of watercourse should be minimised in line with the recommendations of the wetland specialist.
- It must be ensured that natural habitat in the vicinity of the study area is kept intact – specifically those areas that are connected to other natural areas outside the study area extent.
- Areas used during the construction phase and not during the operational phase should be rehabilitated.

8.1.6. Introduction and spread of alien vegetation

The moving of soil and vegetation results in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, outcompete natural vegetation, and decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the

catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users.

Table 37 presents an assessment of the impacts associated with the introduction and spread of alien vegetation.

Table 37: Impacts associated with the introduction and spread of alien vegetation

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

The proposed mitigation measures associated with the introduction and spread of alien vegetation are provided below:

- Implement an Alien Plant Control Plan (**Appendix G**) which specifies long-term monitoring schedules.
- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area and returning it where possible afterwards.
- Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish.
- Where sedimentation has been observed, effective rehabilitation with a focus on the long term control of alien invasive plants should be done.
- Rehabilitate or revegetate disturbed areas.

8.1.7. Changes in water quality due to foreign materials and increased nutrients

Construction and operational activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in watercourse function as well as human and animal waste.

Table 38 presents an assessment of the impacts associated with changes in water quality due to foreign materials and increased nutrients.

Table 38: Impacts associated with changes in water quality due to foreign materials and increased nutrients.

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	4-6 Low
Operational	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	4-6 Low
Operational	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low

The proposed mitigation measures associated with the changes in water quality due to foreign materials and increased nutrients is provided below:

- Provision of adequate sanitation facilities located outside of the watercourse and riparian area.
- Implementation of appropriate stormwater management around the excavations to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse.
- The development footprint must be fenced off from the watercourses, with the exception of the bridge crossings, and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.

- After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use.
- Maintenance of construction vehicles / equipment should not take place within the watercourse or watercourse buffer.
- Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse
- Treatment of pollution identified should be prioritized accordingly.

8.1.8. Changes in disturbance of wetland, riparian and instream habitat

The clearing of vegetation from construction working servitudes through watercourses; the setting up of construction camps and storage areas; the movement of construction vehicles and personnel during bridge and culvert upgrade / demolition, road widening / realignment and stormwater infrastructure upgrade activities as well as the inappropriate storage or dumping of building material / concrete in areas surrounding the direct development footprint may result in the disturbance of wetland, riparian and instream habitat as well as in the compaction / disturbance of soils. This disturbance may also result in the proliferation of alien and invasive species within the surrounding watercourses. **Table 39** presents an assessment of the impacts associated with changes in disturbance of wetland, riparian and instream habitat system.

Table 39: Impacts Associated with the changes in disturbance of wetland, riparian and instream habitat

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	4-6 Low
Operational	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	4-6 Low
Operational	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low

The proposed mitigation measures associated with changes in n disturbance of wetland, riparian and instream habitat are provided below:

- A detailed method statement for proposed upgrade activities within watercourses must be compiled prior to construction.
- Limit upgrade activities within watercourses and their associated buffer areas to the dry winter months.
- Clearly demarcate the construction footprint with orange hazard tape (or similar) and strictly prohibit the movement of construction vehicles and personnel outside of the demarcated areas. Portions of the watercourses and associated buffer areas or the 1:100year flood line, (whichever is greatest) that are located outside of the demarcated construction footprint must be designated as no-go areas.
- Demarcation of the construction footprint must be signed off by an Environmental Control Office (ECO). Demarcation should not be removed until construction is complete, and rehabilitation has taken place.
- The construction footprint through watercourses and their associated buffer areas must be as narrow as possible.

8.1.9. Changes in sediment entering and exiting the system

Construction and maintenance activities will result in earthworks and soil disturbance as well as the disturbance of natural vegetation. This could result in the loss of topsoil, sedimentation of the watercourse and increase the turbidity of the water. **Table 40** presents an assessment of the impacts associated with changes in sediment entering the existing the system

Table 40: Impacts Associated with the changes in sediment entering the existing the system

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	4-6 Low
Operational	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	4 Definite	Y	Low	12-16 High	4-6 Low

Operational	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low

The proposed mitigation measures associated with changes in sediment entering the existing system is provided below:

- Use of SANRAL road standards in terms of drainage and stormwater where practical and possible within project agreements. Stormwater structures shall be designed in accordance with the SANRAL drainage manual in such a way that nearly no sediment is accumulated at the inlets or outlets.
- Debris and wastes will be contained in such a way that they cannot become entrained in surface run-off during periods of heavy rain.
- In order to prevent soil erosion and reduce flow velocities, erosion protection shall be designed in the form of energy dissipator blocks, gabions and reno mattresses at the outlet structures.
- Construction in and around watercourses must be restricted to the dryer winter months where possible.
- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area.
- Where sedimentation has been observed, effective rehabilitation with a focus on the long-term control of alien invasive plants should be done.
- Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.
- Rehabilitation plans must be submitted and approved for rehabilitation of damage during construction and that plan must be implemented immediately upon completion of construction.
- Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- During the construction phase measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation (method statement for working within riparian areas).
- Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.
- Runoff from the construction area must be managed to avoid erosion and pollution problems.

8.1.10. Disturbance of watercourses by blasting in road realignment sections

Blasting may occur at three (3) realignment localities within the study area around centre points:

- Realignment 1: 24°48'34.22"S; 28°20'44.51"E;
- Realignment 2: 24°48'22.95"S; 28°21'19.43"E; and
- Realignment 3: 24°46'28.64"S; 28°21'34.95"E.

The blasting may directly impact on ephemeral watercourses Rip03 and Rip04, as well as an artificial farm dam labelled Dam02, of which portions are within the proposed realignments. The noise may

impact on the faunal species within and surrounding the watercourses as a result of noise. If rubble is not removed, the base level of the ephemeral drainage-lines could be altered, resulting in channel scouring. The altered landscape could also be affected. **Table 41** presents an assessment of the impacts associated with disturbance of watercourses by blasting in road realignment sections.

Table 41: Impacts Associated with blasting in realignment areas

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

The proposed mitigation measures associated with disturbance of watercourses by blasting in road realignment sections are provided below:

- Blasting shall be undertaken by an accredited blasting specialist.
- Neighbouring property owners to be notified at least 24 hours prior to undertaking any blasting activities.
- Blasting may only occur during the daytime hours as defined with the municipal Bylaws applicable to the study area. This will reduce the risk to nocturnal faunal species that may take refuge within the at-risk watercourses.
- Blasting should only occur within the direct footprint of the proposed realignment and only when all other excavation avenues have been considered and deemed not feasible.
- Blasting should ideally not occur directly within Rip03 and Rip04 due to the risk of unnecessary damage occurring to the morphology of the ephemeral streams. However, as both riverine systems are highly ephemeral in nature the significance can be reduced post-mitigation by landscaping the disturbed areas and constructing stormwater infrastructure to accommodate flow through the systems. This should be guided by a watercourse rehabilitation and monitoring programme drafted by a suitably qualified wetland and/or aquatic ecologist.

- No obstacles must impede the flow through Rip03 and Rip04 (i.e. all rubble must be removed from the systems using the least intrusive method possible).
- All blasting and construction should only occur during the dry season for the region to limit impeding and ponding of flow within the blast landscape.
- Rubble and associated infrastructure must be stockpile and stored outside of all watercourses and associated buffer zones (i.e. no-go zones for temporary infrastructure).

8.1.11. Disturbance on aquatic biota during bridge and culvert replacement

There are three major culverts and two bridges along the R101 Section 8. The wetland and aquatic biodiversity impact assessment revealed that the present ecological scores of the watercourses within a 500m radius of the site ranged between Moderately Modified (C) and Seriously Modified (E). The overall ecological importance and sensitivity for these watercourses were 'High'. In addition, small areas of wetland habitat will be lost during the road upgrade which will include excavations and diversions of the at risk watercourses. The installation of the new bridge footings will require dredging and infilling will result in temporal displacement of aquatic biota and may lead small scale permanent disturbance on the aquatic community. Although some of wetland habitat will be permanently lost, the intensity of the impact has been reduced by recommending means of improving the currently degraded state of the at-risk watercourses to a condition better than the baseline data presented herein. **Table 42** presents an assessment of the impacts associated with disturbance on aquatic biota during the bridge and culvert replacement.

Table 42: Impacts Associated with disturbances on aquatic biota during bridge and culvert replacement

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low

Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low

The proposed mitigation measures associated with disturbance on aquatic biota during bridge and culvert replacement are provided below:

- A method statement for the construction of bridging structures or culverts across rivers, streams and wetland areas will be compiled. The method statement must include steps that must be taken to ensure that the water table and water quality of these systems are not significantly affected. All method statements will be produced prior to the commencement of construction and shall be approved by the ECO prior to construction.
- The upgrades must make use of existing materials as far as possible to reduce the impact associated with the installation of new structures.
- Although the older footings will not form part of the upgrades, they should be retained in-situ as far as far as possible to avoid demolition on the foundations which will impact the aquatic biota.
- Demolition must be undertaken through manual process to reduce the impact on aquatic biota.
- Limit upgrade activities within watercourses and their associated buffer areas to the dry winter months.
- Water quality and aquatic biota assessments and monitoring must be undertaken before and after the construction phase. During the construction phase, regular monitoring must be undertaken as and when necessary, at least once a month to ensure the area is still habitable for the aquatic biota.
- Environmentally educate and raise the awareness of the Contractor and project employees that includes sensitization regarding sensitive areas and 'No-Go' areas such as rivers, wetlands, undisturbed areas
-

8.1.12. Pollution of surface water and soils due to demolition

The proposed project includes the demolition and replacement of bridges and culverts. The demolition during construction phase is likely to lead to contamination of soils and the surrounding surface water system. Potential contamination could also occur during the operational phase of the project during maintenance and unforeseen incidents within the bridges and culverts infrastructure. **Table 43** presents an assessment of the impacts associated with pollution of surface water and soils due to demolition.

Table 43: Impacts associated with pollution of surface water and soils due to spills and leaks

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										

Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	3 Highly probable	Y	Low	12-16 High	8-10 Medium
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	3 Highly probable	Y	Low	8-10 Medium	4-6 Low

The proposed mitigation measures associated with potential contamination within riparian areas are provided below:

- Waste material from the demolition must be temporary stored at the designated stockpiling area approved by the ECO. The waste must be disposed at a registered disposal site (Bela Bela and Modimolle Local Municipality Landfill site).
- The use of explosives must be avoided as far as possible to reduce the impact on the natural aquatic systems and potential contamination of the watercourse.
- Avoid direct impact on watercourse.
- All engineering specifications for the proposed demolition and construction shall be adhered to by the Contractor.
- The Resident Engineer shall oversee the proposed demolition methods and construction designs of bridges and culverts.
- A method statement for the proposed demolitions and construction of bridges and culverts including environmental controls shall be approved by the ECO prior to the commencement of any activity.
- During the operational phase there should be periodic inspections of all plant used to identify potential contamination from the plant.
- Any potential contamination must be addressed immediately.
- Rehabilitation of the riparian areas affected by the development must be undertaken after construction.

8.1.13. Loss of Topsoil and Soil Compaction

Potential disturbance on soil includes compaction owing to vehicle traffic (during the construction phase) and increased surface runoff from the compacted areas. Soil pollution may emanate from

petroleum hydrocarbon contamination owing to vehicle and machinery breakdown during the construction phase. The proposed construction of the road will require the clearance of vegetation and stripping of topsoil resulting in the loss of the original spatial distribution of the natural soil forms and horizon sequences. **Table 44** presents an assessment of the impacts associated with loss in topsoil and soil compaction.

Table 44: Impacts associated with loss in topsoil and soil compaction

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

The proposed mitigation measures associated with the topsoil and soil compaction are provided below:

- Topsoils should be excavated and stockpiled separately from the subsoils to be used during the rehabilitation of the road verges.
- Drip trays shall be provided in construction areas for stationary plant and for "parked" plant.
- Drip trays, sumps and bunds must be emptied regularly, especially before a known rain event and after a rain event, and the contents disposed of at a licensed disposal facility.
- All vehicles and equipment shall be kept in good working order and serviced regularly.
- Leaking equipment shall be repaired immediately or removed from the Site.
- A stormwater management plan must be compiled and implemented by the Contractor to take the increased surface water run-off rates and volumes and their erosion potential into consideration.
- Should concrete be mixed on site, mixing will take place within a demarcated fenced off concrete batching area at the Contractors Camp. Concrete must be mixed on an impervious surface.

8.2. Theme 2: Impacts on the Human Environment

8.2.1. Traffic on local roads

The movement of construction vehicles during the construction of the proposed roads can result in an increase in traffic congestion on local roads. Activities during the construction phase of the project such as lane diversions, stop and go points, and temporary diversions will disrupt the normal flow of traffic. During the operational phase, traffic volumes is expected to improve within the adjacent link roads. The proposed roads will have a positive impact on traffic during the operational phase. The assessment of this impact is indicated in **Table 45.**

Table 45: Assessment of traffic impacts

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	2 Local	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
Cumulative	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
Route Alternative 1										
Construction	Negative	2 Local	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
Cumulative	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
Route Alternative 3										
Construction	Negative	2 Local	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
Cumulative	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance

The proposed mitigation measures for the management of traffic brought about by construction activities are as follows:

- There must be an erection of signage warning motorists about the presence of construction vehicles.
- Construction activities must be limited to daytime hours where possible.
- Construction vehicles must not exceed speed limits of 40km/h within the construction site.
- Construction vehicles travelling on public roads must adhere to speed limits.

- Construction vehicles must not dispose of soil or other material on roads. Where this occurs, the ECO and Contractor must ensure that the material must is removed before the end of the working day.

8.2.2. Dust and Air Quality Impacts

Clearance of vegetation, grading, excavation activities and increased traffic volumes will result in dust generation and impact on the local community and adjacent business in the area. Depending on the activities undertaken on site and the climatological conditions, the level of dust emissions will vary. An assessment of the potential dust and air quality impacts of all phases are shown in **Table 46.**

Table 46: Assessment of air quality impacts

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

The proposed mitigation measures for dust and air quality are as follows:

- Implement dust suppression measures in all areas that will be affected by construction activities and where dust will be generated. Dust suppression must also be undertaken during windy and dry weather conditions.
- A continuous dust monitoring process needs to be undertaken during construction.
- Speed restriction of no more than 40km/h must be implemented for all construction vehicles within the construction site.
- Heavy vehicles and machinery should be serviced regularly to minimise exhaust fume pollution.

- Soil stockpiles shall be located in sheltered areas, where possible, to limit the erosive effects of the wind.
- All vehicles transporting friable materials such as sand must be covered by a tarpaulin or wetted down.

8.2.3. Noise Impacts

Construction sites are synonymous with noise impacts. High noise levels can have an adverse impact on both site labourers as well as the public, including occupiers of adjacent land. With regards to the proposed roads, noise sensitive receptors such as the Bela Bela and Modimolle Urban Areas including schools, hospitals and other organisations and facilities are situated adjacent to the study area. It is therefore important that this impact is assessed as presented in **Table 47.** During the operational phase of the project, it is not anticipated that the proposed roads will have an effect on the nearby receptors as a low noise road surface has been considered during the planning and design of the proposed roads.

Table 47: Assessment of noise impacts

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

The proposed mitigation measures to address noise impacts in the undertaking of construction activities are as follows:

- The working hours stipulated in the Construction permit, where applicable, must be adhered to. Where this is not applicable, the following working hours must be adhered to: Monday

to Friday from sunrise to sunset and where applicable on a Saturday which must be agreed upon between SANRAL and the Contractor.

- All construction plant and other equipment must be in a good working order to reduce possible noise pollution.
- Noise reduction is essential, and Contractors must endeavour to limit unnecessary noise, especially loud talking, shouting or whistling, radios, sirens or hooters, motor revving, etc.
- Should Blasting be undertaken on site:
    - All adjacent residents must be notified of the intention to undertake the initial blasting at least 7 working days in advance;
    - Method Statements for blasting shall be approved by the ECO; and
    - The survey of developments (buildings, etc.) should be conducted before the blasting takes place.

8.2.4. Heritage impacts

Construction activities such as excavations and grading could expose or damage features of heritage and cultural value beneath the surface. Although there are no Heritage features within the study area, heritage features immediately outside the boundary of the site as described in **Section 4.1.3(g)** shall be noted of and should any heritage feature be identified during any stage of the project, activities must stop and the LIHRA must be contacted. Refer to **Table 48** for an assessment of potential impacts on heritage resources.

Table 48: Assessment of heritage resources impacts

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Operational	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Cumulative	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Operational	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Cumulative	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Route Alternative 3										

Construction	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Operational	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Cumulative	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance

In order to protect Heritage Resources on site, the following mitigation measures are proposed:

- Although the Anglo Boer Memorial Site is slightly outside of the construction area, the personnel working on site should be made aware of the sensitivity of the memorial.
- The contractors and workers should be made aware of possible heritage and archaeological finds during the construction activities.
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;
- Should any graves be uncovered during the construction phase of the project, the applicant and appointed ECO must ensure in terms of section 38(6) of the Act, the responsible heritage resources authority (LIHRA), as well as the South African Police Service (SAPS) are notified;
- The ECO must train the Contractor to recognise any heritage features. Should there be a sign of such objects, construction must halt in that area immediately and a suitably qualified heritage specialist must be called to investigate through the ECO.

8.2.5. Palaeontological Resources

The development lies on the Alma and Swaershoek Formations (Nylstroom Subgroup, Waterberg Group) in the northern and central sections from Modimolle southwards. These rocks are indicated as moderately sensitive because microbial mat structures have been recorded from younger rocks of the Waterberg Group in the main Waterberg Basin, but not in the Nylstroom Basin. The route passes over the Clarens Formation (Stormberg Group, Karoo Supergroup) in the southern part near Bela-Bela. Fossil vertebrates and plants have been found in this stratum but in the Main Karoo Basin so it is indicated as highly sensitive in the SAHRIS palaeosensitivity map. The Nature of the impact is the destruction of Fossil Heritage. Loss of fossil heritage will have a negative impact. Threats to palaeontological resources are earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of the fossils by the development, vehicle traffic, and human disturbance. There are no paleontological features identified in the study site. Refer to **Table 49** for an assessment of potential impacts on palaeontological resources.

Table 49: Palaeontological Resources

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	1 Improbable	Y	Low	1-3 No Significance	1-3 No Significance
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	1 Improbable	Y	Low	1-3 No Significance	1-3 No Significance
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	1 Improbable	Y	Low	1-3 No Significance	1-3 No Significance
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	1 Improbable	Y	Low	1-3 No Significance	1-3 No Significance
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	1 Low	4-5 Low	1 Improbable	Y	Low	4-6 Low	1-3 No Significance
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	1 Improbable	Y	Low	1-3 No Significance	1-3 No Significance
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	1 Improbable	Y	Low	1-3 No Significance	1-3 No Significance

In order to protect potential Palaeontological Resources on site, the following mitigation measures are proposed:

- A field survey will be necessary for this project (according to SAHRA protocol) if fossils are found during construction.
- The ECO must survey for fossils before and or after clearing, blasting, drilling or excavating.
- Special care must be taken during the digging, drilling, blasting and excavating of foundations, trenches, channels and footings and removal of overburden as a site visit may have missed a fossiliferous outcrop.
- Should Fossils be unearthed the Contractor shall notify LIHRA, SAHRA and specialists to further investigate.
- The area must be fenced-off as a no-go area and the specialist must determine the buffer requirements.

8.2.6. Visual

During the construction phase of the project it is anticipated that construction vehicles in the area as well as excavations will have a potentially negative impact on the surrounding land use. In terms of the operational phase of the project, the area surrounding the site is invaded by other visual elements such as residential areas, existing road networks, schools and business facilities. Although the proposed development would be clearly visible, especially to the residents of Bela Bela and Modimolle CBD, it is anticipated that it would, blend in with the rest of the environment considering the existing road. The overall assessment of this impact is summarised in **Table 50.**

Table 50: Assessment of Visual Impacts

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 1										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Route Alternative 3										
Construction	Negative	1 Site	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
Operational	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low
Cumulative	Negative	1 Site	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	4-6 Low	4-6 Low

In order to mitigate the potential visual Impacts, the following measures are proposed:

- Dust levels must be kept down by regularly wetting dirt roads and exposed soil areas inside the site.
- Clearly demarcate the construction site to limit the area of disturbance.
- Remove all waste, including cleared vegetation from site as soon as possible unless the material will be reused on site. A dedicated area for the placement of waste that will either be removed or reused must be identified and demarcated.
- Domestic waste generated from the site camp must be kept in labelled bins with lids and removed every week or more often as the need arises and be disposed of at a registered

landfill. Proof of the disposal must be kept. Where waste is removed from site through other means, e.g. arrangement with adjacent landowners, written confirmation of this arrangement must be obtained.

8.2.7. Health and Safety Impacts

The construction and maintenance work that will be required may have health and safety implications for the personnel that will be working on the project. However, during the operational phase of the project, the proposed new road will address safety, mobility functions and ensure that reasonable access is provided to adjacent properties and areas to enable the future land use development. The impact is considered to be positive. The overall assessment of this impact is summarised in **Table 51.**

Table 51: Assessment of Health and Safety Impacts

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred)										
Construction	Negative	2 Local	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
4-6 Low	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
4-6 Low	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
Route Alternative 1										
Construction	Negative	2 Local	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
4-6 Low	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
4-6 Low	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
Route Alternative 3										
Construction	Negative	2 Local	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	8-10 Medium	4-6 Low
4-6 Low	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance
4-6 Low	Positive	2 Local	1 Short term	1 Low	3 Negligible	2 Probable	Y	Low	Positive	1-3 No Significance

In order to mitigate the potential visual Impacts, the following measures are proposed:

- Contractor must appoint a Health and Safety Officer for the construction phase of the project
- Suitable Personal Protective Equipment (PPE) must be worn at all times by all employees on site during the construction and maintenance phases of the project.

- With the exception of the project team members, no persons should be allowed to enter the construction site area.
- The site and crew are to be managed in strict accordance with the OHS Act.
- The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, spills, contamination of soil, accidents to employees and limiting casual access to the construction site for workers, use of hazardous substances and materials, etc.
- The Contractor must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site.
- The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of this emergency centre, including police and ambulance services must be available at prominent locations around the construction site.
- A Health and Safety Officer as well as an independent firm must be appointed to audit the site's compliance with the OHS Act during construction.

8.2.8. Temporary Employment Opportunities

The proposed development will have a positive impact within the Waterberg District Municipality as suppliers of construction materials will experience economic growth during the construction phase. During the construction phase, the creation of skilled and semiskilled jobs will be created. The use of local labour, as far as possible, is recommended as this would have a positive impact on the local economy and would prevent influx of job seekers from outside the Limpopo province. The impact is considered to be positive. The overall assessment of this impact is summarised in **Table 52.**

Table 52: Assessment of Temporary Employment Impacts

Project phase	Nature of impact	Extent	Duration	Intensity	Consequence (E+ D+I)	Probability	Reversibility	Loss of resources	Significance (C X P) Without Mitigation	Significance With Mitigation
Preliminary Design Route (Preferred), Route Alternative 1 and Route Alternative 2										
Construction	Positive	2 Local	2 Medium	2 Medium	4-5 Low	2 Probable	Y	Low	Positive	1-3 No Significance
Operational	*Temporary job opportunities for the local residents and suppliers will only be created during the construction phase of the project.*									

Even though the impacts related to temporary employment is positive, the SANRAL 14-point plan that stipulates the principles concerning project liaison, sub-contracting and labour sourcing shall be implemented. A Project Liaison Committee (PLC) shall be established to assist with the recruitment of local labour.

8.3. Cumulative Impacts

The NEMA EIA Regulations (2014) defines a "cumulative impact" in relation to an activity, as the past, current and reasonably foreseeable future impact of an activity, considered together with the impact

of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities. This is required on the basis that 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. The environmental impacts that will emanate from the activities associated with the proposed construction of the roads have already been discussed in this BAR. The impacts on surface water, floral and faunal habitats noise, dust and traffic are those of concern and where mitigation measures are not applied can lead to environmental degradation.

Mitigation measures to ameliorate these impacts during the construction, and operational phases of the project have been discussed in some sections of this chapter and are prescribed in detail in the EMPr attached as **Appendix G** of this report.

9 CONCLUSION, ENVIRONMENTAL IMPACT STATEMENT AND RECOMMENDATIONS

It is the intention of the South African National Road Agency Soc Ltd (SANRAL) to improve/upgrade the National Road R101 Section 8 from Bela Bela (km 0.0) to Modimolle (km 26.8). The National Road, R101 Section 8 is situated within two Local Municipalities (Bela Bela and Modimolle) both located within the Waterberg District Municipality, Limpopo Province. The proposed upgrade starts in Bela Bela at the intersection of R101 and Voortrekker Road/Chris Hani Drive (km 0.0) and ends at Modimolle at the intersection of R101 and R33 (km 26.8). The road will start at coordinates 24°53'5.16"S and 28°17'56.88"E and will end at coordinates 24°42'0.33"S and 28°24'21.10"E.

The R101-8 consists of a two lane, single carriageway road with gravel shoulders along most of the route. The road has an average surfaced width of 7.0 m. Within Modimolle, the road widens to four lanes with parking bays and sidewalks in the central business district (CBD). The general objective of this project is to successfully and optimally upgrade the National Road R101 Section 8 from Bela Bela (km 0.0) to Modimolle (km 26.8). The broad goal of the road upgrade is to improve road geometry and road safety, relieve and prevent traffic congestion to an acceptable level of service, replacement of bridges and other structures for hydraulic and traffic capacity improvement, and provide adequate pavement capacity for the design period.

Based on the summary of this Basic Assessment, it is a conclusion of this report that the proposed project will have moderate to low impacts on the bio-physical environment provided all mitigation measures detailed in this report as well as the EMPR in are adhered to. It is anticipated that the proposed project will have a positive impact on traffic safety during the operational phase and on job opportunities during the construction phase. The sensitives of the area include CBAs, ESAs, watercourses, protected trees and heritage features. A site specific sensitivity map is provided below.

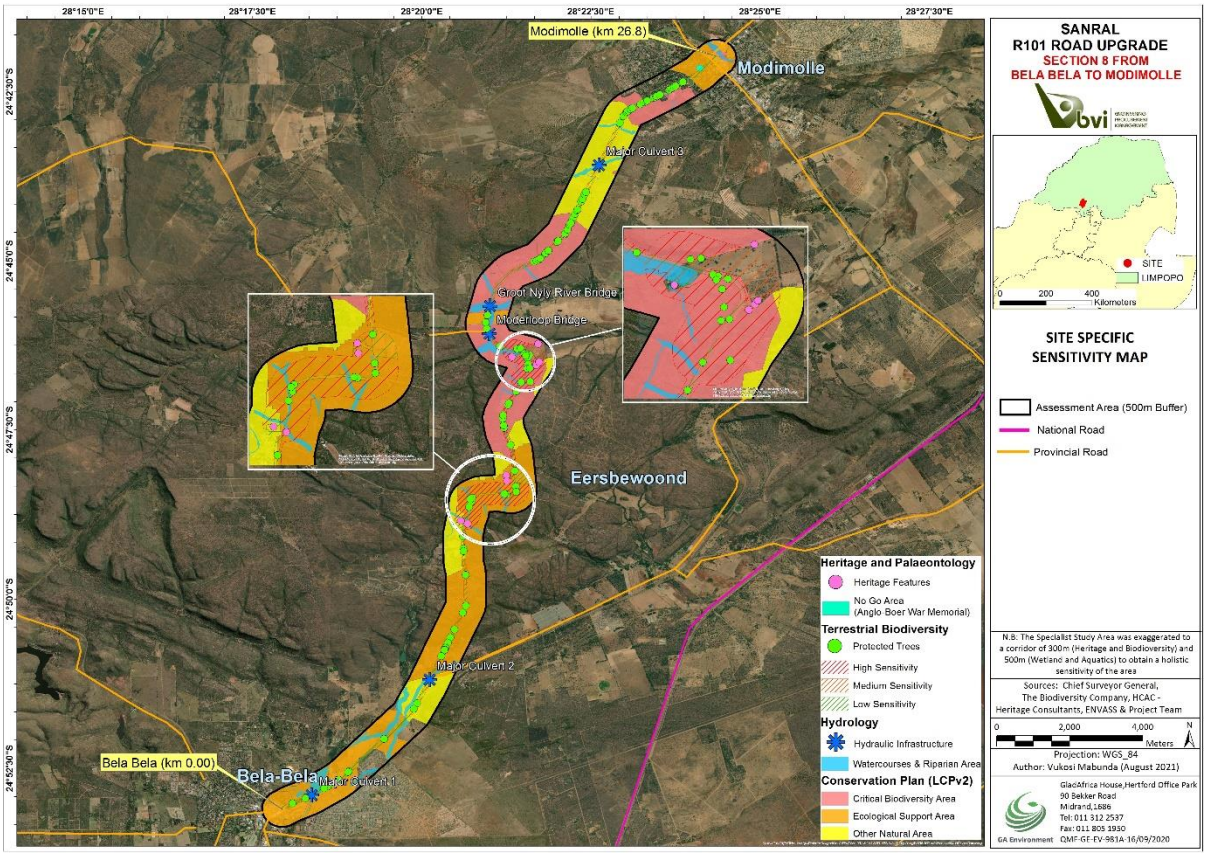

Figure 37: Site Specific Sensitivity Map

In the undertaking of any Basic Assessment Process, Public participation is a legislative requirement as set out in the NEMA EIA Regulations. The Public participation process involved sourcing of comments from I&AP, particularly adjacent land owners. It must be highlighted that to date, the project has not drawn sufficient attention to warrant public meetings or any further focus groups (one has already been held with Bela Bela Local Municipality). Consultation with all the key stakeholders was undertaken to inform them about the proposed project. In light of the COVID 19 Directions issued by the Minister, GA Environment will issue this report for public review, and depending on the comments and queries that will be raised by the public, GA Environment will advise on the way forward.

9.1 Environmental Impact Statement

The riparian areas of Bad se Loop, Klein Kariba and Groot Nyl River were recorded on the study site. The existing and proposed road traverses these watercourses at various points. There are three designs of which all follow the same path with the exception of bend angle at the realignment area. All three designs interact the riparian areas several times. The proposed demolition and replacement of the bridges and culverts within the riparian area will result in potential impacts such as loss of vegetation cover and habitat. Earthworks and soil disturbances could result in the loss of topsoil, sedimentation of the watercourse and increase the turbidity of the water. Even though the riparian habitat is dominated by alien vegetation, it provides potential habitat or foraging opportunities for faunal species. During the demolition and replacement of bridges contamination to the watercourse,

soil and surrounding environment will likely occur as well as the anticipated high waste generated, special attention must be placed on the EMPr and Wetlands Specialist guidelines.

The terrestrial biodiversity impacts that will emanate from from blasting impacts at the three realignment areaswill directly impacts on the faunal and floral species thereby resulting in the destruction,and fragmentation of intact and functional CBA areas. It has further been revealed through this wetland and aquatic biodiversity assessment that the proposed development

is located within 500m radius the watercourses that are regarded to have a high overall ecological importance and sensitivity. The status of the wetlands is regarded as within a Moderately Modified (C) and Seriously Modified (E). It must further be noted that some sections of the proposed road widening will predominantly take place in already infilled and transformed areas within the existing road reserve. The anticipated activities such as blasting, demolition, temporary diversions of flow, and excavations in watercourses, in particular, during the construction phase will negatively impact on the water quality, the aquatic biota and wetland habitats. These activities were holistically assessed to be of 'High' and "Medium' i significance prior to mitigations and "Medium' and 'Low' post mitigations. It is anticipated that the recommended baseline water quality and biomonitoring that will be undertaken prior construction and during and post construction will reduce the impacts further. The independent ECO monitoring that will be undertaken during the construction phase will review the results of the monitoring that will be undertaken.

In proceeding within the project, it is therefore important that integrated environmental management be considered. Each of the impacts identified in this report can be mitigated by the measures as outlined in **Chapter 8** of this report as well as in the Environmental Management Programme attached as **Appendix G** of this BAR. These plans must be supplemented with additional conditions from the Environmental Authorization that will be issued by DFFE as the Competent Authority.

A total of three (3) route alternatives were identified for the project as well as the No-go Option. These are as follows:

- No-go option;
- Route Alternatives:
  - Preliminary design (preferred)
  - Alternative Route 1
  - Alternative Route 2
- Cross section alternatives:
  - Option 1; (preferred) and
  - Option 2.
- Bridge Alternatives:
  - Option 1: Rehabilitation;
  - Option 2: Raise the deck;'
  - Option 3: New deck / additional spans; and
  - Option 4: New Bridge (preferred)
- Construction Methodology for the Replacement of Major Culverts:
  - Preliminary Construction Sequence Option 1 (**preferred**); and

  - Construction Sequence Option 2
- Construction Methodology for the Replacement of Bridges:
  - Preliminary Construction Sequence Option 1 (**preferred**); and
  - Construction Sequence Option 2

As stated before, the route alternatives for this project are similar except for the geometrical re-alignment at substandard curves to allow for three different design speeds. The proposed design speed of 100km/hr is preferred for this study as it corrects the issues identified on the realignment areas and it allows uniform design for the entire road. The cross-sections alternatives are similar except for additional climbing lanes at specific sections for option 2. Cross section Option 1 is more economically viable and thus preferred. There are four alternatives for the upgrade of bridges. Based on the Final Preliminary Design Report, the bridges are reaching their lifespans and thus require wholesale improvements. As such, new bridges are preferred to address the issues of ageing infrastructure and flooding requirements.

There were five specialist assessment undertaken to aid with this DBAR;

- The Terrestrial Biodiversity Impact Assessment;
- Freshwater Assessment: Wetland Delineation and Impact Assessment;
- Heritage Impact Assessment;
- Palaeontology Impact Assessment Phase I; and
- Detailed Desktop Agricultural Impact Assessment, Remedial Measures and Implementation Measures.

The studies found the site to be overall, moderate to low sensitive mainly due to the activities being undertaken on an existing road with a 35m servitude that has already been transformed. Based on all information presented in this report and the specialist reports, there are foreseen environmental impacts associated with the proposed road upgrade, but the construction will mainly be undertaken on an existing servitude which has already been degraded. The recommendations made in this report and the specialist reports must be followed to ensure there is minimal environmental impact.

This DBAR will be followed by a Final BAR which will incorporate all public comments and feedback during the DBAR public review phase. The Final BAR will be submitted to the competent authority (DFFE) for review and consideration. Once the Environmental Authorization has been received for the proposed activities, SANRAL can then proceed with the construction of the proposed roads and associated infrastructure.

9.2 EAP's Recommendations

This Basic Assessment report has provided a comprehensive assessment of the potential environmental impacts associated with the proposed activity. These impacts have been identified by the EAP and the specialist studies undertaken for the proposed development. The key findings of the Basic Assessment Process are discussed in this report. It is the recommendation of the EAP that the **preliminary design** be approved as this route is the most effective way of meeting the need and purpose of the proposed activity. The impact assessment has revealed that the construction and operational phases of the proposed project will generate negative impacts of moderate to low

significance after mitigation, but of a moderate to high positive significance for road users. The proposed project will restore enhanced traffic and safety conditions for pedestrians, vehicles and adjacent landowners. The construction of the proposed roads will complement infrastructure development within the area. Infrastructure forms the backbone of a country's economy, hence the proposed development is significant for the overall development of the country.

Taking into consideration the findings of the environmental impact assessment, the project benefits outweigh the negative impacts identified provided that mitigation measures are applied effectively. Impacts of high significance are not foreseen once proper mitigation measures have been implemented. It is therefore recommended that the environmental authorities subject the proposed application to the following conditions:

a. The Contractor shall inform all adjacent landowners of the commencement of construction activities at least 30 days before the commencement via adequate signage at strategic points on site;
b. An Independent Environmental Control Officer must be appointed to monitor all construction activities and ensure the demarcation of all applicable areas and approve the locations of all infrastructure;
c. A protected tree search and rescue plan must be undertaken before the construction phase to ensure all potentially affected protected trees are accounted for and managed accordingly;
d. The Contractor may only establish on the least sensitive environment which must be approved by the ECO. It is recommended that the Contractor assess the four potential site establishment areas as indicated in **Section 1.5.8** of this report.
e. Construction work within the watercourses should be limited to the dry season as far as possible as indicated in the Bridges and Major Culverts Construction Methodology to reduce impacts on the aquatic ecosystems.
f. Water quality assessments and biomonitoring (upstream and downstream of the construction activities) must be undertaken before and after the construction phase in accordance with the recommendation made by the Aquatic specialists. The period and frequency of monitoring required post-construction must be determined by a suitably qualified aquatic ecologist and approved by the ECO.
g. Prior to construction, the final road alignment, road reserve and development footprint area must be demarcated on site to ensure that construction impacts are contained within this area. If necessary, these areas may be fenced or, alternatively, nearby sensitive areas are to be fenced to prevent access;
h. Work on the riparian areas for the demolition and replacement of bridges and major culverts must be undertaken with precision by following the guidelines provided in the EMPr and Wetland Specialist Report;
i. The location and extent of areas of increased ecological importance and sensitivity (such as the Mountain Bushveld, Riparian habitat and Savanna units should be considered during the preconstruction and planning phases;
j. All areas of increased ecological sensitivity outside of the development footprint that are at risk of being impacted by development activities should be clearly indicated on site, and be strictly off limits for construction vehicles and workers;

k. Floral SCC (*Cleomaceae* and *Apocynaceae*) encountered within the study area should ideally be conserved *in situ.* Where the encroachment of the proposed road alignment encroaches upon *Cleomaceae and Apocynaceae* is unavoidable, it is recommended that these plants be relocated under the supervision of a qualified botanist to suitable adjacent habitat;
l. A permit must be obtained before moving or tempering with the two protected tree species were recorded within the study area, *Sclerocarya birrea subsp. caffra* (Marula) and *Combretum imberbe* (Leadwood);
m. The Contractor must also note that there are at least seven (7) SCC Bird species with a high likelihood of occurring on site. These species must not be harmed;
n. It is recommended that a walkdown of the development footprint within the ecological sensitive and important biodiversity areas (should these areas be impacted as per the final and approved designs) be undertaken by an ecologist within the appropriate season prior to commencement of construction. Should any SCC be identified to fall within the proposed construction footprint (road reserve) but will not necessarily be impacted on, these SCC shall be clearly marked and the areas barricaded as a no-go zone;
o. Should other floral SCC not encountered during the field assessment be noted within the development footprint, the relevant authorities Limpopo Department of Agriculture and Rural Development (LDARD) or the DFFE should be consulted based on the conservation status of such species, and it must be determined whether relocation is possible. Relocation of such species should only be undertaken upon approval by the relevant authorities;
p. Movement of faunal species through the study area must be catered for by the provision of functional drainage culverts, in order to maintain regional metapopulation dynamics and to prevent local extinctions;
q. If water is sprayed on the operational surfaces for any reason during the operational process, utmost care must be taken to ensure the runoff water does not pollute the system or any of the associated catchment areas. A storm water cut-off drain should be constructed between the operational area and the aquatic system to ensure that storm water flowing through the operational area cannot flow into the aquatic system. The water from the cut-off drain must be collected in a sedimentation pond before entering the aquatic system;
r. Increased runoff due to removal of vegetation and increased soil compaction must be managed to ensure the prevention of siltation and the maximum stream bank stability;
s. Any species of fauna encountered during the operational phase should be moved to a safe location where no harm can be bestowed on the species;
t. Implement an Alien Plant Control Plan which specifies long-term monitoring schedules;
u. Maintenance of construction vehicles / equipment should not take place within the watercourse or riparian areas;
v. Topsoils should be excavated and stockpiled separately from the subsoils to be used during the rehabilitation of the road verges. Drip trays shall be provided in construction areas for stationary plant and for "parked" plant; Drip trays, sumps and bunds must be emptied regularly, especially before a known rain event and after a rain event, and the contents disposed of at a licensed disposal facility;

w. The Contractor must be trained to recognise any heritage features. Should there be a sign of such objects, construction must halt in that area immediately and a suitably qualified heritage specialist must be called to investigate through the ECO;
x. Adhere to all conditions of the Environmental Authorisation issued by DFFE as well as any conditions of permits that may be required thereafter; and
y. Adhere to all recommendations outlined in the specialist Reports (**Appendix F**) and the Environmental Management Programme in **Appendix G.**

Based on the environmental assessment of the site conditions, and the potential impact of the proposed road, the preliminary design has emerged as the most viable option subject to adherence to mitigation measures outlined in this report and the EMPr. It is the EAPs recommendation that the project be authorised that these activities are completed within a period of 5 years to avoid dire impacts on the environment which cannot be corrected. It is therefore recommended that the project be authorised for a period of 5 years. The proposed construction phase will commence in April 2022 and conclude in May 2024.

It is therefore strongly advised that the recommendations highlighted in this section be included as conditions of authorisation by the DFFE. It is GA Environment's recommendation that the applicant, SANRAL, be granted an Environmental Authorisation for the proposed roads subject to the conditions stipulated in the preceding section and that all Mitigation Measures provided in this report be strictly adhered to and closely monitored by an independent EAP to avoid adverse environmental Impacts. **.**

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