FINAL BASIC ASSESSMENT REPORT

SANRAL SOC Ltd REHABILITATION OF NATIONAL ROUTE R56 SECTION 8 FROM MATATIELE (KM 130.15) TO THE KWAZULU NATAL BORDER (KM 168.71), EASTERN CAPE PROVINCE

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

SANRAL SOC Ltd REHABILITATION OF NATIONAL ROUTE R56 SECTION 8 FROM MATATIELE (KM 130.15) TO THE KWAZULU NATAL BORDER (KM 168.71), EASTERN CAPE PROVINCE

FINAL BASIC ASSESSMENT REPORT

DFFE REFERENCE: 14/12/16/3/3/1/2706

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ACRONYMS

AIS	Alien Invasive Species
BID	Background Information Document
BAR	Basic Assessment Report
CA	Competent Authority
CBA	Critical Biodiversity Area
CES	Coastal and Environmental Services (Pty) Ltd. (t/a CES)
COT	City of Tshwane
DBAR	Draft Basic Assessment Report
FBAR	Final Basic Assessment Report
DFA	Dark Fibre Africa
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GDARD	Gauteng Department of Agriculture and Rural Development
GN	Government Notice
HIA	Heritage Impact Assessment
IWMP	Integrated Waste Management Plans
IDP	Integrated Development Plan
I&AP	Interested and Affected Party
MEC	Member of the Executive Council
MSDF	Metropolitan Spatial Development Framework
MTN	Mobile Telecommunication Network
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NEMPAA	National Environmental Management: Protected Areas Act
NFEPA	National Freshwater Ecosystem Priority Area
NDP	National Development Plan
PPP	Public Participation Process
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Association
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework
SCC	Species of Conservation Concern
SG	Surveyor General
SIA	Social Impact Assessment
SOER	State of Environment Reporting
TOPS	National List of Threatened or Protected Species
WUL	Water Use License

EXECUTIVE SUMMARY

BACKGROUND

The South African National Roads Agency (SANRAL SOC Ltd) proposes the rehabilitation of the 38.56 km section of the National Route R56 Section 8 which is located between Matatiele at KM 130.15 and the KZN Border at KM 168.71, in the Eastern Cape Province. The National Route R56 is an important economic route as it connects Durban with Cape Town and is renowned for being the shortest route between KwaZulu Natal and the Western Cape. The mission of SANRAL is to ensure that the provision of the national road transport system is sustainable, taking into account factors such as safety, the environment, resource efficiency, good corporate citizenship and governance.

CES has been appointed by Gibb Engineering & Science on behalf of SANRAL SOC Ltd as an independent Environmental Assessment Practitioner (EAP) to undertake a Basic Assessment (BA), including specialist studies, and apply for the necessary Environmental Authorisation (EA) for the proposed project. The SANRAL National Route R56 Section 8 road upgrade was previously authorised (Reference number: 14/12/16/3/3/1/1580); however, the environmental authorisation has subsequently lapsed; therefore, a new application needs to be submitted.

LOCATION, SITE AND PROJECT DESCRIPTION

The National Route R56 Section 8 is located between Matatiele from Km 130.15 and the KZN Border at Km 168.71 (Figure 1). The project route falls within an existing registered servitude which traverses several farm portions within Wards 19, 20 and 26 of the Matatiele Local Municipality, Eastern Cape Province (Table 2-1). The study area is bordered by the Matatiele town to the west, passing through the town of Cedarville and concluding at the KZN border to the east.

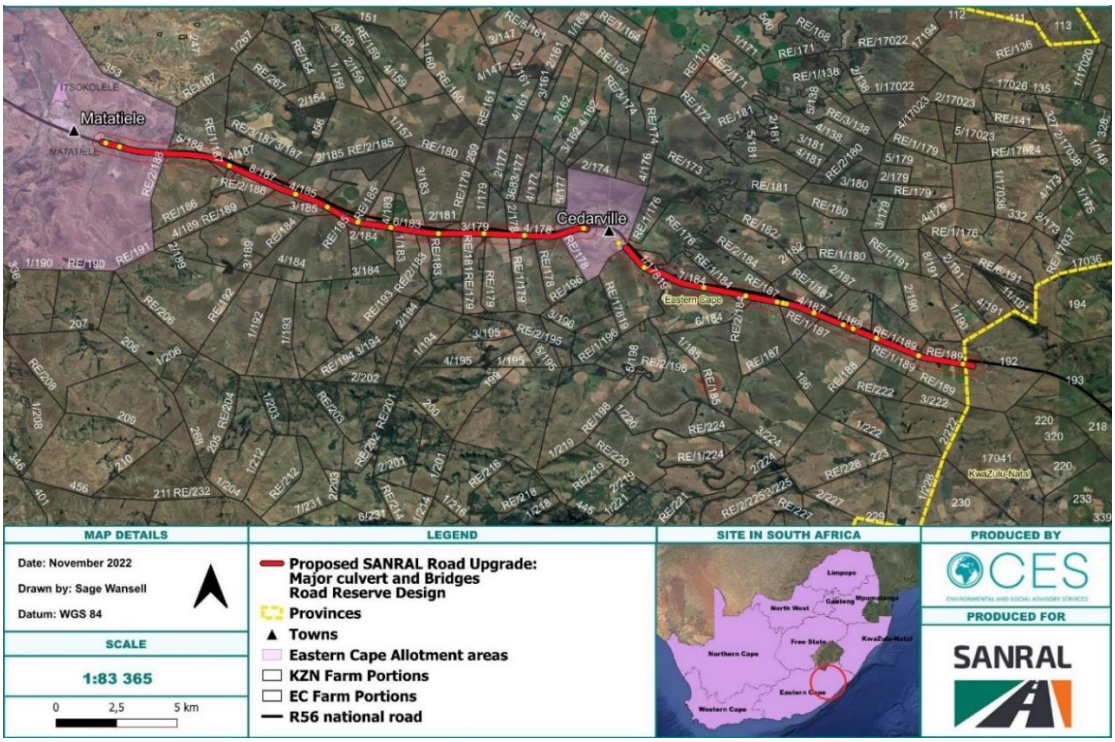

Figure 1: Locality map of the proposed SANRAL SOC Ltd National Route R56 Section 8 Study Area

In terms of the Environmental Impact Assessment (EIA) regulations of 2014 (as amended), the rehabilitation of the National Route R56 Section 8 project requires an Environmental Authorisation, from the Department of Forestry, Fisheries and the Environment (DFFE). The triggered activities are listed under Listing Notices 1 & 3 (published in Government Notices No. R 327 and No. R 324 respectively), and as such, a BA Process needs to be followed. The listed activities that have been applied for are provided in Table 1 below.

Table 1: Listed Activities triggered in the 2014 NEMA EIA Regulations (as amended) - (Basic Assessment)

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
12	**The development of—** **(ii) 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 development will require the construction of temporary or permanent infrastructure (e.g. bridges, support structures and culverts) with a physical footprint of more than 100 square metres within at least 32 m of watercourses. The physical footprint of structures within watercourses and streams and within 32 m of watercourses and streams is 14 Ha.**
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 water course.**	**No watercourses will be altered, yet excavation and backfilling of foundations of structures (bridges and culverts) will occur in watercourses.**
~~**27**~~	~~**The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.**~~	**The site camp is located in an urban area that is already disturbed. Therefore, this activity does not apply.**
Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3** of the EIA Regulations, 2014 as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
4	**The development of a road wider than 4 metres with a reserve less than 13,5 metres.** **a. Eastern Cape** **i. Outside urban areas:** **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** **(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas;**	The proposed development activities will involve the development of a road outside urban areas in the Eastern Cape. It falls within both CBA 1 and 2 as defined in the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2020), and located within 5km of the National Protected Area Expansion Strategy (NPAES) focus areas (Drakensberg and midlands; Southern Berg Griqualand) and is adjacent to the NEMPAA stewardship nature reserve (the Matatiele Nature Reserve).
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.** **a. Eastern Cape** **i. Within any critically endangered or endangered ecosystem listed in terms of**	The proposed development will involve the cumulative clearance of an area of 300 square metres of indigenous grassland due to the fact that the rehabilitation and construction occurs along a linear development which exceeds 30km. The development within critically endangered and endangered ecosystems (East Griqualand grassland

	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;	and Mabela Sandy grassland, respectively). Approximately 700 m^2 of Mabela Sandy Grassland will be cleared, and 12.6 Ha of East Griqualand grassland will be cleared during the construction of the road. The positions are indicated on the sensitivity maps under Appendix A of the Basic Assessment Report.
14	**The development of—** **i. 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 metres of a watercourse, measured from the edge of a watercourse;** **a. Eastern Cape** **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;** **(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 proposed development activities will involve the development of bridges exceeding 10 square metres in size within a watercourse or 32m of a watercourse outside urban areas in the Eastern Cape. It falls within both CBA 1 and 2 as defined in the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2020), and located within 5km of the National Protected Area Expansion Strategy (NPAES) focus areas (Drakensberg and midlands; Southern Berg Griqualand) and is adjacent to the NEMPAA stewardship nature reserve (the Matatiele Nature Reserve). The footprint of infrastructure within 32 m of a watercourse and within CBAs is 8.5 Ha. The footprint of infrastructure within 32 m of a watercourse and within 5 kilometres of a protected area is 12 Ha.
18	**The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.** **a. Eastern Cape** **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** **(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;**	The proposed development will involve the widening of a road by more than 4 metres and the lengthening of a road by more than 1 kilometre in the Eastern Cape. The project is located within 5km of the National Protected Area Expansion Strategy (NPAES) focus areas (Drakensberg and midlands; Southern Berg Griqualand) and is adjacent to the NEMPAA stewardship nature reserve (the Matatiele Nature Reserve) and falls within both CBA 1 and 2 as defined in the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2020).
23	**The expansion of-** **(i) infrastructure or structures where the physical footprint is expanded by 10 square metres or more:** **where such expansions occurs-** **(a) within a watercourse;** **(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;** **a. Eastern Cape**	The proposed development will involve the expansion of bridges by 10 square metres or more within watercourse or 32 metres of a watercourse outside urban areas in the Eastern Cape. The project is located within 5km of the National Protected Area Expansion Strategy (NPAES) focus areas (Drakensberg and midlands; Southern Berg Griqualand) and is adjacent to the NEMPAA stewardship

	i. Outside urban areas: **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans**; **(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA.**	nature reserve (the Matatiele Nature Reserve) and falls within both CBA 1 and 2 as defined in the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2020). The footprint of infrastructure within 32 m of a watercourse and within CBAs is 8.5 Ha. The footprint of infrastructure within 32 m of a watercourse and within 5 kilometres of a protected area is 12 Ha.
~~Activity No(s):~~	~~Provide the relevant **Scoping and EIR Activity(ies)** as set out in **Listing Notice 2** of the EIA Regulations, 2014 as amended.~~	~~Describe the portion of the proposed project to which the applicable listed activity relates.~~

PUBLIC PARTICIPATION PROCESS

Public consultation is a legal requirement throughout the BA process. The Public Participation Process included:

- Placing notice boards on site;
- Identifying and registering Interested and Affected Parties (I&APs) and relevant stakeholders;
- Providing notice to I&APs and stakeholders of the intent to submit an application for EA and the release of the Draft Basic Assessment Report (BAR) for public review.
- Publishing an advertisement in a local newspaper notifying the public of the release of the Draft BAR for public review;
- Keeping a register of all comments by and responses to registered I&APs and stakeholders for inclusion in the Final BAR.

IMPACT ASSESSMENT

Table 2 provides an overall summary of the negative (cost) and positive (benefit) environmental impacts associated with the proposed rehabilitation of the National Route R56 Section 8 road.

Table 2: Summary of impacts before and after mitigation across phases.

THEME	BEFORE MITIGATION					AFTER MITIGATION				
	LOW	MOD LOW	MOD	HIGH	V HIGH	LOW	MOD LOW	MOD	HIGH	V. HIGH
Environmental policy				*-3*		*-3*				
Built environment			*-9(+1)*			*-8*		*(+1)*		
Socio-economic			*-11*	*(+4)*	*(+1)*	*-11*			*(+4)*	*(+1)*
Rehabilitation and maintenance			*-3*			*-3*				
Terrestrial Biodiversity and Ecology	*-6*		*-6*	*-5*		*-10*		*-7*		
Heritage	*-3*		*-1*		*-1*	*-5*				
Aquatic and wetland		*-5*	*-3*			*-6*	*-2*			
Total	-9	-5	-34(+1)	-8 (+4)	-1 (+1)	-46	-2	-7(+1)	(+4)	(+1)

CONCLUDING REMARKS AND RECOMMENDATIONS

It is the professional opinion of CES and specialists that:

- **NO FATAL FLAWS** are currently associated with the proposed development, as all identified impacts can be adequately mitigated to reduce the risk or significance of impacts to an acceptable level, provided mitigation measures recommended in this report are implemented and maintained throughout the life of the project.
- If any changes to these layouts are made, the input of the relevant specialist must be obtained and incorporated into any changes.
- The information in the report is sufficient to allow DFFE to make an informed decision.

It is the recommendation of CES that the proposed upgrade of the National Route R56 Section 8 should be approved provided that the proposed mitigation measures are implemented and that the EMPr is implemented, maintained and adapted to incorporate relevant legislation, standard requirements and audit reporting, throughout the life of the development. The mitigation measures for all impacts identified in the BAR must be incorporated into the EMPr and must be used by the engineers during the detailed Planning & Design Phase, by the contractors during the Construction Phase and by SANRAL SOC Ltd during the Operation Phase.

The period for which the Environmental Authorisation (if granted) is required is ten years. The activity is permanent, and is therefore not expected to be concluded in the short to medium term.

1 INTRODUCTION

1.1 BACKGROUND

The South African National Roads Agency SOC Ltd. (SANRAL) proposes the rehabilitation of 38.56 km section of the National Route R56 Section 8 which is located between Matatiele at Km 130.15 and the KZN Border at Km 168.71 (Figure 1-1) in the Matatiele Local Municipality, Eastern Cape Province. The proposed road improvement will entail the following:

- Half of the 38.56 km section of the R56 will be resealed or overlaid and the other half rehabilitated;
- Rehabilitation of the existing R56 using the in-situ material as part of the new pavement by adding 3 metre shoulders with a centerline offset of approximately 6 to 7 metres resulting in a two way traffic scenario;
- Rehabilitate the existing R56 using the in-situ material as part of the new pavement by adding 1.5 metres shoulders with a centerline offset of approximately 3 metres resulting in a Stop-Go scenario;
- Reconstructing the R56 on a new off-set alignment (while traffic continues to use the existing R56);
- Mining authorisation for a rock quarry for material sources. The mining licence was issued 21 June 2021 by the Department of Minerals Resources and Energy (DMRE). Reference: EC 30/5/1/3/3/3/00083BPEM); and
- Water use licenses for all the water crossings. The General Authorisation was issued by the Department of Water and Sanitation on 30 September 2016 (Reference 27/2/2/T631/1/4).

The proposed rehabilitation of the National Route R56 Section 8 from Matatiele to the KwaZulu Natal border is within the Matatiele Local Municipality. As the proposed project activities trigger listed activities published under GNR. 327 and GNR. 324 of the EIA Regulations (as amended), a BA process must be undertaken in such a manner that the environmental outcomes, impacts and residual risks of the proposed project being applied for are noted in the BA Report and assessed accordingly by the Environmental Assessment Practitioner (EAP). The SANRAL National Route R56 Section 8 rehabilitation was previously authorised (Reference number:14/12/16/3/3/1/1580); however, the environmental authorisation has subsequently lapsed, therefore a new application needs to be submitted, which will require a BA as outlined above.

The current BA is only applicable to the rehabilitation and upgrade of the National Route R56 Section 8. A mining authorisation for the quarries and borrow pits was authorised in 2021 by the Department of Mineral Resources and Energy (DMRE) with the reference EC30/5/1/3/3/3/00083BPEM. A second application for the Edendale Quarry was submitted in September 2021, Reference 00156BPEM and is pending a decision from DMRE.

The proposed National Route R56 Section 8 rehabilitation occurs within 32 metres of numerous watercourses and within 500 metres of numerous wetlands. Water use licensing is therefore required in terms of the National Water Act (Act No.36 of 1998) from the Department of Water and Sanitation

(DWS), for the water crossings along the National Route R56 Section 8 route. This water use license was applied for an issued in 2016, Reference number 27/2/2/T631/1/4.

Ultimately, the outcome of the BA Process is to provide the Competent Authority, the National Department of Forestry, Fisheries and the Environment (DFFE) with sufficient information to provide a decision on the Application in terms of Environmental Authorisation (EA), in order to avoid or mitigate any detrimental impacts that the activity may inflict on the receiving environment.

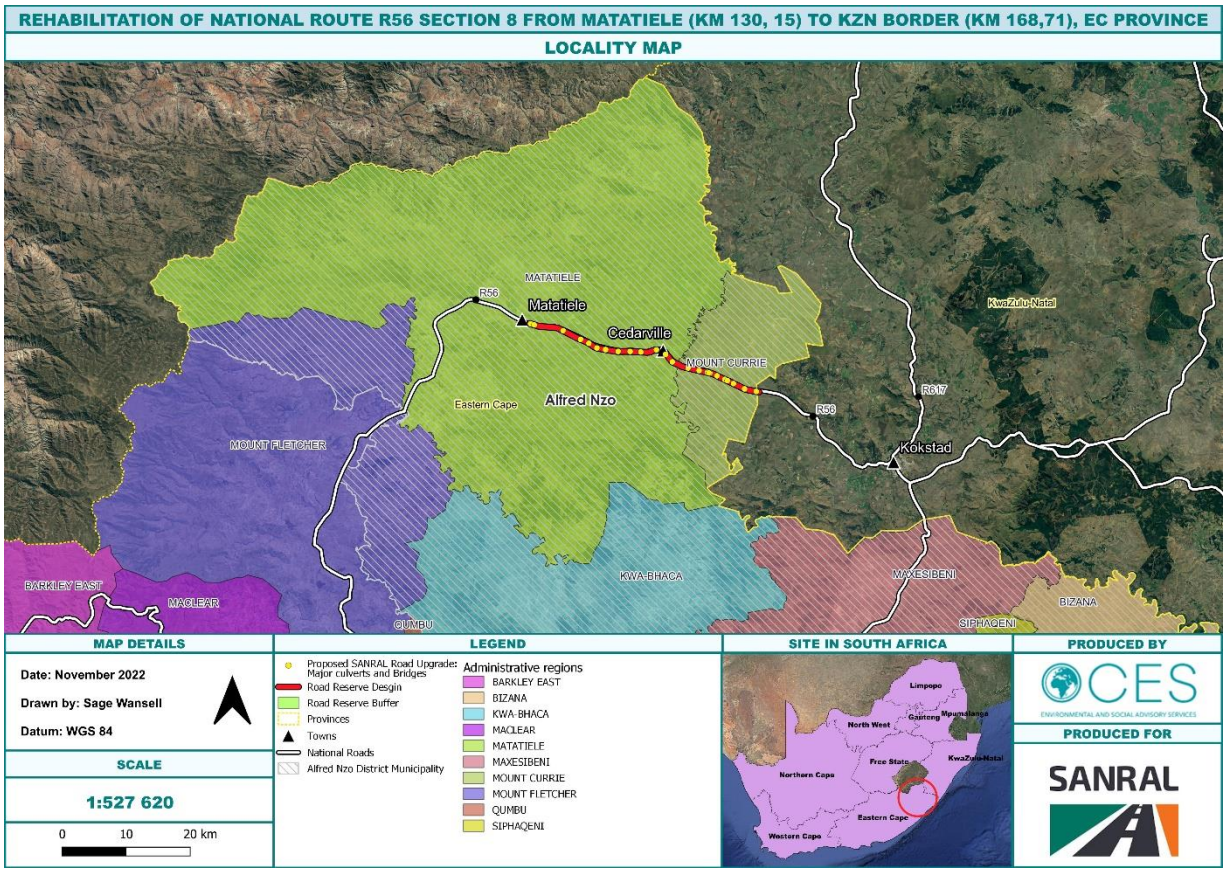

Figure 1-1: Locality of the overall proposed SANRAL SOC Ltd National Route R56 Section 8 rehabilitation.

1.2 PURPOSE OF THIS REPORT

In accordance with the National Environmental Management Act, 1998 (Act No. 107 0f 1998) (NEMA) and the NEMA EIA Regulations (2014), as amended, the issuing of an Environmental Authorisation (EA) requires the undertaking of a BA process, with associated Public Participation Process (PPP) and specialist studies. This will enable the competent authority to decide whether to issue an EA for the proposed development, and if so, on what conditions. The NEMA EIA Regulations (2014) (as amended) allow for a BA process for activities with limited environmental impact (listed in GN R 327 and 324) and a more rigorous two-tiered approach, known as a Scoping/EIA process, for activities with potentially greater environmental impact (listed in GN R 325).

In terms of the NEMA EIA Regulations of 2014 (as amended), the triggered activities for this project are listed under Listing Notice 1 and 3 (published in GN R 327 and GN R324, respectively), and as such, the BA process will be followed. This report documents the process and findings of the BA for the

proposed road upgrade. This report is subject to a public comment period and submitted to the competent authority for review.

1.3 DETAILS AND EXPERIENCE OF THE ENVIRONMENTAL ASSESSMENT PRACTIONER

In fulfilment of the legislative requirement (see Section 4.1 below) the details of the EAP that prepared this environmental impact assessment report as well as the expertise of the individual members of the study team are provided below.

CES was established in 1990 as a specialist environmental consulting company based in Grahamstown, with branches in East London, Cape Town, Port Elizabeth and Centurion. CES has considerable experience in; terrestrial, marine and freshwater ecology, Social Impact Assessment (SIA) processes, State of Environment Reporting (SOER), Integrated Waste Management Plans (IWMP), Spatial Development Frameworks (SDF), public participation, as well as the management and co-ordination of all aspects of Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) processes. CES has been active in all of the above fields, and in so doing have made a positive contribution to towards environmental management and sustainable development in the Eastern Cape, South Africa and many other African countries.

Dr Alan Carter
(Role: Executive Director, Environmental Assessments Practitioner [EAP], Reviewer)
Alan is the Executive Director for the CES East London and Port Elizabeth offices. He holds a PhD in Marine Biology and is a Certified Public Accountant (licenced in Texas, USA), with extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He has over 30 years of experience in environmental management and has specialist skills in renewable energy, infrastructure, industrial processes, sanitation, coastal environments, waste and climate change.

Alan has the following relevant professional registrations:

- Certified Environmental Assessment Practitioners of South Africa (EAPASA).
- Registered as a professional Environmental Scientist with the South African Council for Natural Scientific Professions (SACNASP: Pri.Sci.Nat) (since 2004).
- Certified ISO14001 Environmental Auditor with Exemplar Global (since 2001), formerly the Registrar Accreditation Board (USA) and Quality Systems Association (Australia) (RABQSA).

Ms Robyn Thomson
(Role: Principal Environmental Consultant, Project Manager, Reviewer)
Robyn is a Principal Environmental Consultant with 19 years' experience. She holds a BSc degree with majors in Archaeology, Environmental and Geographical Science, as well as a BSc (Hons) in Environmental Science from the University of Cape Town and Rhodes University respectively. Robyn's key experience includes renewable energy developments, linear developments, residential developments and mining developments, with her main interest being on renewable energy. Her main focuses include Project Management, Basic Assessment Processes, Scoping and EIA Processes, the Environmental Authorisation (EA) Amendment Processes, Reviewing Reports, the Public Participation Process (PPP), Water Use Licence Applications and associated reports and GIS Mapping. Robyn completed both the Introduction to Environmental Impact Assessment Procedure and Introduction to

Environmental Risk Assessment Short Courses by Coastal and Environmental Services and the Department of Environmental Science Rhodes University respectively. In addition, Robyn is a member of the International Association for Impact Assessment (IAIA).

Ms Sinazo Bhengu

(Role: Environmental Consultant, Public Participation, Reporting)

Sinazo is an Environmental Consultant that obtained her undergraduate degree in BSc Life and Earth Sciences, majoring in Environmental Science and Biological Sciences, from the University of KwaZulu-Natal. She has 2 years' experience in an office and field setting in the consulting sector. Her experience includes Basic Assessments, Environmental Impact Assessments and Environmental Management Programmes; Water Authorisations; Mining and Prospecting Applications; Agricultural Applications; Planning and executing the Public Participation Processes; Conducting environmental monitoring, reviews, and audits (ECO & Performance Assessments); Environmental Governance, Climate Change Adaptation and Mitigation; and Project Management.

Full Curricula Vitae (CV) for individual members of the project team are attached in Appendix F.

1.4 NATURE AND STRUCTURE OF THE REPORT

The structure of this report is based on Appendix 1 of GN R 517, of the NEMA EIA Regulations (2014) (as amended), which details the required content of a Basic Assessment Report.

- **Chapter 1** introduces the proposed project and describes the purpose of this report and its structure.
- **Chapter 2** details the project location and describes the proposed project in detail.
- **Chapter 3** describes the needs and desirability of the project.
- **Chapter 4** describes the legislation that is applicable to the project.
- **Chapter 5** describes the biophysical and social environment of the proposed project site.
- **Chapter 6** describes the Public Participation Process (PPP) undertaken.
- **Chapter 7** provides a description of the alternatives to the proposed development, or components of the proposed development.
- **Chapter 8** covers the impact assessment methodology.
- **Chapter 9** provides a summary of the key findings of the specialist studies.
- **Chapter 10** covers the impact assessment for the proposed project.
- **Chapter 11** provides a sensitivity analysis.
- **Chapter 12** provides a summary of the key environmental findings, recommendations and the opinion of the EAP.

1.5 SCOPE OF ASSESSMENT AND CONTENT OF THE BASIC ASSESSMENT REPORT

Section 3 of Appendix 1 of GN R 517, as amended, specifies the content requirements for a Basic Assessment Report. The table below indicates how this BAR complies with these requirements.

Table 1-1: Required Contents of a Basic Assessment Report

Section 3	*NEMA EIA Regulations – Appendix 1 Requirement*	*Section in Report*
(a)	details of- (i) the EAP who prepared the report; and	Section 1.3

Section 3	NEMA EIA Regulations – Appendix 1 Requirement	Section in Report
	(ii) the expertise of the EAP, including a curriculum vitae;	Appendix F
(b)	the location of the activity, including- (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 2.1
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Section 2.1 and Appendix A
(d)	a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Section 4.1 and Section 4.2
(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;	Section 4.1
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Chapter 3
(g)	a motivation for the preferred site, activity and technology alternative;	Chapter 7
(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 PPP 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 I&APs, 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;	 Chapter 7 Chapter 6 and Appendix D Appendix D Chapter 5 Chapter 9, Chapter 10 &11 and Appendix B

Section 3	NEMA EIA Regulations – Appendix 1 Requirement	Section in Report
	(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified 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 identifying 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 8 Chapter 9, Chapter 10 and Appendix B Chapter 9, Chapter 10 and Appendix B N/A Chapter 7 Section 12.4
(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 EIA 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 8, Chapter 9, Chapter 10 & 11 and Appendix B
(j)	an assessment of each identified potentially significant impact and risk, including— (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;	Chapter 9, Chapter 10 & 11 and Appendix B
(k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix	Chapter 9

Section 3	NEMA EIA Regulations – Appendix 1 Requirement	Section in Report
	6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	
(l)	an environmental impact statement which contains— (i) a summary of the key findings of the EIA; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	 Chapter 12 Chapter 10 Appendix A Chapter 12
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	Chapter 9 Appendix E
(n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapter 12
(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Chapter 12
(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 12
(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;	N/A
(r)	an undertaking under oath or affirmation by the EAP in relation to— (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; and	Appendix F
(s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t)	any specific information that may be required by the competent authority; and	N/A
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A

2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

SANRAL proposes to rehabilitate and upgrade of National Route R56 Section 8, from Matatiele (KM 130.15) passing through Cedarville to the KwaZulu Natal border (KM 168.71) (see Figure 2-1). The project route falls across several farm portions within Wards 19, 20 and 26 of the Matatiele Local Municipality, Eastern Cape Province (Table 2-1). The study area is bordered by the Matatiele town to the west, transects through Cedarville and the KwaZulu Natal border to the east.

Table 2-1: Location of the proposed R56 Section 8 road upgrade

GEOGRAPHICAL ENTITY	LOCATION
Province/s	Eastern Cape Province
District Municipality	Alfred Nzo District Municipality
Local Municipality	Matatiele Local Municipality
Ward number	Ward 19; Ward 20; and Ward 26.
Nearest town	Matatiele and Cedarville
Farm names, numbers, and portions	Farm 188 Portion RE & 189 Portion 1 Farm 187 Portion 1 & 2 Farm 188 Portion RE Farm 17 189 Portion 0 Farm 184 Portion 1, 2 & 6 Farm 178 Portion RE Farm 179 Portion 1 Farm 187 Portion 1 & 4 Farm 186 Portion RE Farm 188 Portion 2 Farm 188 Portion 5 Farm 187 Portion 3 Farm 185 Portion 2 Farm 185 Portion RE Farm 183 Portion 4 Farm 178 Portion 2 Farm 186 Portion 1 Farm 186 Portion 2 Farm 186 Portion RE Farm 180 Portion 4 Farm 180 Portion RE
SG Code	Please see Appendix H

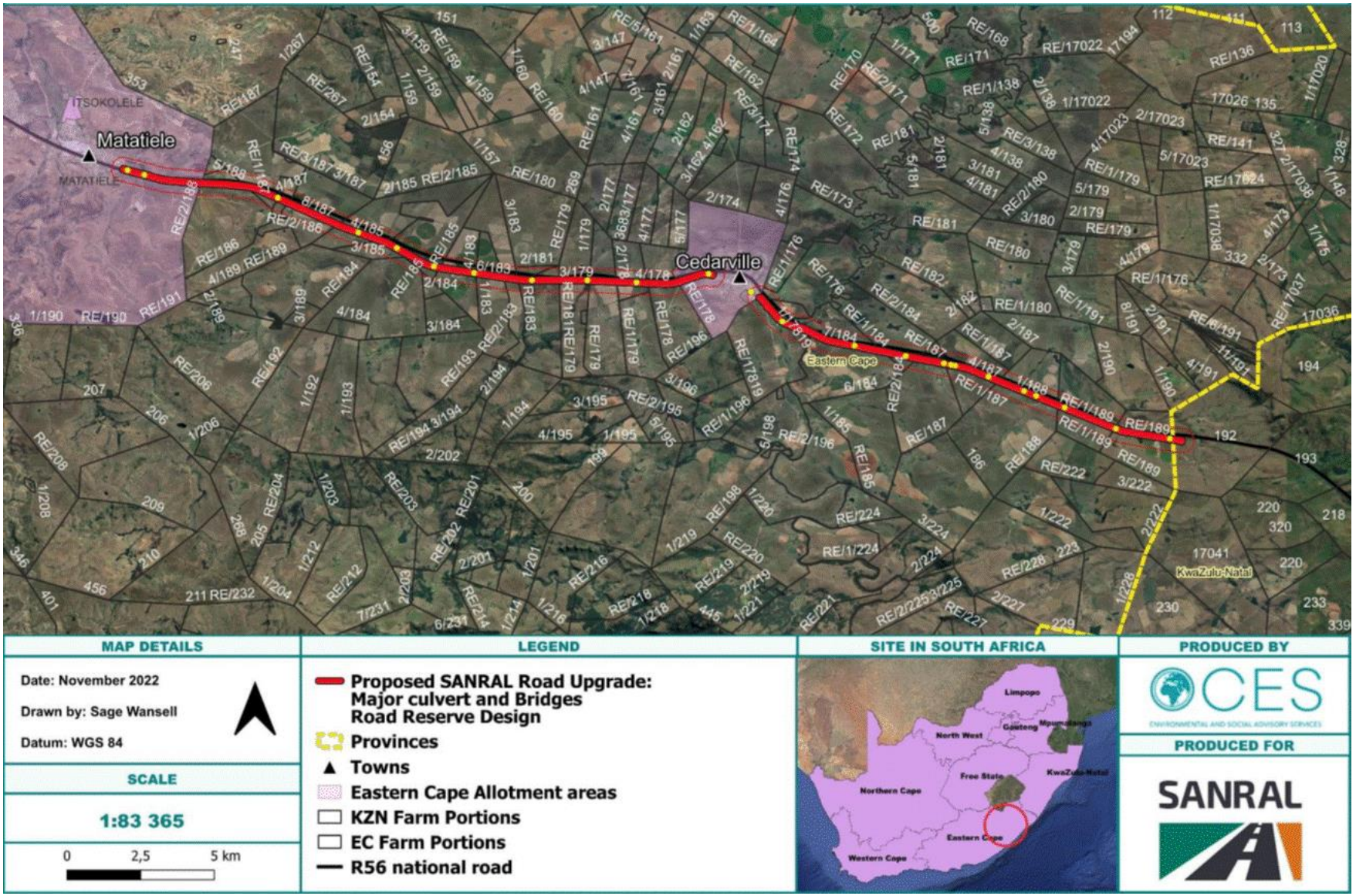

Figure 2-1: Locality of the proposed SANRAL SOC Ltd National Route R56 Study Area.

2.2 TECHNICAL DETAILS

2.2.1 GENERAL ROADWORKS

The proposed activity will consist of the rehabilitation of a 38.56 km section of National Route R56 Section 8 which is routed from Matatiele (KM 130.15), passing through Cedarville to the KwaZulu-Natal Border at KM 168.71 in the Matatiele Local Municipality in the Eastern Cape Province, as indicated in Figure 1-1. The proposed road improvement general roadworks activities are summarised in Table 2-2, with detailed descriptions.

Table 2-2: Summary of technical details for the proposed R56 rehabilitation

ASPECT	DESCRIPTION
Extent of upgrade	From Matatiele (KM 130.15) to KZN border (KM 168.71) on a two-lane single carriageway, located within the Matatiele Local Municipality, Eastern Cape Province;
Realignments	Rehabilitation of the existing R56 using the in-situ material as part of the new pavement by adding 3 metre shoulders with a centerline offset of approximately 6 to 7 metres resulting in a two-way traffic scenario; Rehabilitation of the existing R56 using the in-situ material as part of the new pavement by adding 1.5 metres shoulders with a centerline offset of approximately 3 metres resulting in a Stop-Go scenario; and Reconstructing the R56 on a new off-set alignment (while traffic continues to use the existing R56)
Road reserves	Widening and amendment of existing road reserves, including land acquisition to be acquired by SANRAL;
Existing services	Extensive relocation of services e.g. main sewer lines, water lines, electrical overhead lines;
Stockpile areas	Stockpile areas and vegetation clearance outside road reserve in excess of one hectare;
Material sourcing	All required materials to be used in the road construction works will be obtained from borrow pits and quarries that have been authorised by the DMRE (see Section 1.1).

2.2.2 DRAINAGE AND CULVERTS

The National Route R56 Section 8 from Matatiele (KM 130.15) to the KZN Border (KM 168.71) traverses numerous rivers, river tributaries, wetlands, and drainage lines. The renovation of existing bridges and culverts is being proposed. The existing bridges and culverts will be demolished and replaced. The existing culverts will be lengthened. The proposed bridges and culverts will require excavation of the riverbanks and the removal of materials from the riverbed.

2.2.3 ACCESS MANAGEMENT

All intersections and accesses onto the National Route R56 Section 8 were assessed in terms of sight distances and access spaces. Effective access management provides the following benefits:

- Reduced congestion and better overall traffic flow;
- A lower potential for vehicle accidents as there are fewer places where vehicles cross paths with other vehicles, as well as with pedestrians;
- Decreased travel times for commuters, truck drivers and others; and
- Easier movement between properties, improving the sustainability of adjacent farms.

The minimum shoulder sight distance requirements, as set out by the SANRAL Geometric Design Guidelines and Geometric Design of Rural Roads (TRH174), are provided in the table below:

TYPE OF CONTROL	MINIMUM SIGHT DISTANCES (m)	
	Geometric Design Guidelines	TRH17
Signalised or priority controlled	300 m	200 m
No control	80 m – 165 m	170 m – 210 m

The National Route R56 road is characterised by distinct differences in the road environment in terms of the land use, access types and configurations, as well as non-motorised and public transport activity along the route. According to the Rural Functional Road Classification, the National Route R56 is classified as a Class 3 minor arterial road which links 12 main towns on the R56, namely Middelburg Karoo, Steynsburg, Molteno, Dordrecht, Khowa, Ugie, Maclear, Matatiele, Kokstad, Ixopo, Richmond and Pietermaritzburg. The route links small towns and rural settlements with KwaZulu Natal, Eastern Cape and Western Cape and carries inter-district traffic between these locations, and therefore has an important regional mobility function, but has an equally significant accessibility function.

2.2.4 WATER USE

Water for human consumption shall be available at the site offices and at other convenient locations on site. All effluent water from the camp / office sites shall be disposed of in a properly designed and constructed system, situated so as not to adversely affect water sources (streams, rivers, pans, dams, etc.). Only domestic type wastewater shall be allowed to enter this system.

The proposed National Route R56 Section 8 road upgrade occurs within 32 metres of numerous watercourses and within 500 metres of numerous wetlands. Water use licensing is therefore required, in terms of the National Water Act (Act No.36 of 1998) from the Department of Water and Sanitation (DWS), for all of the water crossings along the National Route R56 Section 8 route. This water use license was applied for and issued in 2016 Reference number 27/2/2/T631/1/4.

2.2.5 WASTE MANAGEMENT

The section below describes the waste management for the construction phase. No waste will be produced during the operational phase of the road.

2.2.5.1 Solid Waste

Solid waste shall be stored in an appointed area in covered, tip-proof metal drums or similar containers for collection and disposal. Disposal of solid waste shall be at a licensed landfill site or at a site approved by the relevant authority in the event that an existing operating landfill site is not within reasonable distance from the project area. No waste shall be burned or buried at or near the project area. The nearest landfill sites are indicated in the table below:

Table 2-3: Nearest landfill

LANDFILL SITE NAME	COORDINATES
Matatiele Solid Waste Landfill Site	30°19'58.94"S 28°49'35.12"E

All solid waste (inert earth material) or construction camp wastes (domestic wastes) will be collected at a central location and will be stored temporarily, less than 89 days (storage for greater than 90 days will incur waste licence activities), until it can be removed to an appropriately permitted landfill site near the construction site. The contractor must make all attempts to follow the waste hierarchy in dealing with wastes produced (i.e., landfilling should be the final option and not the first response to treatment of any material).

2.2.5.2 Litter

No littering by construction workers shall be allowed with particular emphasis on litter control measures which shall apply at stop/go facilities. During the construction period, the various contractor's facilities shall be maintained in a neat and tidy condition and the site shall be kept free of litter. At all places of work the contractor shall provide litter collection facilities for later safe disposal at approved sites.

2.2.5.3 Hazardous Waste

Hazardous waste such as oils shall be disposed of at an approved landfill site. Special care shall be taken to avoid spillage of bitumen products such as binders or pre-coating fluid to avoid water-soluble phenols from entering the ground or contaminating surface water.

Under no circumstances shall the spoiling of bituminous products on the site, over embankments, in borrow pits or any burying, be allowed. Unused or rejected bituminous products shall be returned to the supplier's production plant. Any spillage of bituminous products shall be attended to immediately and affected areas shall be promptly reinstated to the satisfaction of the engineer.

2.2.5.4 Construction and demolition waste

The opportunity for recycling and reuse of construction and demolition waste as fill for road embankments, land reclamation and drainage control must first be explored and take priority before the option of declaring these materials a 'waste'. The contractor is encouraged to actively engage with authorities and landowners adjacent to the site and identify where such 'waste' materials can be usefully deployed to repair existing environmentally damaged areas such as erosion dongas.

2.3 NOISE

Noise generated will be typical construction noise as a result of the movement of hauling trucks and graders. The noise nuisance will be managed in terms of the CEMP and the applicable sections of the Occupational Health and Safety Act (OHSA) and relevant Construction Regulations (CR). Normal road construction equipment (trucks, graders, bulldozers, compactors etc.) will be used primarily. Noise levels may reach between 80-85 dBA per 15 m at an anticipated maximum. In the rural environment, such noise levels are expected to be negligible.

2.4 EMISSIONS

Emissions will include nuisance dust as a result of construction activities and general smoke emissions from construction vehicles. These levels are not anticipated to exceed acceptable norms, taking into account the relatively short term of the construction period and the existing use of the site, which accommodated vehicular traffic with similar emissions.

3 PROJECT NEED AND DESIRABILITY

The National Route R52 is an important economic route with a high number of heavy vehicles connecting KwaZulu Natal, Eastern Cape and the Western Cape provinces. The road also links small towns and rural settlements and carries inter-district traffic making the road an important regional mobility function that has an equally significant accessibility function within these provinces. Over time and with increasing use, the road and associated infrastructure require maintenance and relevant review of overall safety and ease of use. The need and desirability section has been compiled in line with the DEA (2017) Guideline on Need and Desirability.

3.1 NEED

One of the mandates of SANRAL SOC Ltd is to upgrade and maintain major regional roads. As this road is currently under their jurisdiction, it is their sole mandate to ensure the proper functioning and maintenance of this road, amongst others. The rehabilitation of National Route R52 Section 8 will occur substantially within the existing road reserve. The general objective of this project is to improve the road in order to relieve congestion to acceptable levels of service, improve road safety, and provide adequate pavement capacity.

3.2 DESIRABILITY

3.2.1 INTERNATIONAL CONVENTIONS

Global and international responsibilities form the premise of South Africa's Environmental Legislation. This document has been compiled in line with these requirements.

3.2.2 NATIONAL

The National Development Plan (NDP) 2030 describes public infrastructure such as roads, important for both economic growth and employment. Infrastructure is essential for development, according to the NDP, public infrastructure spending is currently lower than historic standards. For growth and inclusivity, the country requires greater capital spending on roads, public transport, rail, ports, electricity, water and sanitation.

3.2.3 PROVINCIAL

The National Road R56 is an important economic route as it connects Kwa Zulu Natal with Eastern and Western Cape and is renowned for being the shortest route between Durban in KwaZulu Natal and Cape Town in the Western Cape. The road therefore has an important provincial and regional mobility function and an equally significant accessibility function. The purpose of the R56 Section 8 road rehabilitation project is therefore to not only protect the mobility function of the road, but also to ensure that reasonable access is provided to adjacent properties and areas to enable the future land use development.

Road improvements are stipulated in the Eastern Cape Provincial Spatial Development Framework (PSDF), with an aim to improve the quality of existing roads to relieve traffic congestion, road safety, and improve general maintenance. The R56 Section 8 road is listed as one of the Strategic Transport

Routes in the PSDP for the Eastern Cape. The Eastern Cape PSDF also indicates that ongoing maintenance is required in order to address the adverse impacts of climate events such as flooding throughout the province. Upgrades and maintenance on a major regional road is a SANRAL mandate (SANRAL takes responsibility for upgrades and maintenance of regional routes). This project does not conflict with the provincial SDF, IDP or EMF.

3.2.4 MUNICIPAL

The road upgrade will improve road safety, reduce traffic congestion and road accidents, while contributing to short term employment. The negative impacts include a minimal loss of biodiversity and some traffic disruptions during construction. There will be job creation during the construction phase for skilled and semi-skilled workers as well as skills development. The road upgrade will result in a safer and better-quality road for its users.

The Matatiele Local Municipality's Comprehensive Infrastructure Plan comprises of their Integrated Transport Plan which is aligned with Alfred Nzo District Integrated Transport Plan. These plans ensure effective use of all forms of transportation, plans to expand transportation infrastructure and services which should be well coordinated (Matatiele Local Municipality, 2022). The principal regional access route connecting Matatiele with other urban centres like Kokstad to the east and Mount Fletcher to the south-west is R56, which travels through Matatiele in an east-west direction. It acts as the primary connection between KwaZulu-Natal Province and the Eastern Cape Province, second only to the N2. As it makes it easier to access agricultural zones in the Cedarville-Matatiele area, tourist areas in the Ongeluksnek area, and commercial and industrial zones in Matatiele, R56 is a multi-sectoral corridor.

The Matatiele Local Municipality SDF (2020) Chapter 4 identifies Key Issues relating to the condition of the roads. Stating that the construction of access roads and access road maintenance are still in high demand. Access roads have been designated as a priority within each ward. Due to the recent flooding and heavy rains, the majority of roads, including access roads, district roads, and T-roads, are in worse condition than before, making it extremely difficult for vehicles to go to other places and for people to access services.

3.2.5 ECOLOGICAL CONSIDERATIONS

3.2.5.1 Threatened Ecosystems

According to SANBI's National Vegetation Map (2018), the proposed development occurs within two vegetation types, namely Mabela Sandy Grassland and East Griqualand Grassland (Figure 5-7). These vegetation types fall within the Grassland Biome. Both Mabela Sandy Grassland and East Griqualand Grassland fall under the Sub-Escarpment Grassland Group. Sub-Escarpment Grasslands are mesic grasslands and occur on flat to gently rolling hills, cut by deep river valleys, at mid-altitudes (760-1800 masl). Mabela Sandy Grassland occurs within flat valley basins (1440 – 1500 m) with poorly drained, low nutrient soils in the region of Cedarville to Matatiele and a small area in a basin of Simi and Ramohlakoana, Kinira River Valley, Transkei. Whilst the East Griqualand Grassland occurs on hills and slopes (920-1740 m) within the Eastern Cape and KwaZulu-Natal Provinces, with a major portion of this vegetation type occurring within East Griqualand with Matatiele and Kokstad as centre.

The National Environmental Management: Biodiversity Act, (Act No. 10 OF 2004) (NEM:BA) provides a National List of Ecosystems that are threatened and in need of protection – GN 1002 of 2011. However, the Red List of Ecosystems (RLE) (SANBI, 2021) provides an updated version of the threat status of terrestrial ecosystems within South Africa. According to this list, Mabela Sandy Grassland is classified as Critically Endangered, while East Griqualand Grassland is classified as Endangered. The proposed road upgrade will potentially result in some further loss of these threatened ecosystems. However, given that the project will largely involve upgrades to an existing road in a largely transformed area, the impacts to threatened ecosystems will be relatively minor.

3.2.5.2 Management of Environmentally Sensitive Areas

All access to the proposed development will be limited to existing access roads and pathways. No ad hoc roadways should be permitted, without first being authorised by the ECO. If any protected plant species are found within the construction footprint, permits must be received before construction commences on site. No plant species (SCC or common) will be harvested or removed from site without approval from the ECO or Applicant in writing. If any protected species die during the translocation process, specimen loss must be offset at a ratio of 1:3.

3.2.5.3 Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs")

According to the Eastern Cape Biodiversity Conservation Plan (2019) the proposed project traverses a PA (the Cedarville Protected Environment), a terrestrial CBA 1 and 2, a terrestrial ESA 1 and 2 (see Figure 5-8), as well as an aquatic CBA 1, CBA 2 and ESA 1 (see Figure 5-9). The rehabilitation of the National Route 56 will therefore result in the loss of a portion of these areas. The classification of these areas was driven by the vegetation type, threat status, and the established national conservation target. Even though the majority of the project area has been impacted by commercial agriculture, livestock grazing, alien plant species, illegal dumping, and mining, amongst other land uses.

According to the Eastern Cape Biodiversity Conservation Plan these support areas range from having sensitivity features that are selected to meet biodiversity targets (CBA) to support areas that maintain ecological function within the localised and broader landscape (ESA). From a terrestrial perspective, the proposed rehabilitation of the National Route R56 Section 8 road is sufficiently set back from areas of concern as most of the project area falls within the reserve and there will be no new restriction of the movement of fauna or destruction of habitats. It is therefore concluded that with application of mitigation techniques, coupled with the recommendations found within the Ecological Impact Assessment and the Freshwater Impact Assessment compiled for this project, no irreversible impact should be caused. Please refer to the Ecological Impact Assessment report and the baseline Aquatic Biodiversity Assessment report in Appendix C, for more details.

3.2.5.4 Conservation Targets

During the field assessment one (1) protected plant species was recorded within the development footprint, namely *Sensitive Species 1* , one (1) mammal SCC was observed, namely *Redunca fluvoruful*, and one (1) herpetofauna species, namely *L. sylvicolus* is Data Deficient. Please refer to section 9, 11, 12 and the Ecological Impact Assessment report on Appendix C.

3.2.6 INTEGRATED ENVIRONMENTAL MANAGEMENT (SECTION 23 OF NEMA)

The general objectives of Integrated Environmental Management were taken into account by considering all the potential negative and positive impacts of the proposed project on both the biophysical and socio-economic environments. In order to avoid potentially significant impacts, specialist inputs were obtained in relation to terrestrial and aquatic ecology. Based on the findings of the specialist studies a number of recommendations / mitigation measures have been identified for consideration in further project design and implementation. The public and authorities will be given adequate opportunity to comment on the proposed project and to participate in the Basic Assessment Process.

3.2.7 WASTE GENERATION AND MANAGEMENT

Solid waste shall be stored in an appointed area in covered, tip-proof metal drums or similar containers for collection and disposal. Disposal of solid waste shall be at a licensed landfill site or at a site approved by the relevant authority in the event that an existing operating landfill site is not within reasonable distance from the project area. No waste shall be burned or buried at or near the project area. Please refer to section 2.2.6 for more information.

3.2.8 CULTURAL AND HERITAGE RESOURCES

3.2.8.1 Archaeological Heritage

The proposed rehabilitation of National Route R56 Section 8 road included an HIA conducted by PGS Heritage & Grave Relocation Consultants (PGS) in 2016 which identified 10 sites of heritage potential; 8 Stone Age sites and 2 historical sites. CES was requested to reappraise the HIA findings and no additional heritage sites or features were noted in the project area during the updated site assessment which was conducted in November 2022.

During the site survey it might be assumed that the proposed project will result in a minimal (if any) impact on heritage resources. The following recommendations are made based on general observations in the proposed development footprint for the National Route R56 road rehabilitation in terms of heritage resources management.

- According to the South African Heritage Resources Agency Information System (SAHRIS) Palaeo Map, portions of the study area fall within a potentially high fossiliferous of the Tarkastad Subgroup, Beaufort Group of the Karoo Supergroup. Should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA, ECPHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.
- Due to the subterranean nature of many of the lithic sites identified in the proposed project area, it is recommended that an archaeological watching brief be implemented during the course of the construction work on the project. Such a watching brief would assist in the early identification of any Stone Age (or other archaeological) sites which may be located in a subterranean position within the proposed development footprint.

- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the study area along water sources and drainage lines and pans would often have attracted human activity in the past. Also, since Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development.

3.2.8.2 Palaeontological Heritage

The proposed project is situated within an expanding peri-rural area where the landscape interface is between small towns and land used for agricultural use. Here, former large agricultural units or farms have been converted into a number of smaller properties or plots. Most of the route is underlain by Triassic aged rocks of the Tarkastad Subgroup and Jurassic aged dolerite of the Karoo Supergroup as well as Tertiary aged sediments associated with terrestrial deposits associated with wetlands in the study area.

The very high fossiliferous potential of the Tarkastad Subgroup, Beaufort Group of the Karoo Supergroup warrants an allocation of a very high palaeontological sensitivity to the areas underlain by the rocks of this Subgroup. A moderate palaeontological sensitivity is allocated to Tertiary aged sediments in this region. Dolerite areas are allocated very low palaeontological sensitivity. If extensive excavation of topsoil and removal of more than 1.5 m of soil cover is planned in this region, all the areas of activity will be allocated a very high palaeontological sensitivity as these rocks can contain very significant remains of plants and animals that will contribute significantly to our understanding of the palaeo-environments in this part of the Karoo Basin.

According to the Palaeontological Desktop Assessment procuded by PGS (2016 and updated in 2022), the potential palaeontological impact of the proposed rehabilitation of National Route R56 Section 8 road is Moderate to Very High, with a small section allocated a Very low palaeontological sensitivity, based on the fact that most of the route is underlain by Triassic aged rocks of the Tarkastad Subgroup and Jurassic aged dolerite of the Karoo Supergroup as well as Tertiary aged sediments associated with terrestrial deposits associated with wetlands in the study area.

An Early Stone Age site was identified during the fieldwork within the present study area and seven of the eight Stone Age sites were identified during the fieldwork of the present study area are also Middle Stone Age sites in the National Route R56 Section 8 road rehabilitation footprint areas and it is the opinion of the author of the Heritage Impact Assessment Report Site Management Memorandum that

the project will not impact on sensitive heritage resources should the proposed mitigation measures be applied. This opinion is subject to desktop and site observations and requirements for site sensitivity verification (SSV) stipulated in Government Gazette 43110 published in Government Notice No. 320 on 20 March 2020. Further information can be obtained from the Heritage Impact assessment on Appendix C and section 11 of the DBAR.

3.2.9 RESOURCE MANAGEMENT

Non-renewable natural resources will include the extraction of gravel material and the use of water. Water for human consumption shall be available at the site offices and at other convenient locations on site. All effluent water from the camp / office sites shall be disposed of in a properly designed and constructed system, situated so as not to adversely affect water sources (streams, rivers, pans, dams, etc.). Only domestic type wastewater shall be allowed to enter this system. The use of renewable natural resources will be very limited. A majority of the materials to be used are non-renewable.

The proposed development may promote economic development in the long term. The design of roads is done in such away that all ecological impacts are put into consideration and negative effects eliminated accordingly. As the ecological management is integral part of the infrastructure development. The proposed use of natural resources constitute the best use. The proposed location, type and scale of development promote a reduced dependency on resources. Please refer to section 7 of this report for more information.

A risk analyses of the impacts identified was conducted to determine the significance of the impacts of the proposed development activities on the fauna and flora of the study area. A cautious approach was taken. Please refer to section 11.

3.2.10 PRECAUTIONARY APPROACH

The precautionary approach was adopted in the planning and design phase. A risk analyses of the impacts identified was conducted to determine the significance of the impacts of the proposed development activities on the study area. Please refer to section 12.4.

3.2.11 ENVIRONMENTAL RIGHTS

The project will not affect the rights of the local community. The applicant and EAP have ensured community engagement during the Public Participation Process to ensure that the rights of the local community will not be affected.

3.2.12 CONSIDERATION OF ALTERNATIVES

According to NEMA, the evaluation of alternatives is determined "*through a detailed site selection process, which includes an identification of impacts and risks inclusive of identification of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment*." This process was not applied at the outset due to the limited anticipated impact of the preferred alternative. Rather, the alternatives for the proposed development were identified in response to the need and desirability for the road upgrade, namely to improve road capacity and safety. The proposed alternatives were evaluated based on their advantages and disadvantages, as well as their feasibility and reasonability in meeting

this need. Only feasible and reasonable alternatives were further evaluated in the impact assessment. Please refer to section 7 of this report for more information.

4 RELEVANT LEGISLATION

4.1 ENVIRONMENTAL AUTHORISATION IN SOUTH AFRICA

The regulation and protection of the environment within South Africa, occurs mainly through the application of various items of legislation, within the regulatory framework of the Constitution, 1996 (Act No. 108 of 1996). The primary legislation regulating Environmental Impact Assessment (EIA) within South Africa is the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). NEMA makes provision for the Minister of Environmental Affairs to identify activities which may not commence prior to authorisation from either the Minister or the provincial Member of the Executive Council ("the MEC"). In addition to this, NEMA also provides for the formulation of regulations in respect of such authorisations.

The EIA Regulations (2014) (as amended) allow for a Basic Assessment (BA) process for activities with limited environmental impact (listed in GN R 327 & 324, 2014, as amended) and a more rigorous two-tiered approach to activities with potentially greater environmental impact (listed in GN R 325, 2014, as amended). This two-tiered approach includes both a Scoping and EIA process. In terms of the Environmental Impact Assessment (EIA) regulations of 2014 (as amended), the proposed National Route R56 road rehabilitation requires Environmental Authorisation, from the National Department of Forestry, Fisheries and the Environment (DFFE). The triggered activities are listed under Listing Notices 1 and Listing Notice 3 (published in Government Notices No. R 327 & 324, respectively), and as such, the BA Process needs to be followed. The listed activities that have been applied for are provided in Table 4-1 below.ww

Table 4-1: Listed activities triggered by the proposed development.

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
12	**The development of—** **(ii) 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 development will require the construction of temporary or permanent infrastructure (e.g. bridges, support structures and culverts) with a physical footprint of more than 100 square metres within at least 32 m of watercourses. The physical footprint of structures within watercourses and streams and within 32 m of watercourses and streams is 14 Ha.**
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 water course.**	**No watercourses will be altered, yet excavation and backfilling of foundations of structures (bridges and culverts) will occur in watercourses.**
~~**27**~~	~~**The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.**~~	**The site camp is located in an urban area that is already disturbed. Therefore, this activity does not apply.**

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3** of the EIA Regulations, 2014 as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
4	**The development of a road wider than 4 metres with a reserve less than 13,5 metres.** **a. Eastern Cape** **i. Outside urban areas:** **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** **(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas;**	The proposed development activities will involve the development of a road outside urban areas in the Eastern Cape. It falls within both CBA 1 and 2 as defined in the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2020), and located within 5km of the National Protected Area Expansion Strategy (NPAES) focus areas (Drakensberg and midlands; Southern Berg Griqualand) and is adjacent to the NEMPAA stewardship nature reserve (the Matatiele Nature Reserve).
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.** **a. Eastern Cape** **ii. 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;**	The proposed development will involve the cumulative clearance of an area of 300 square metres of indigenous grassland due to the fact that the rehabilitation and construction occurs along a linear development which exceeds 30km. The development within critically endangered and endangered ecosystems (East Griqualand grassland and Mabela Sandy grassland, respectively). Approximately 700 m^2 of Mabela Sandy Grassland will be cleared, and 12.6 Ha of East Griqualand grassland will be cleared during the construction of the road. The positions are indicated on the sensitivity maps under Appendix A of the Basic Assessment Report.
14	**The development of—** **ii. 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 metres of a watercourse, measured from the edge of a watercourse;** **b. Eastern Cape** **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;** **(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 proposed development activities will involve the development of bridges exceeding 10 square metres in size within a watercourse or 32m of a watercourse outside urban areas in the Eastern Cape. It falls within both CBA 1 and 2 as defined in the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2020), and located within 5km of the National Protected Area Expansion Strategy (NPAES) focus areas (Drakensberg and midlands; Southern Berg Griqualand) and is adjacent to the NEMPAA stewardship nature reserve (the Matatiele Nature Reserve). The footprint of infrastructure within 32 m of a watercourse and within CBAs is 8.5 Ha. The footprint of infrastructure within 32 m of a watercourse and within 5 kilometres of a protected area is 12 Ha.

18	**The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.** **b. Eastern Cape** **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** **(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;**	The proposed development will involve the widening of a road by more than 4 metres and the lengthening of a road by more than 1 kilometre in the Eastern Cape. The project is located within 5km of the National Protected Area Expansion Strategy (NPAES) focus areas (Drakensberg and midlands; Southern Berg Griqualand) and is adjacent to the NEMPAA stewardship nature reserve (the Matatiele Nature Reserve) and falls within both CBA 1 and 2 as defined in the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2020).
23	**The expansion of-** **(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more:** **where such expansions occurs-** **(a) within a watercourse;** **(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;** **a. Eastern Cape** **i. Outside urban areas:** **(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans**; **(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA.**	The proposed development will involve the expansion of bridges by 10 square metres or more within watercourse or 32 metres of a watercourse outside urban areas in the Eastern Cape. The project is located within 5km of the National Protected Area Expansion Strategy (NPAES) focus areas (Drakensberg and midlands; Southern Berg Griqualand) and is adjacent to the NEMPAA stewardship nature reserve (the Matatiele Nature Reserve) and falls within both CBA 1 and 2 as defined in the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2020). The footprint of infrastructure within 32 m of a watercourse and within CBAs is 8.5 Ha. The footprint of infrastructure within 32 m of a watercourse and within 5 kilometres of a protected area is 12 Ha.
~~Activity No(s):~~	~~Provide the relevant **Scoping and EIR Activity(ies)** as set out in **Listing Notice 2** of the EIA Regulations, 2014 as amended.~~	~~Describe the portion of the proposed project to which the applicable listed activity relates.~~

4.2 APPLICABLE LEGISLATION

This section describes the South African (national), provincial and municipal legislation considered during the Basic Assessment process of the proposed development. Legislation applicable to the proposed development are outlined in Table 4-2 below.

Table 4-2: Legislation relevant to the proposed development

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
Constitution of the Republic of South Africa (108 of 1966). The Constitution of the Republic of South Africa is the supreme law of the land. As a result, all laws, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone has the right: *a) To an environment that is not harmful to their health or well-being; and* *b) To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:* *i. Prevent pollution and ecological degradation.* *ii. Promote conservation; and* *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	Mitigation measures have been proposed to ensure that the proposed development does not result in pollution and ecological degradation. The proposed development will be ecologically sustainable and can translate to economic and social development.	Department of Forestry, Fisheries and the Environment.
National Environmental Management Act, (Act 107 of 1998); with subsequent amendments; and Environmental Impact Assessment Regulations 2014 (and as amended 07 April 2017). Relevant Sections of the Act: Section 2, 23, 24, 28-33 • Application of the NEMA principles (e.g. need to avoid or minimise impacts, use of the precautionary principle, polluter pays principle, etc.) • Application of fair decision-making and conflict management procedures are provided for in NEMA. • Application of the principles of Integrated Environmental Management and the consideration, investigation and assessment of the potential impact of existing	The onus has been placed on the applicant and all their relevant contractors and sub-consultants to consider, investigate and assess the potential impact of existing and planned activities on the environment, socio-economic conditions and the cultural heritage.	Department of Forestry, Fisheries and the Environment.

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
and planned activities on the environment; socio-economic conditions; and the cultural heritage. NEMA introduces the duty of care concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution and may lead to the prosecution of managers or directors of companies for the conduct of the legal persons.		
National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004); and Alien Invasive Species Regulations, 2014. The National Environmental Management: Biodiversity Act (NEM:BA), No. 10 of 2004, aims to assist with the management and conservation of South Africa's biological diversity through the use of legislated planning tools. These planning tools include the declaration of bioregions and the associated bioregional plans as well as other mechanisms for managing and conserving biodiversity. The objectives of the Act include inter alia: • 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 suitable manner; • The fair and equitable sharing of benefits arising from bio-prospecting of genetic material derived from 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 the Act. In addition to this, Sections 50-62 of the Act provide details relating to the protection of threatened or protected ecosystems and species, while Sections 63-77 of the Act	An Ecological Impact Assessment (CES, 2023) (Appendix C) was undertaken in order to identify any protected or endangered species. The listed activities applied for include the clearance of indigenous vegetation in sensitive biodiversity areas listed in the NEMBA. No protected species may be removed or damaged without a permit.	Department of Forestry, Fisheries and the Environment.

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
provide details relating to alien and invasive species with the purpose of preventing their introduction and spread, managing, controlling and eradicating of alien and invasive species. The NEM:BA Alien and Invasive Species List (Government Notice 599 of 2014) lists Alien and Invasive species that are regulated by the NEM:BA Alien and Invasive Species Regulations (Government Notice 98 of 2014).		
National Environmental Management: Air Quality Act (Act 39 of 2004) with subsequent amendments and Regulations. As with the Atmospheric Pollution Prevention Act 45 of 1965, the objective of the NEM: Air Quality Act is to protect the environment by providing the necessary legislation for the prevention of air pollution. "*To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.*"	The best practicable means for dust suppression should be undertaken. Relevant dust suppression mechanisms have been provided as mitigation.	Department of Forestry, Fisheries and the Environment.
National Heritage Resources Act, (Act 25 of 1999). The protection of archaeological and paleontological resources is the responsibility of a provincial heritage resources authority and all archaeological objects, paleontological material and meteorites are the property of the State. "*Any person who discovers archaeological or paleontological objects or material or a meteorite in the course of development must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority*".	No person may alter or demolish any structure or part of a structure, which is older than 60 years or disturb any archaeological or paleontological site or grave older than 60 years without a permit issued by the relevant provincial heritage resources authority. No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter or deface archaeological or historically significant sites	South African Heritage Resources Agency.
National Water Act (Act 36 of 1998) and its subsequent amendments and General Authorisation Regulations in terms of Section 39 of the National Water Act, 1998 (Act 36 of 1998) for water uses as defined in Section 21 (a), (c), (f), (g), (i) and (j).	Riparian zones must be protected, and appropriate steps must be implemented to prevent pollution of water courses and other water resources.	Department of Human Settlements, Water and Sanitation

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
The purpose of this Act (Section 2) is to ensure that the Nation's water resources are protected, used, developed, conserved and controlled in ways that take into account, including: (a) Promoting sustainable use of water; (b) Protection of aquatic and associated ecosystems and their biological diversity; and (c) Reducing and preventing pollution and degradation of water resources. <u>Protection of Water Resources (Sections 12-20)</u> Provides details of measures intended to ensure the comprehensive protection of all water resources, including the water reserve and water quality. With respect to the establishment of water quality objectives, objectives may relate to (Section 13): • The presence and concentration of particular substances in the water; • The characteristics and quality of the water resource and the in-stream and riparian habitat; • The characteristics and distribution of aquatic biota; and • The regulation and prohibition of in-stream and land-based activities which may affect the quantity and quality of the water resources. <u>Section 19 deals with Pollution Prevention (Part 4)</u> The person (including a municipality) who owns, controls, occupies or uses the land in question, is responsible for taking reasonable measures to prevent pollution of water resources. If such measures are not taken, the catchment management agency concerned, may itself do whatever is necessary to prevent the pollution or remedy its effects and recover all reasonable costs from the persons responsible for the pollution. The 'reasonable measures' which have to be taken may include measures to:	Construction/operations within a river, within the regulated area of a watercourse (100 meters from a river), and within 500 meters of a wetland are all considered water uses under the NWA's section 21 (c) and (i). Water usage and runoff should be managed in such a way that pollution is minimized. Prevent the inappropriate use of water in close proximity to drainage pipes and waterbodies. Water should be used sparingly. A Water Use Authorisation (WUA) in terms of Section 21 (c) & (i) is required for this project. The application for the WUA was issued in 2016 Reference number 27/2/2/T631/1/4.	

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
• Cease, modify or control any act or process causing the pollution; • Comply with any prescribed waste standard or management practice; • Contain or prevent the movement of pollutants; • Eliminate any source of the pollution; • Remedy the effects of the pollution; and • Remedy the effect of any disturbance to the bed and banks of a watercourse. With respect to pollution of rivers, the following definition is relevant when considering the potential impacts of development on water resources. Pollution may be deemed to occur when the following are affected: • The quality, pattern, timing, water level and assurance of instream flow; • The water quality, including the physical, chemical and biological characteristics of the water; • The character and condition of the in-stream and riparian habitat; • The characteristics, condition and distribution of the aquatic biota. The Act defines 'instream habitat' as including the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse. <u>Riparian Ecosystems</u> 'Riparian habitat' 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 and physical structure distinct from those of adjacent land areas. <u>Section 21 deals with the Use of Water</u> Section 21 (a-k) describes activities defined as a water use under the Act. These activities may only be undertaken subject to the application for, and issue of, a water use licence.		

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
National Forest Act (Act 84 of 1998) and its subsequent amendments and 1976 List of Protected Trees (Government Gazette No. 9542 Schedule A) in the 1998 National Forest Act (NFA) as amended in December 2016. The NFA provides the legal framework for the protection and sustainable use of South Africa's indigenous forests. Any area that has vegetation which is characterised by a closed and contiguous canopy and under storey plant establishment is defined as a 'forest' and as a result falls under the authority of the Department of Agriculture, Forestry and Fisheries (DAFF): Forestry sector. A clause in Chapter 3, Part 1 covers: <u>Prohibition on destruction of trees in natural forests</u> Section 7 (1) No person may cut, disturb, damage or destroy any indigenous living tree in, or remove or receive any such tree from, a natural forest except in terms of (a) a licence issued under subsection (4) or section 23. <u>Prohibition on destruction of protected trees</u> Section 15 (1) No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. <u>Effect of setting aside protected areas</u> Section 10 (1) No person may cut, disturb, damage or destroy any forest product in, or remove or receive any forest product from, a protected area, except— (a) In terms of the rules made for the proper management of the area in terms of Section 11(2)(b); (b) In the course of the management of the protected area by the responsible organ of State or person; (c) In terms of a right of servitude: (d) In terms of the authority of a licence granted under section 7(4) or 23; (e) In terms of an exemption under section 7(1)(b) or 24(6); or	Without a permit, no forest patches or protected trees in a forest or forest association may be damaged or destroyed. The Specialist Ecological Impact Assessment (CES, 2023) (Appendix C) confirmed that there are no protected trees located on the site.	Department of Forestry, Fisheries and the Environment

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
In the case of a protected area on land outside a State forest, with the consent of the registered owner or by reason of another right which allows the person concerned to do so, subject to the prohibition in section 7(1).		
National Environmental Management: Protected Areas Amendment Act (No. 31 of 2004). The purpose of this Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. The objectives of this Act are - • To provide, within the framework of national legislation, including the National Environmental Management Act, for the declaration and management of protected areas; • To provide for co-operative governance in the declaration and management of protected areas; • To effect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity; • To provide for a representative network of protected areas on state land, private land and communal land; • To promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas; • To promote participation of local communities in the management of protected areas, where appropriate; and • To provide for the continued existence of South African National Parks. In terms of Section 50 (1)(a)(ii) of this Act, the management authority of a national park, nature reserve and world heritage site may, despite any regulation or by-law referred to in section 49, but subject to the management plan of the park, reserve or site - "*carry out or allow an activity in the park, reserve or site aimed at raising revenue*". However, Section 50 (2) states that such activity "*may not negatively affect the survival of any species in or significantly disrupt the integrity of the ecological*	Development within protected areas or within close proximity to protected areas require Authorisation. The proposed activity is traverses of a Protected area.	Department of Forestry, Fisheries and the Environment

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
systems of the national park, nature reserve or world heritage site". Furthermore, in terms Section 51 (a), the Minister or MEC is responsible for the regulations or restrictions of the development and other activities in a protected environment, "*which may be inappropriate for the area, given the purpose for which the area was declared*".		
National Environmental Management: Waste Act (NEM:WA) (Act 59 of 2008) and its subsequent amendments. This legislation aims to enforce an integrated approach to waste management, with emphasis on prevention and reduction of waste at source and, where this is not possible, to encourage reuse and recycling in preference to disposal. Section 16 (Chapter 4) of this Act deals with the general duty in respect to waste management and emphasises that, "*A holder of waste must, within the holder's power, take all reasonable measures to:- avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts; prevent any employee or any person under his or her supervision from contravening this Act; and prevent the waste from being used for an unauthorised purpose*". Chapter 4, Part 3 of this Act deals with reduction re-use and recovery of waste, Part 4 deals with waste management activities, Part 5 covers storage collection and transportation of waste, Part 6 deals with treatment, processing and disposal of waste, Part 7 covers industry waste management plans and Part 8 deals with contaminated land. Chapter 5 covers all issues regarding the licensing of waste management activities.	Mitigation measures have been included to: • Reduce, re-use, recycle, and recover waste; and, if waste must be disposed of, ensure that it is processed and disposed of in an environmentally sound manner. • Manage the waste so that it does not damage human health or the environment, or create a nuisance due to noise, odour, or aesthetic effects. • Prevent any employee or other person from violating the Act, as well as garbage from being used for an unapproved purpose.	Department of Forestry, Fisheries and the Environment
Occupational Health and Safety Act, (Act 85 of 1993). The objective of this Act is to provide for the health and safety of persons at work. In addition, the Act requires that, "*as far as reasonably practicable, employers must*	All health and safety aspects will be adhered to on the site.	Department of Health

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
ensure that their activities do not expose non-employees to health hazards" (Glazewski, 2005: 575). The importance of the Act lies in its numerous regulations, many of which will be relevant to the proposed development. These cover, among other issues, noise and lighting.		
Noise Regulations: The proposed project would need to adhere to the following noise regulations (SANS 10103, 2008): • South Africa - GNR.154 of January 1992: Noise control regulations in terms of section 25 of the Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989). • South Africa - GNR.155 of 10 January 1992: Application of noise control regulations made under section 25 of the Environment Conservation Act, 1989 (Act No. 73 of 1989). • South Africa - SANS 10103:2008 Version 6 - The measurement and rating of environmental noise with respect to annoyance and to speech communication. • South Africa - SANS 10210:2004 Edition 2.2 – Calculating and predicting road traffic noise. • South Africa - SANS 10357:2004 Version 2.1 - The calculation of sound propagation by the Concawe method. The ambient outdoor noise levels guidelines in SANS 10103:2008 is between 45dBA and 50dBA during the day and between 35dBA and 40dBA at night in rural and suburban districts respectively. Please refer to SANS 10103:2008 for specific levels for different types of areas. Furthermore, the South African noise control regulations describe a disturbing noise as any noise that exceeds the ambient noise by more than 7dB. This difference is usually measured at the complainant's location should a noise complaint arise. Therefore, if a new noise source is introduced into the environment,	Development should have noise levels that do not exceed the required levels as outlined in the table to the left.	Municipal Bylaws

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
irrespective of the current noise levels, and the new source is louder than the existing ambient environmental noise by more than 7dB, the complainant will have a legitimate complaint. Guidelines for expected community responses to excess environmental noise is available reflected in SANS 10103:2008.		
The Hazardous Substances Act (HSA) (Act 15 of 1973) The Act aims to manage hazardous substances. It is the principal national legislation that controls the transportation, and manufacturing, storage, handling, treatment or processing facilities for any substance that is n dangerous or hazardous (Groups I-IV).	Mitigation measures have been provided to: • Ensure hazardous substances are managed in such a way that they do not damage human health or the environment. • Prevent dangerous compounds from being utilized for purposes they were not intended for.	Department of Employment and Labour
Matatiele Local Municipality Integrated Development Plan (2022/2027) The establishment and functions of metropolitan, district, and local municipalities were governed by legislation, which included the adoption of integrated development planning as a tool for development in district and local municipal IDP reports. The IDP serves as tools for transforming municipalities towards facilitation and management of development within their areas of jurisdiction. This is done in accordance with Chapter 5 and Section 25 of Municipal Systems Act, (Act 32 of 2000), "that the municipal council must within a prescribed period after the start of its elected term, adopt a single all-inclusive and strategic plan for the development of the municipality"	The need & desirability of the project is in line with the local municipality's IDP.	Matatiele Local Municipality
Alfred Nzo District Municipality Integrated Development Plan (2017/2022) The establishment and functions of metropolitan, district, and local municipalities were governed by legislation, which included the adoption of integrated development planning as a tool for development in district and local municipal IDP reports. The IDP serves as tools for transforming municipalities towards facilitation and management of development within their areas of jurisdiction. This is done in accordance with Chapter 5 and Section 26 of Municipal Systems Act, (Act 32 of 2000),	The need & desirability of the project is in line with the district municipality's IDP	Alfred Nzo District Municipality
National Road Traffic Act (No. 93 of 1996) The National Road Traffic Act (No. 93 of1996) (NRTA) regulates all aspects of road traffic in South Africa and is implemented uniformly across the country.	All applicable sections of the National Road Traffic Act have been incorporated into the EMPr.	Department of Transport

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) The Eastern Cape Biodiversity Conservation Plan (ECBCP) is responsible for mapping areas that are priorities for conservation in the province, as well as assigning land use categories to the existing land depending on the state that it is in (Berliner et al. 2007). Critical Biodiversity Areas (CBAs) are defined by Berliner et al. (2007) as: "CBAs are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning". These areas are classified as natural to near-natural landscapes. In addition to the CBA's the ECBCP also defines Other Natural Areas (ONA) as well as Transformed Areas. Biodiversity Land Management Classes (BLMCs) are also used in the plan: "Each BLMC sets out the desired ecological state that an area should be kept in to ensure biodiversity persistence. For example, BLMC 1 refers to areas which are critical for biodiversity persistence and ecosystem functioning, and which should be kept in as natural a condition as possible". Table 4-7shows how the BLMCs relate to the CBAs.	The application and this report have incorporated and made relevant references to the Eastern Cape Biodiversity Conservation Plan.	Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)
Matatiele Local Municipality Spatial Development Framework 2020 Chapter 4 Part A of SPLUMA sets out the focus and general requirements that must guide the preparation and compilation of SDF products at the various scales, it sets out general provisions which are applicable to the preparation of all scales of SDFs. These provisions require that all SDFs must: • interpret and represent the spatial development vision of the responsible sphere of government and competent authority; • be informed by a long-term spatial development vision; • represent the integration and trade-off of all relevant sector policies and plans; • guide planning and development decisions across all sectors of government; • guide a provincial department or municipality in taking any decision or exercising any discretion in terms of this Act or any other law relating to spatial planning and land use management systems; • contribute to a coherent, planned approach to spatial development in the national, provincial and municipal spheres;	The application and this report have incorporated and made relevant references to the Matatiele Local Municipality Spatial Development Framework.	Matatiele Local Municipality

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
• provide clear and accessible information to the public and private sector and provide direction for investment purposes; • include previously disadvantaged areas, areas under traditional leadership, rural areas, informal settlements, slums and land holdings of state-owned enterprises and government agencies and address their inclusion and integration into the spatial, economic, social and environmental objectives of the relevant sphere; • address historical spatial imbalances in development; • identify the long-term risks of particular spatial patterns of growth and development and the policies and strategies necessary to mitigate those risks; and • provide direction for strategic developments, infrastructure investment, promote efficient, sustainable and planned investments by all sectors.		

5 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter provides a description of the affected environment within the vicinity of the proposed road upgrade. This information is provided to assist the reader in understanding the possible effects of the project on the environment within which it is proposed to be developed. This information has been sourced from existing information available for the area as well as the specialist consultants who have undertaken studies for the proposed development. This chapter aims to provide the context within which this BA is being conducted.

5.1 CLIMATE

Matatiele is the nearest urban area in close proximity to the proposed development site, the climate is classified as warm and temperate. When compared with winter, the summers have much more rainfall. The Köppen-Geiger climate classification is Cwb (Peel MC, 2007). The southern region has a temperate temperature, with typical summer highs of 26°C and midwinter lows of 1°C. Matatiele has a four-degree lower average temperature with an average maximum of 17°C in January and a minimum of 2°C in June. More than 75 days of frost are possible in the mountainous regions south of Matatiele and in the border region in the northeast, with snow being a frequent occurrence (Meteoblue, 2023).

The average annual rainfall ranges from less than 550 mm to more than 1 000 mm. An average summer rainfall pattern begins in October and lasts until April. South of Cedarville and Matatiele, in the northern valley, there is a rain shadow. The likelihood of continuously high agricultural yields is also at its lowest in this area, as is the consistency of the rain. In the majority of the study region, runoff is excessively high due to inadequate vegetation cover. This has increased the potential of soil erosion.

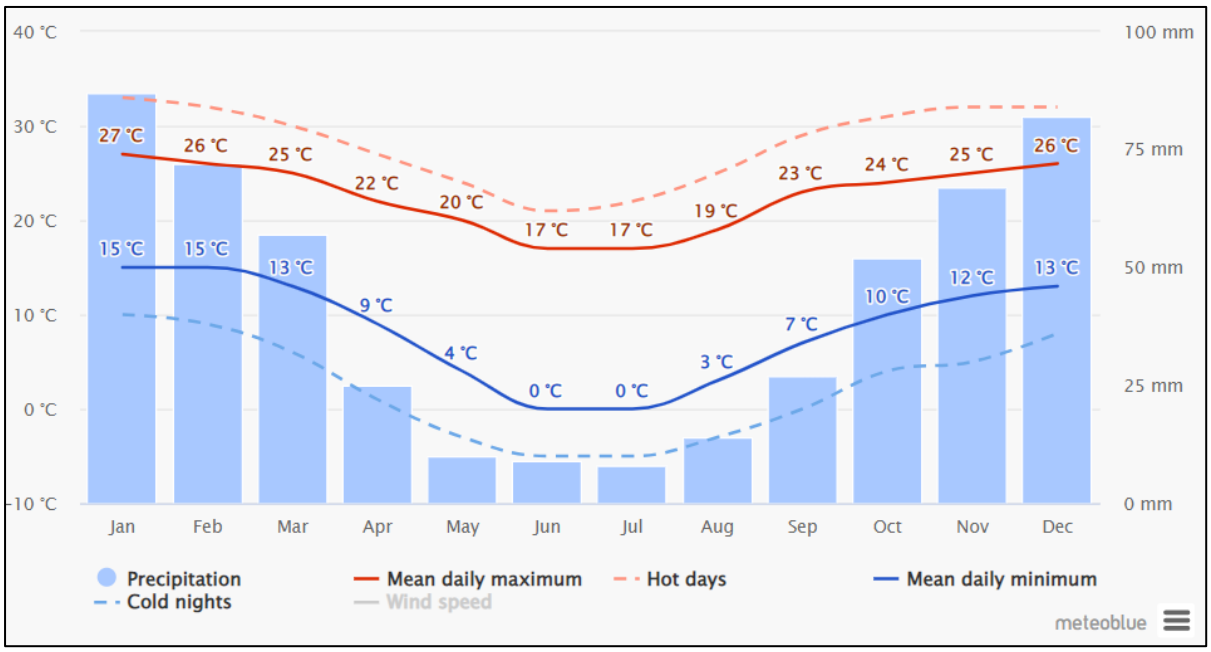

Figure 5-1: Climatic data for Matatiele, Eastern Cape (Meteoblue, 2023)

5.2 TOPOGRAPHY

The topography of the broader area varies from very steep gradients of 1:1.5 to relatively gentle slopes of less than 1:7 at mountain foothills and river plains. The very steep gradients mainly occur in the western and south-eastern boundary of the Matatiele LM due to the extension of the Drakensberg Mountain Range (Matatiele Local Municipality, 2022). The proposed development site situated approximately between 1 480 – 1 580 m above sea level (see Figure 5-2)

5.3 GEOLOGY AND SOILS

The broader Matatiele area is located on Karoo sediments (Matatiele Local Municipality, 2022). Most of the study area is likely to be underlain by mudstone and arenite of the Beaufort Group (Karoo Supergroup) and sedimentary Quaternary Deposits (sand and calcrete) (see Figure 5-4). Soils found within the proposed development area are classified as well drained, with a depth of 500-800 mm underlying East Griqualand Grassland and 200-300 mm underlying Mabela Sandy Grassland.

According to SOTER (1995), the soils underlying the project area include Dystric Regosols, Eutric Gleysols, Haplic Lixisols, and Ferric Lixiols. Regosols are typically 'young' soils with poorly developed horizons, except for an ochric (surface) horizon which is generally thin and low in organic matter. These soils are highly permeable and have a low water holding capacity making them unfavourable for agricultural purposes and sensitive to drought. Regosols are prone to erosion, particularly on sloping surfaces, and often form a hard surface crust during dry periods that prevents the infiltration of water and the emergence of seedlings. These soils are typically used for extensive grazing. Gleysols are wetland soils and are typically well saturated within 50 cm of the surface of the soil for extended periods of time Lixisols are found in seasonally dry tropical, subtropical and warm temperate regions are defined by the presence of a subsurface layer of soils with subsurface accumulation of low activity clays and high base saturation. They develop under intensive tropical weathering conditions and subhumid to semi-arid climate (Sposito, 2008).

5.4 WATERCOURSES

The proposed development falls within the quaternary drainage area of the Mzimvubu-Tsitsikamma Water Management Area (WMA 7) and traverses two quaternary drainage areas, namely the T31F and the T33A. The primary river draining the T31F catchment area is the Mzimvubu which flows in a general southerly direction. The National Route R56 Section 8 crosses the Mzimvubu River immediately east of the town of Cedarville. All watercourses crossed by the target length of the National Route R56 Section 8 road are tributaries of the Mzimvubu River, with the exception being a seasonal stream near Matatiele which is a tributary of the Kinira River which drains the T33A catchment (see Figure 5-5).

Wetlands are specialized ecosystems that provide a variety of ecosystem services, including the habitat for various plant and animal species, water filtration and flow regulation, flood attenuation, and others. According to the National Wetland Map Version 5 (2018), five wetland types occur within 500 m of the proposed road upgrade, including a seep, an unchanneled valley-bottom, a channelled valley-bottom and a floodplain. There are also two artificial wetlands (dams) within 500 m (Figure 5-5). No NFEPA wetland clusters fall within 500 m of the proposed development site.

Refer to the Aquatic Biodiversity Assessment (Appendix C) for greater detail on the project area aquatic environment.

5.5 LAND USE AND COVER

According to the National Land Cover Dataset (DEA, 2020), the proposed development area contains number of land uses which dominate the landscape in which the proposed development occurs. The field assessment collaborated with the findings of Figure 5-6 below, whereby the following was observed: Cultivated Commercial Annuals Non-Pivot/Non-Irrigated, Natural Grassland, Natural Rivers, Herbaceous Wetlands, Residential Formal (low veg / grass), Roads & Rail (Major Linear), Mines: Extraction Sites: Open Cast & Quarries combined, Fallow Land & Old Fields (Grass), Artificial Dams, Cultivated Commercial Annuals Pivot Irrigated, and Contiguous & Dense Planted Forest. The most extensive land use within the road reserve buffer includes Cultivated Commercial Annuals Non-Pivot/Non-Irrigated and Cultivated Commercial Annuals Pivot Irrigated.

Based on the observations made during the field assessment, the findings of the SA NLC (DEA, 2020) were corroborated. The project area includes the National Route R56 and the surrounding road reserve and extends into neighbouring farms by approximately 10-20 m. Dumping and litter, as well as alien and weedy plant species, are prevalent within the existing road reserve. Surrounding land uses within the broader road reserve buffer largely includes agriculture/cultivation and livestock farming.

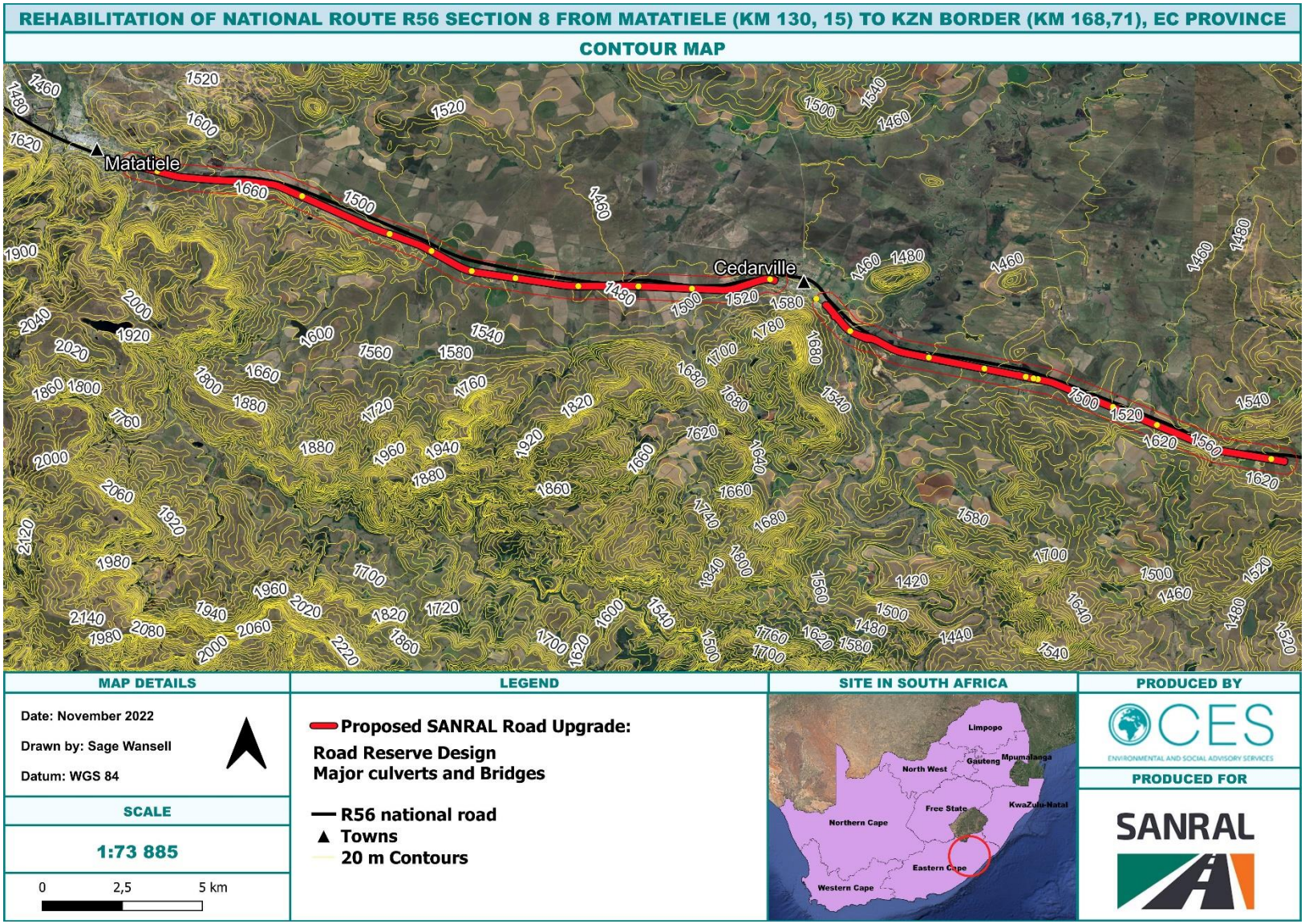

Figure 5-2: Topographic map along the National Route R56 Section 8 project route

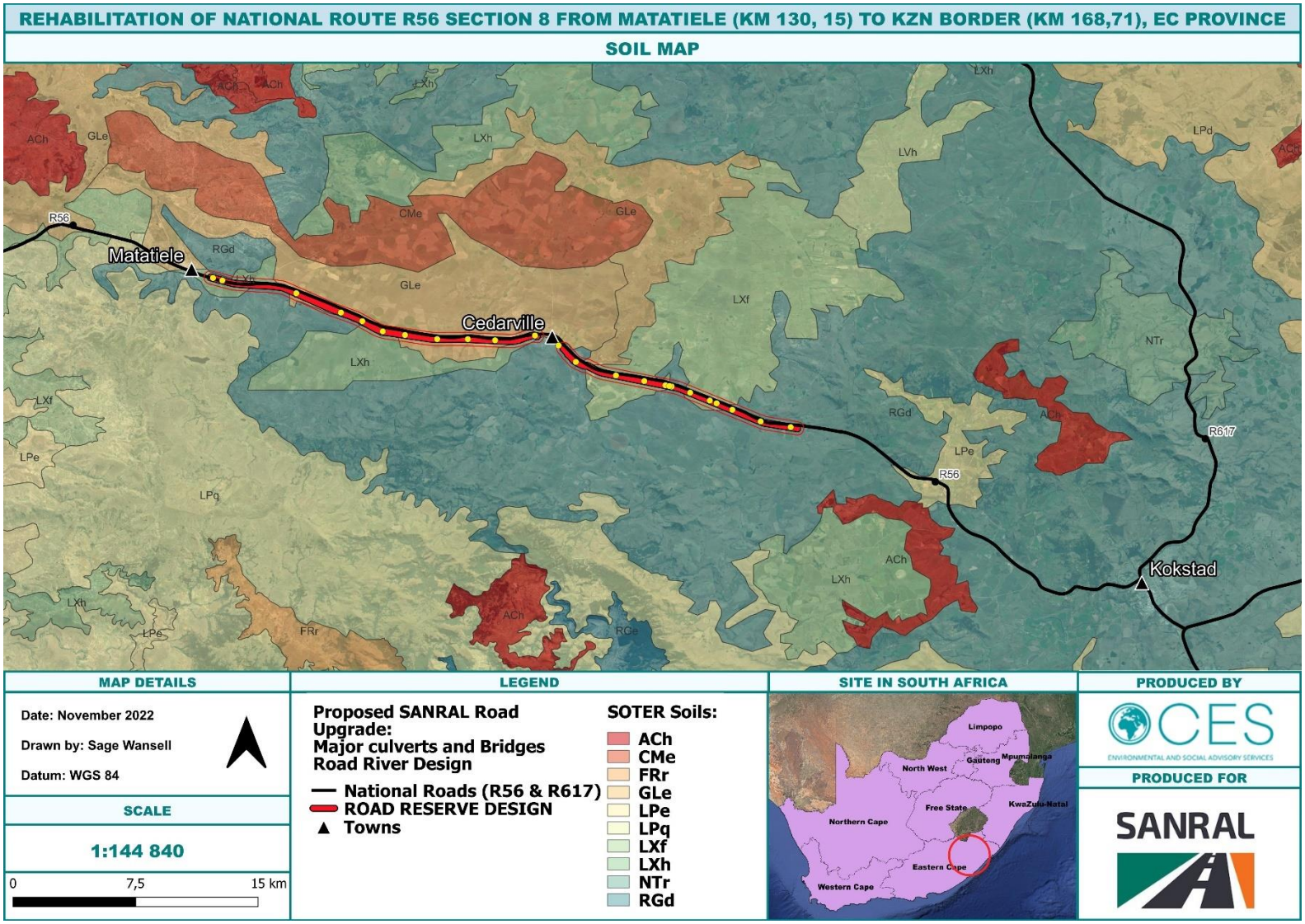

Figure 5-3: Soil map of the region along the National Route R56 Section 8 project route

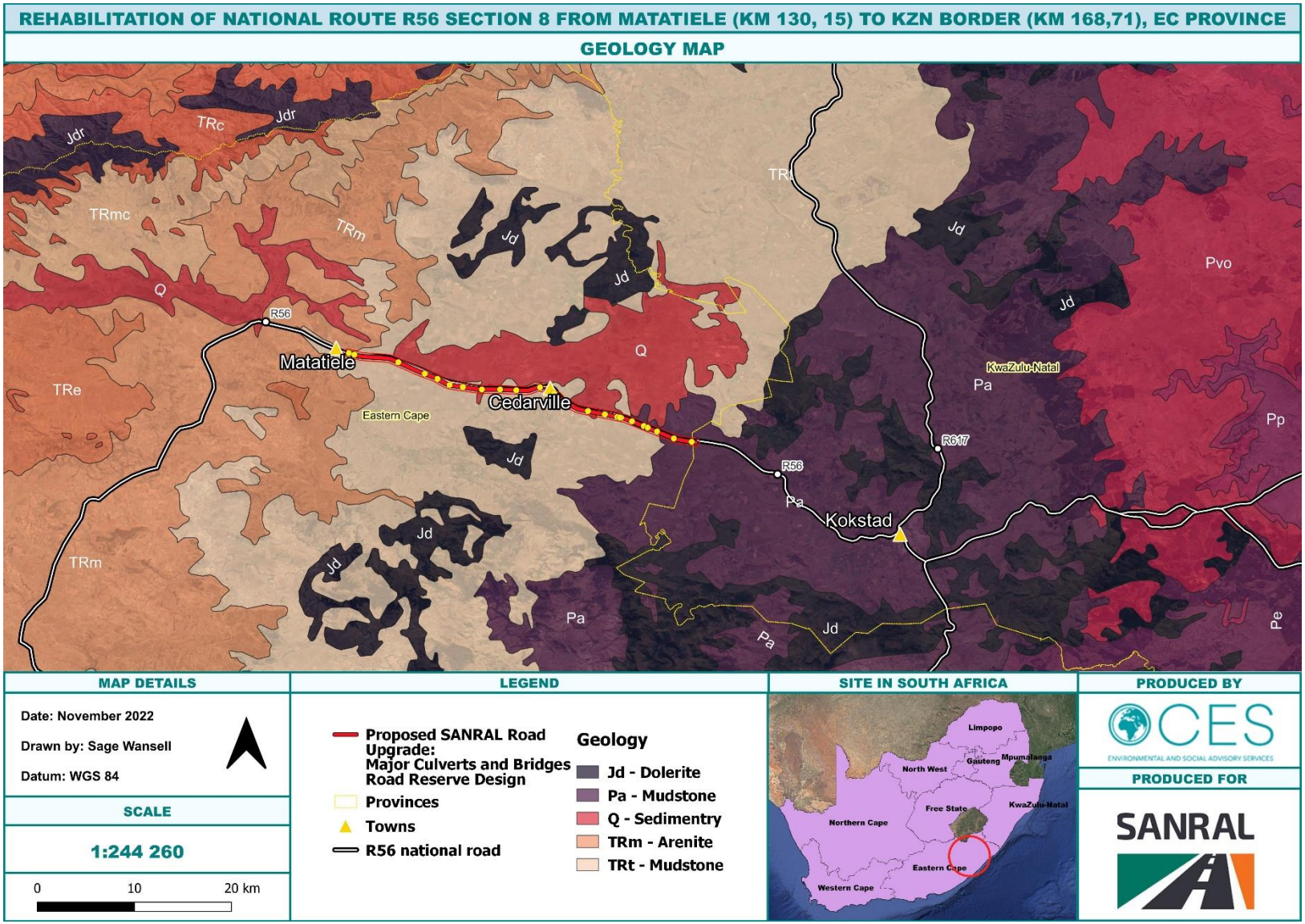

Figure 5-4: Geological map of the region along the National Route R56 Section 8 project route.

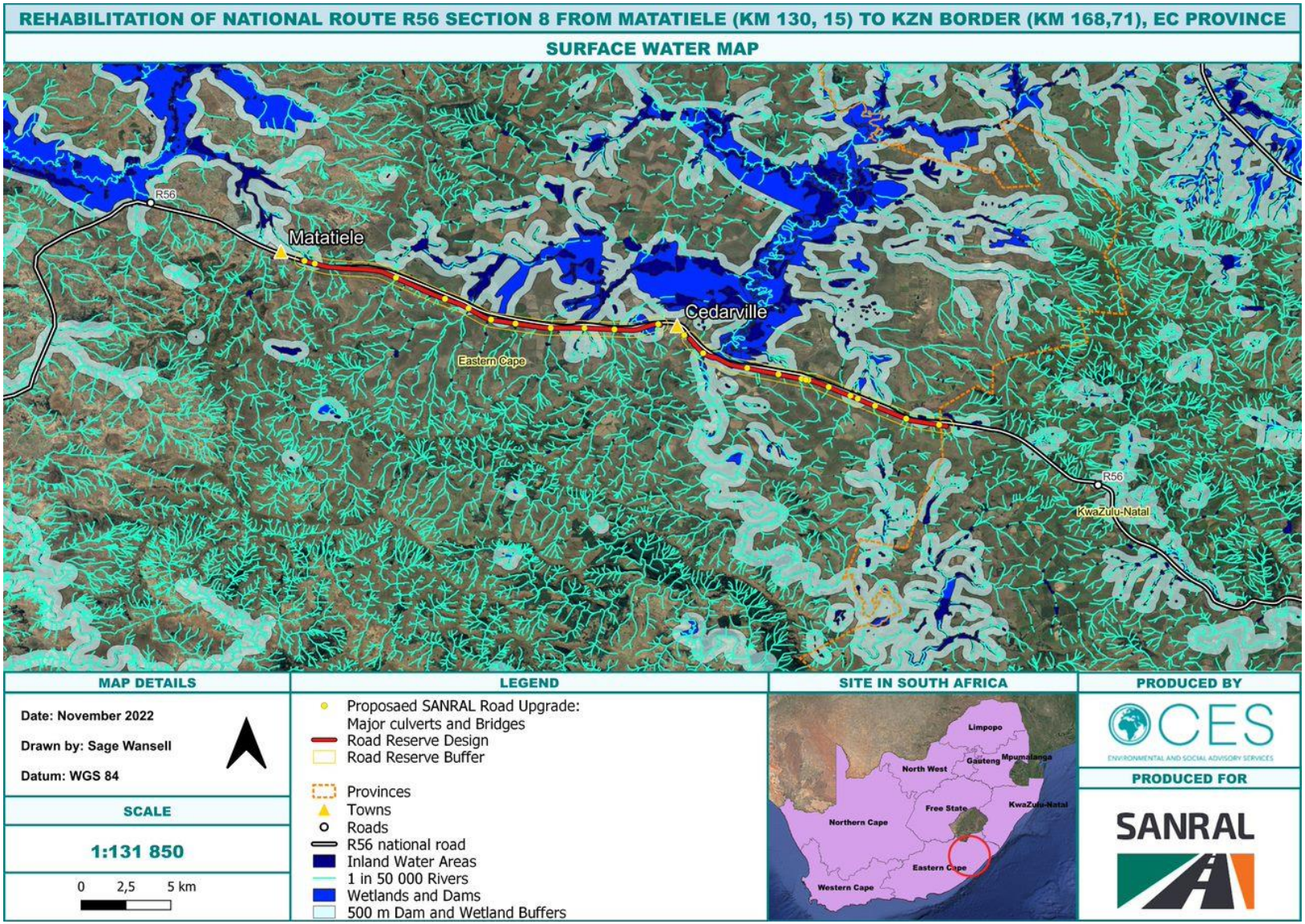

Figure 5-5: Rivers, wetlands and catchment context of the region along the National Route R56 Section 8 project route.

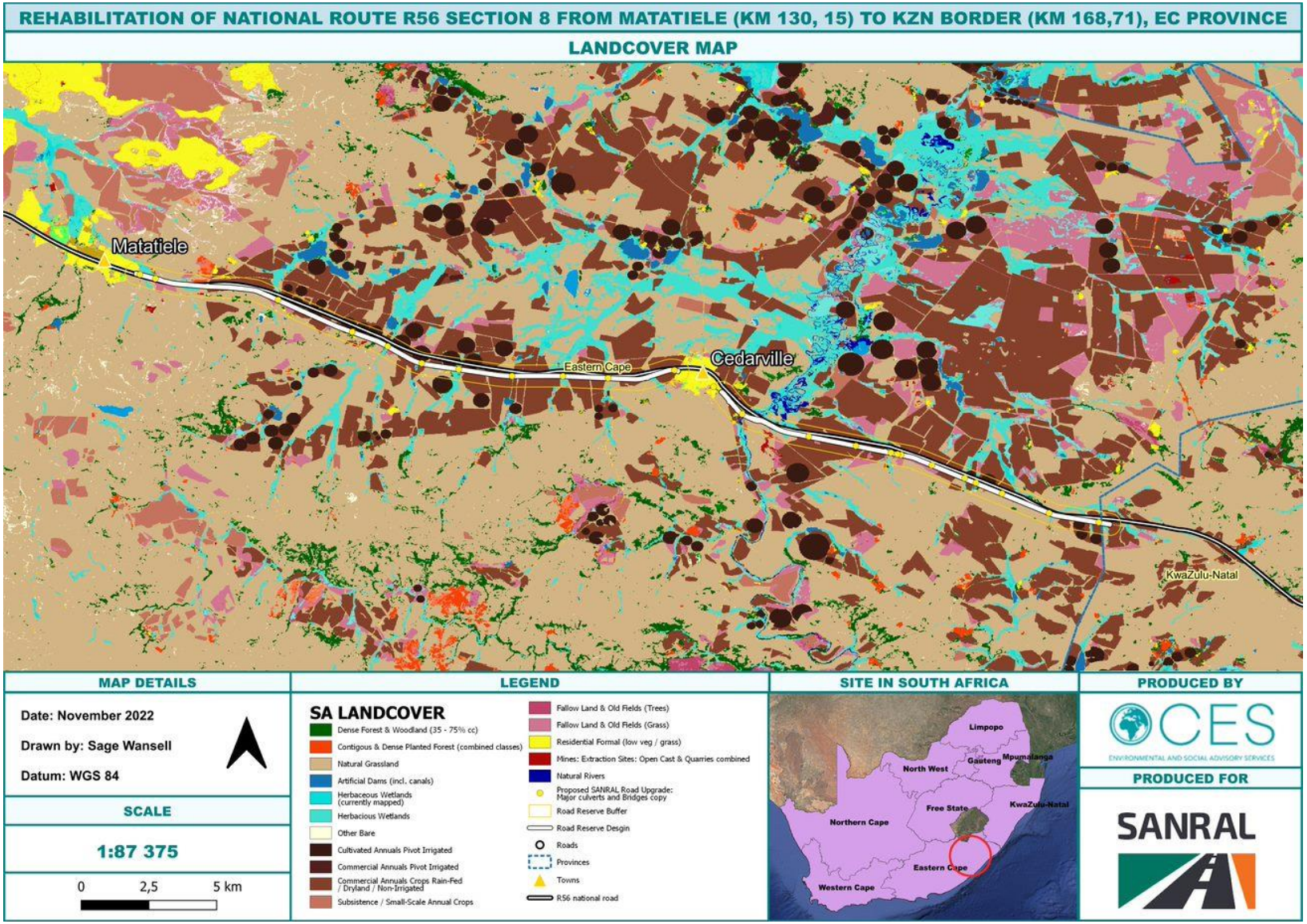

Figure 5-6: South African National Land Cover (DFFE, 2020) of the National Route R56 Section 8 project route.

5.1 VEGETATION AND FLORISTICS

5.1.1 NATIONAL VEGETATION MAP

The South African Vegetation Map (SA VEGMAP) of 2018 is an important resource for biodiversity monitoring and conservation management in South Africa. Under the custodianship of the South African National Biodiversity Institute (SANBI) the SA VEGMAP, (2018). According to SANBI's National Vegetation Map (2018), the proposed development occurs within two vegetation types, namely Mabela Sandy Grassland and East Griqualand Grassland (see Figure 5-7). These vegetation types fall within the Grassland Biome. Table 5-1 below describes this vegetation types most prominent features, conservation status and characteristics as described by Mucina and Rutherford (2011).

Table 5-1: Unique features that define the impacted vegetation type (Mucina & Rutherford, 2011)

FEATURE	DESCRIPTION	
	Mabela Sandy Grassland	**East Griqualand Grassland**
Description	Eastern Cape Province: Occurs region of Cedarville to Matatiele and a small area in a basin of Simi and Ramohlakoana, Kinira River Valley, Transkei. Altitude approximately 1440 – 1500 m.	Eastern Cape and KwaZulu-Natal Provinces: A major portion of this vegetation type occurs within Matatiele and Kokstad as centre points. Altitude approximately 920-1740 m.
Vegetation and Landscape Features	Occurs within flat valley basins with poorly drained, low nutrient soils and is characterised by low species diversity and low tussock dominated, sour grasslands where indigenous trees are absent.	Occurs on hills and slopes characterised by grassland with patches of bush clumps in wet areas and in low-lying and very dry areas.
Important Taxa (major indicator species)	*Sporobolus pyramidalis* and *Aristida junciformis.*	**Wet areas:** *Leucosidea sericea.* **Very dry areas:** *Diospyros lycioides, Vachellia karroo* and *Ziziphus mucronate*.
Conservation	• Critically Endangered (CR); and • Not Protected.	• Endangered (EN); and • Poorly Protected.

Based on the observations made during the field assessment, there was no apparent differentiation between vegetation types within the road reserve. However, species composition and alien plant species density differed slightly in that the density of alien plant species to indigenous species was much higher in certain areas within the road reserve, the cause of which was not obvious but most likely attributed to previous road related construction activities, lawn mowing, and seed dispersal from adjacent agricultural lands. The indicator species for both Mabela Sandy Grassland, particularly *Sporobolus pyramidalis* and *Aristida junciformis*, and East Griqualand Grass was largely absent within the road reserve. Whilst common indigenous plant species recorded within and surrounding the road reserve was relatively low (CES, 2023). Only one (1) SCC, *Sensitive Species 1*, was identified along the boundary of the road reserve. This species has an extent of occurrence (EOO) of 2024 km^2 and is classified as Vulnerable (VU) according to the Red List of South African Plants.

5.1.2 ECOLOGICAL DRIVERS

The outcome of the Ecological Impact Assessment confirmed that much of the proposed development footprint occurs within the existing road reserve which has already been subjected to some levels of disturbance and as a result has been significantly transformed from its natural state. Majority of the vegetation within and surrounding the road reserve has been severely degraded due to previous road-related construction activities and frequent mowing. The existing road network which passes through this area, coupled with other land uses such as agriculture and the establishment of farm fences around more natural habitats has led to the study area being fragmented. The upgrade of the National Route R56 Section 8 road, for the most part will have a limited impact to the already transformed areas, but with the possibility of an increased impact to grasslands and watercourses should mitigation measures not be adhered to. Please refer to section 9, 11, 12 and the Ecological Impact Assessment report in Appendix C.

5.1.3 ECOSYSTEMS, BIODIVERSITY AND THE BIOPHYSICAL ENVIRONMENT

The field assessment confirmed that the proposed development footprint occurs within the existing road reserve which has already been subjected to some levels of disturbance and as a result has been significantly transformed from its natural state. The proposed development will directly impact on two (2) national vegetation type, namely the Mabela Sandy Grassland and the East Griqualand Grassland which has a conservation status of Critically Endangered (CR) and Endangered (EN), respectively. There was no apparent differentiation between vegetation types within the road reserve and the indicator species for both the Mabela Sandy Grassland and East Griqualand Grass was largely absent within the road reserve. The very small portions of Mabela Sandy Grassland and East Griqualand Grassland that occurs within the development footprint has been impacted to some extent by livestock grazing, alien plant species, frequent access by vehicles, previous road-related construction activities and frequent mowing.

According to the South African Conservation Areas Database (SACAD) and the South African Protected Areas Database (SAPAD) (2022, Q3), as well as the Eastern Cape Protected Areas Expansion Strategy (ECPAES, 2012), the proposed project traverses the Cedarville Protected Environment. The following nature reserves are also located within 10 km of the development footprint:

Table 5-2: Nature reserves surrounding the proposed project.

Name of Nature Reserve	Distance from development footprint
Matatiele Nature Reserve	660 m south
Wilfried Baur Nature Reserve	5.5 km northwest
Mountain Lake Nature Reserve	5.3 km south
Golden Fleece Nature Reserve	4.6 km north

The latest Important Bird and Biodiversity Areas (IBBAs) dataset of the proposed development footprint does not overlap any IBBAs. However, the Matatiele Nature Reserve is approximately 660 m away and is classified as an Important Bird Area (IBA) in the Eastern Cape Province (BirdLife, 2015). A checklist of birds for Matatiele Nature Reserve can be found in Appendix 4 (https://gobirding.birdlife.org.za/southern-drakensburgmatatiele-nature-reserve/). According to this list, approximately 123 bird species are likely to occur within the project area, of which 13 are considered

SCC. Additionally, five species are Near Endemic and one is Endemic. During the bird survey, 67 species were recorded based on sight and/or sound. Of the species observed, two are Threatened, namely Grey Crowned Crane (*Balearica regulorum*) and Denham's Bustard (*Neotis denhami*), and one is Near Threatened, namely Peregrine Falcon (*Falco perergrinus*).

Eleven (11) ecological impacts were identified for the proposed rehabilitation and widening of the R56 road. The majority of these impacts are associated with the construction phase. Of the eleven impacts identified, four (4) impacts are of high significance and seven (7) are of moderate significance prior to mitigation. If the mitigation measures identified and specified in this report are implemente and adhered to, the significance of a number of these impacts could be reduced. Six (6) impacts are of moderate significance and five (5) impacts are of low significance after mitigation.

It is therefore the specialist's opinion that the proposed development should receive a favourable outcome for the Environmental Application lodged with the Department of Forestry, Fisheries and Environment (DFFE), provided that the conditions and mitigation techniques set out in this report are carefully implemented by the Applicant throughout the project Lifecycle. Please refer to section 8, 11 and Appendix B for more information on mitigation measures.

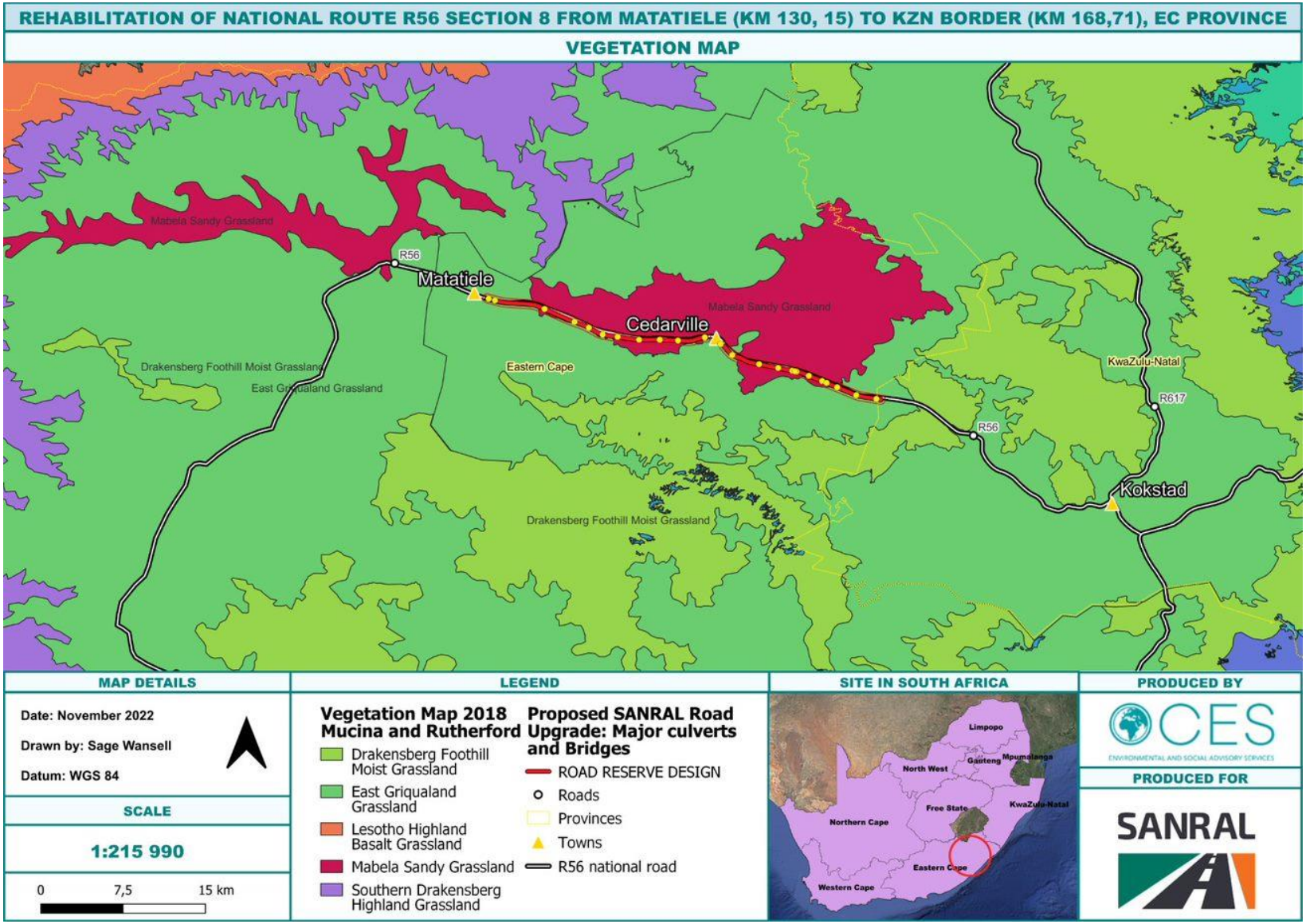

Figure 5-7: Vegetation map of the region along the National Route R56 Section 8 project route.

5.1.4 EASTERN CAPE BIODIVERSITY CONSERVATION PLAN (2019)

The ECBCP (2019) replaces the ECBCP (2007) in its entirety and provides a map of important biodiversity areas, outside of the Protected Areas network, which can be used to inform land use and resource-use planning and decision making. The objectives of the ECBCP (2019) are to:

1. Identify the minimum spatial requirements needed to maintain a living landscape that continues to support all aspects of biodiversity and retain/maintain essential ecological infrastructure. This is achieved through the selection of areas, based on achieving targets, which represent important biodiversity pattern AND ecological processes;
2. Serve as the primary source of biodiversity information for land use planning and decision-making; and
3. Inform conservation and restoration action in important biodiversity areas.

The main aim of the ECBCP was to map biodiversity priority areas through a systematic conservation planning process. The main outputs of the ECBCP include Protected Areas (PA), Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA) and No Natural Habitat Remaining (NNR) for both terrestrial and aquatic ecosystems. The ECBCP has been adopted by DEDEAT as a systematic biodiversity plan for the Eastern Cape Province.

According to the ECBCP (2019), the study site occurs within a terrestrial CBA 1 and 2, a terrestrial ESA 1 and 2, as well as an aquatic CBA 1, CBA 2 and ESA 1 (see Figure 5-8 and Figure 5-9) below. The management requirements for each of these biodiversity
priority areas are summarised in Table 5-3 below.

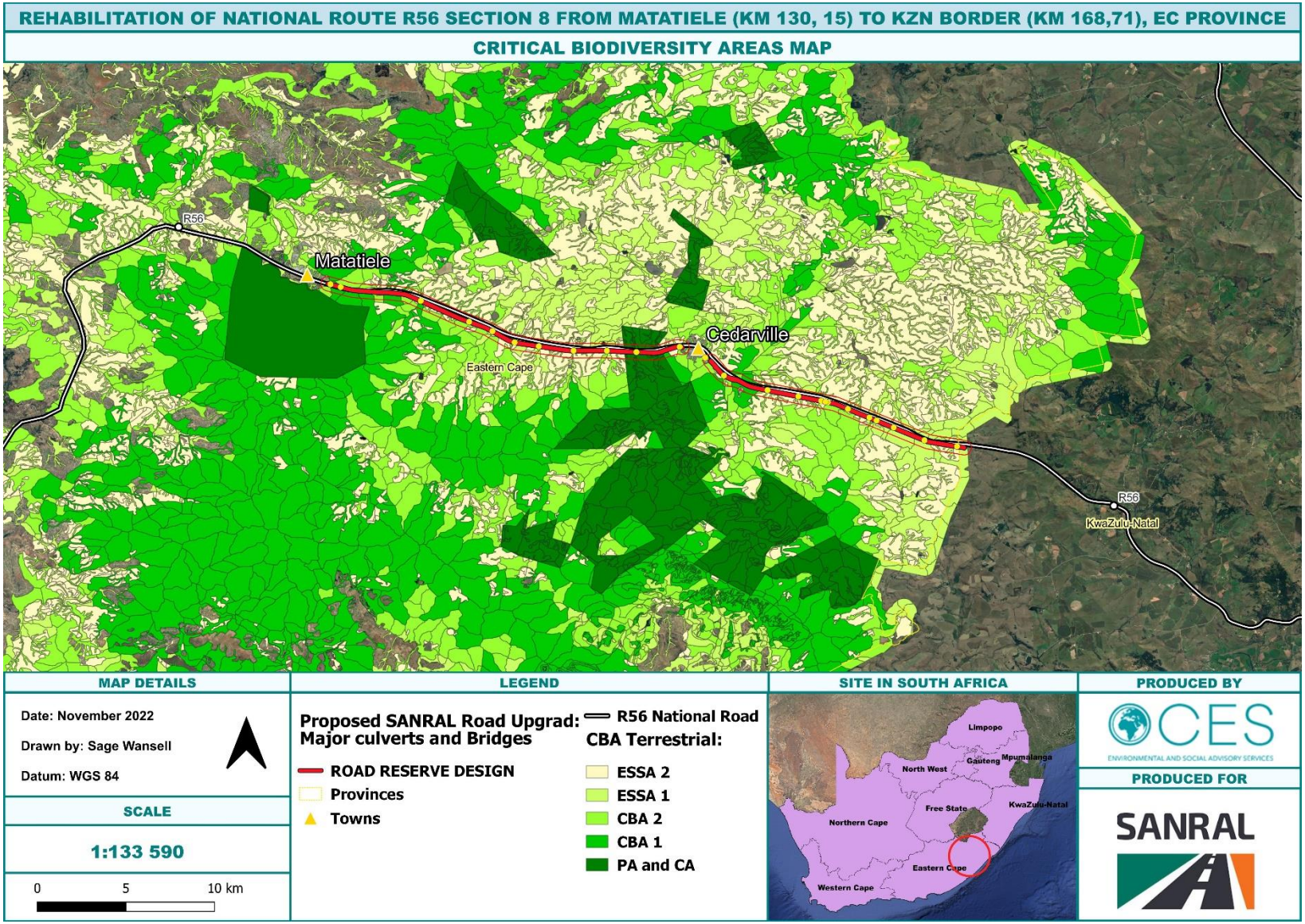

Figure 5-8: Eastern Cape Biodiversity Conservation Plan (2019) terrestrial CBAs map of the region along the R56 Section 8 project route.

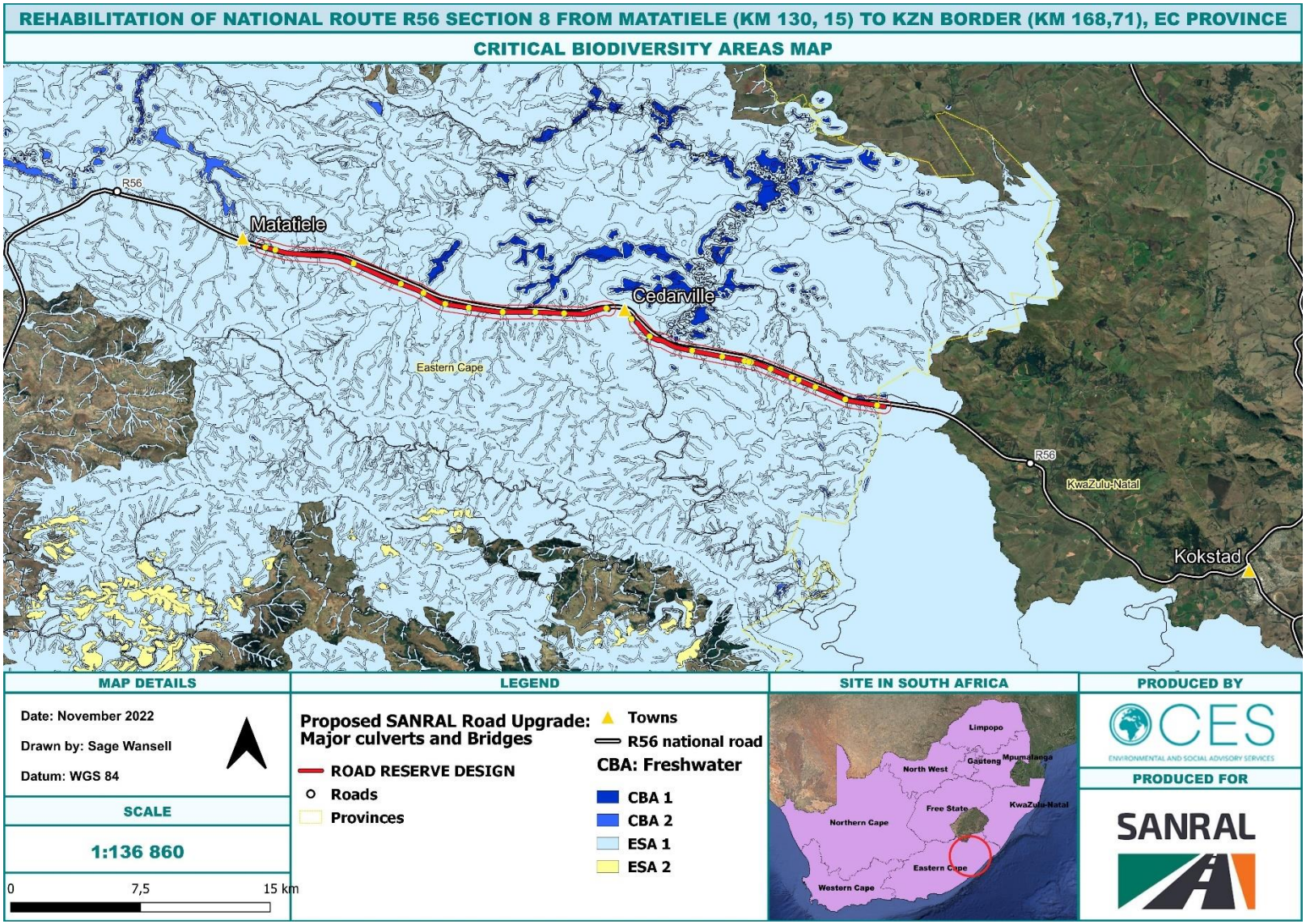

Figure 5-9: Eastern Cape Biodiversity Conservation Plan (2019) aquatic CBAs map of the region along the R56 Section 8 project route.

Table 5-3: Summary of management objectives (Desmet, Holness, Skowno, & Egan, 2013)

Category	Sensitivity Features	Desired Management Objective	Recommendation

CBA 1	• CBAs are selected to meet biodiversity targets for species, ecosystems and ecological processes. These include:
	  • Critically Endangered and Endangered Ecosystem.
	  • Critical linkage points (bottlenecks or pinch-points) in the corridor network.
	  • All areas required to meet biodiversity targets and to ensure future persistence of species, ecosystems, and habitats.
	
	CBAs are areas of high biodiversity value and should therefore be maintained in a natural state with no further loss of habitat.
		Maintain in a natural state (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes:
		For areas classified as CBA1, the following objectives must apply:
		• Ecosystem and species must remain intact and undisturbed;
		• Since these areas demonstrate high irreplaceability, if disturbed or lost, biodiversity targets will not be met;
		• Important: these biodiversity features are at, or beyond, their limits of acceptable change.
		
		If land use activities are unavoidable in these areas, and depending on expert opinion of the condition of the site, a Biodiversity Offset must be designed and implemented.
			Based on the desired management objective for areas classified as CBA 1, the study area should be maintained in a natural state. However, if areas classified as CBA 1 cannot be avoided then all infrastructure must avoid sensitive ecosystems such as wetlands, as far as practically and feasibly possible. All mitigations and recommendations as specified in this report must be implemented and adhered to. Additionally, the clearance of vegetation must be limited to that which is strictly necessary for the rehabilitation of the National Route 56.

CBA 2	These areas are considered as natural or near-natural landscapes and biodiversity must be managed for minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted.	Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes: For areas classified as CBA2, the following objectives apply: • Ecosystems and species must remain intact and undisturbed; • There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a	As development within the CBA 2 is not avoidable, all mitigations and recommendations as specified in this report must be implemented and adhered to. The development footprint must be limited to that which is strictly necessary for the rehabilitation of the National Route 56.

		CBA2 area may elevate other CBA 2 areas to a CBA 1 category. • These biodiversity features are at risk of reaching their limits of acceptable change. If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented.	
ESA 1	ESAs are not essential for meeting biodiversity targets, but are essential in terms of: • Terrestrial landscape: Ensuring connectivity between CBAs, strengthening climate change resilience and proper function of ecosystem infrastructure for delivery of ecosystem services. From a terrestrial perspective, ESAs may include riparian areas, coastal corridors, ridges, etc. • Aquatic landscape: ESAs extend into catchments that are essential for the maintenance of CBA rivers and wetlands.	Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained. For areas classified as ESA1, the following objectives apply: • These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience. • These systems may vary in condition and maintaining function is the main objective, therefore:	As development within an area classified as an ESA 1 is not avoidable, sensitive ecosystems such as wetlands must be avoided as far as practically and feasibly possible. The clearance of vegetation for the development footprint must be strictly limited to that which is necessary. Mitigation measures as specified in this report must be implemented and adhered to in areas classified as ESA 1.

		○ Ecosystems still in natural, near natural state should be maintained. Ecosystems that are moderately disturbed/degraded should be restored.	
ESA 2		Maintain current land use with no intensification For areas classified as ESA2, the following objectives apply: • These areas have already been subjected to severe and/or irreversible modification • These areas are not required to meet biodiversity targets, but they may still perform some function with respect to connectivity, ecosystem service delivery and climate change resilience • Objective is to maintain remaining function, therefore: ○ Areas should not undergo any further deterioration in ecological function. ○ Opportunities to change land use practices to improve ecological function (i.e. cultivation agriculture to livestock grazing agriculture) are desirable in ESA 2 areas.	As above.

5.1.5 PROTECTED AND PRIORITY AREAS

The National Protected Areas Expansion Strategy (NPAES, 2008) was developed to "*achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate*

change." The NPAES originated as Government recognised the importance of protected areas in maintaining biodiversity and critical ecological processes. The NPAES sets targets for expanding South Africa's protected area network, placing emphasis on those ecosystems that are least protected. According to the NPAES (2010/18) as well as the Eastern Cape Protected Areas Expansion Strategy (ECPAES, 2012), the proposed project occurs less than 20 metres away from the Southern Berg Griqualand Focus Area.

The South African Protected Areas Database (SAPAD) and the South African Conservation Areas Database (SACAD) is a spatial dataset that includes all the protected areas (PA) and conservation areas (CA) within South Africa. Data on privately owned PAs are also included in the dataset which is maintained and updated on a quarterly basis. This dataset therefore provides the most up to date information on protected areas and conservation areas in South Africa. According to SACAD and SAPAD (2022, Q3), as well as the ECPAES (2012), the proposed project traverses the Cedarville Protected Environment. The following nature reserves are also located within 10 km of the development footprint (see Figure 5-9 and Figure 5-8 above).

5.2 CULTURAL AND HISTORICAL FEATURES

Matatiele, which once had wetlands and marshes as its main features, gets its name from a combination of the Sotho terms "matata," which means "wild ducks," and "ile," which means "gone," as well as the Phuthi words "mati," which means "water," and "ayile," which means "dried out." As a whole, Matatiele suggests that "ducks have flown" as a result of "dried-out wetlands and marshes." The region is filled with artwork embellishing rocks that serves as proof that people lived there during the Stone Age. The Griquas moved here in the early 1860s after crossing the Drakensberg from Philippolis. It took the Cape Mounted Riflemen until 1874 to bring order back to the town, which had been the epicenter of gunrunning and cattle rustling. In 1904, the settlement was given municipal status.

Three Early Stone Age sites are recorded in the KwaZulu-Natal Museum heritage database in the greater Matatiele area. Stone tools in the form of hand-axes and cleavers have been recorded at these sites (Prins & Hall, 2012). An Early Stone Age site was also identified during the fieldwork within the present study area (see Mat 5 in the HIA in Appendix C). Eleven Middle Stone Age sites, all surface scatters, are known from the greater Matatiele area (Prins & Hall, 2012). Apart from the 11 MSA sites mentioned by Prins & Hall (2012), seven of the eight Stone Age sites identified during the fieldwork of the present study area are also Middle Stone Age sites.

Stone walled Iron Age settlements have been recorded in the greater Matatiele area and were most probably built by southern Sotho immigrants who settled there after 1870. However, none are known from the project area. This said, in the wider surroundings, excavations at Strathalan Cave A, close to Maclear, have yielded the remains of sorghum grain and calabash fragments on the living floor, indicating that Nguni farmers were in the area before the 1800's (Opperman, 1996). Early Nguni people arrived in the region between 1100 and 1300 AD (Feely 1986, cited in Fischer et al. 2013; Feely 1987) and as suggested above, by the beginning of the nineteenth century the main Cape Nguni-speaking agropastoral groups inhabiting the Eastern Cape were the Mpondo, Mpondomise and Thembu (Soga 1930, cited in Henry 2011). By the 1820s, the period of unrest and conflict known as the Mfecane, had significantly affected the region, causing disruption amongst these groups (Derricourt 1974, cited in

Henry 2011). The effects of the Mfecane were wide-reaching and people were displaced as far as the Zambezi River (Mitchell 2002).

The Basotho Gun War (1880 – 1881) was a significant conflict within the study area and its surroundings and comprised an armed resistance by a section of the Basotho against British Imperial attempts to disarm them. The events of early October 1880 are especially significant for the present study area. The withdrawal of Chief Magistrate of Griqualand East, Charles Brownlee from Matatiele to Cedarville Drift and Kokstad would have taken him through at least sections of the present study area. Similarly, the events associated with Cedarville Drift would have taken place in close proximity to sections of the present study area located near Cedarville and the Umzimvubu River. The last decades of the nineteenth century saw the establishment of a permanent white farming and administrative community in Griqualand East on the one hand, and the increasing marginalisation of the Griqua and Bantu-speaking residents of the area on the other. The Cedarville area is renowned to this day as one of the best dairy farming areas in South Africa (Erasmus, 2004). These events in Griqualand East did not always go unchallenged, with rebellions breaking out in 1878 and 1897.

Refer to the Heritage Impact Assessment (Appendix C) for greater detail on the cultural and historical context of the project area.

5.1 PALAEONTOLOGICAL FEATURES

The proposed project is situated within an expanding peri-rural area where the landscape interface is between small towns and land used for agricultural use. Here, former large agricultural units or farms have been converted into a number of smaller properties or plots. Most of the route is underlain by Triassic aged rocks of the Tarkastad Subgroup and Jurassic aged dolerite of the Karoo Supergroup as well as Tertiary aged sediments associated with terrestrial deposits associated with wetlands in the study area.

The very high fossiliferous potential of the Tarkastad Subgroup, Beaufort Group of the Karoo Supergroup warrants an allocation of a very high palaeontological sensitivity to the areas underlain by the rocks of this Subgroup. A moderate palaeontological sensitivity is allocated to Tertiary aged sediments in this region. Dolerite areas are allocated very low palaeontological sensitivity. If extensive excavation of topsoil and removal of more than 1.5 m of soil cover is planned in this region, all the areas of activity will be allocated a very high palaeontological sensitivity as these rocks can contain very significant remains of plants and animals that will contribute significantly to our understanding of the palaeo-environments in this part of the Karoo Basin.

According to the Palaeontological Desktop Assessment procuded by PGS (2016 and updated in 2022), the potential palaeontological impact of the proposed rehabilitation of National Route R56 Section 8 road is Moderate to Very High, with a small section allocated a Very low palaeontological sensitivity, based on the fact that most of the route is underlain by Triassic aged rocks of the Tarkastad Subgroup and Jurassic aged dolerite of the Karoo Supergroup as well as Tertiary aged sediments associated with terrestrial deposits associated with wetlands in the study area.

An Early Stone Age site was identified during the fieldwork within the present study area and seven of the eight Stone Age sites were identified during the fieldwork of the present study area are also Middle Stone Age sites in the National Route R56 Section 8 road rehabilitation footprint areas and it is the opinion of the author of the Heritage Impact Assessment Report Site Management Memorandum that the project will not impact on sensitive heritage resources should the proposed mitigation measures be applied. This opinion is subject to desktop and site observations and requirements for site sensitivity verification (SSV) stipulated in Government Gazette 43110 published in Government Notice No. 320 on 20 March 2020. Further information can be obtained from the Heritage Impact assessment on Appendix C and section 11 of the DBAR.

Refer to the Palaeontological Impact Assessment (Appendix C) for greater detail on the palaeontological context of the project area.

5.2 SOCIO-ECONOMIC PROFILE

The proposed National Route R56 Section 8 rehabilitation falls within the Matatiele Local Municipality (M LM) in the Alfred Nzo District Municipality (AN DM). The M LM covers an area of approximately 4,352 km^2. According to StatsSA 2011, the local municipality has a total population of 203 843, spread over 26 wards. The area accounts for 41% of the district's population. The population demographic based on the 2011 census was 98, 1% black, 0, 7% white, 0, 9% coloured and 0.3%Indian/Asian.The gender distribution shows the high percentage of females than males, females are 54% and males are 46%. Age distribution revealed that there is a relatively high youth component of the population, with 71% that are younger than 35 years of age and 7% over 65 years of age.

The rising number of school dropouts is one of the issues facing the town. Due to this a significant proportion of young people do not finish high school. The vast majority of students in Matatiele attend basic and secondary institutions. However, aside from an AET centre, the municipality does not have any tertiary institutions. In Matatiele, 22.6% of people who are of working age and between the ages of 15 and 65 have completed at least matric or a higher degree of education. The term "labour force" in reference to this category describes individuals who are either employed or unemployed and actively seeking employment. Estimates put the number of workers in Matatiele at 43 160. The number of unemployed persons in the municipality was estimated at 15296 in 2016. It is estimated that there are 26800 employed persons within MLM and 16074 unemployed people in 2017. In 2017, there were 17 398 people engaged in the formal sector, making up 64.9% of all employment, which is the percentage of the Matatiele workforce employed in this industry. While 9 402 persons, or 35.1% of all employment, were thought to be employed in the unofficial sector.

6 PUBLIC PARTICIPATION

Public consultation is a legal requirement throughout the EIA process. Developers are required to conduct public consultation throughout the Basic Assessment process. Formal EIA documents are required to be made available for public review, which include the project brief, Draft and Final BARs, and the decision of the Competent Authority.

According to Regulation 41(2) of the NEMA EIA Regulations 2014 (as amended 2017) "*The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act*". These guidelines include:

- The 2012 Public Participation Guidelines (General Notice 807 of 2012), which provides information and guidance for applicants, I&APs and EAPS on the public participation requirements of the BA process; and
- The Promotion of Access to Information Act (PAIA), 2000 (Act No. 2 of 2000), which allows citizens access to any information held by the State, and any information held by private bodies that is required for the exercise and protection of any rights.

6.1 NOTIFICATION TO POTENTIAL I&APS

According to Regulation 41(2) of the NEMA EIA Regulations 2014 (as amended 2017) "*The person conducting a public participation process . . . must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by—*

6.1.1 SITE NOTICES

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

During the initial site visit, site notices were placed along the National Route R56 Section 8 (see Appendix D for proof of placement). Site notices were placed at each of the following locations (Table 6-1).

Table 6-1: Locations of site notices

Location	Coordinates
Cedarville Post Office	30°23'20.2"S 29°02'32.9"E

6.1.2 I&AP AND STAKEHOLDER NOTIFICATIONS

(b) giving written notice, in any of the manners provided for in section 47 D of the Act, to—
(i) the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, 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 inception of the project and the availability of the Draft BAR for public review by means of email and/or registered mail (all notification proofs will be provided in Appendix D of the Final BAR).

6.1.3 NEWSPAPER ADVERTISEMENT

> *(c) placing an advertisement in—*
> *(i) one local newspaper; or*
> *(ii) any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;*
> *(d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii);*

A newspaper advertisement was placed in the Daily Dispatch on 29 November 2022, in order to notify the general public of the inception of the proposed project and intent to submit an application for Environmental Authorisation. Proof of placement has been provided in Appendix D of the BAR.

6.2 REGISTER OF STAKEHOLDERS AND I&APS

According to Regulation 42 of the NEMA EIA Regulations 2014 (as amended 2017) "*A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of—*

> *(a) all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;*
> *(b) all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and*
> *(c) all organs of state which have jurisdiction in respect of the activity to which the application relates.*

A comprehensive I&AP register was compiled and is included in Appendix D. This register included the following parties, among others:

- Immediate neighbours,
- The Department of Forestry, Fisheries and the Environment (DFFE); including the following units:
    - Biodiversity Planning and Conservation;
    - Protected Areas Systems Management;

    - National Wildlife Information Management; and
    - Biodiversity Specialist Monitoring and Services
- Matatiele Local Municipality, including the Municipal Ward councillors;
- Eskom;
- SANBI;
- Department of Economic Development Environmental Affairs and Tourism (DEDEAT) Eastern Cape;
- Eastern Cape Provincial Heritage Resources Authority (ECPHRA);
- Department of Mineral Resources and Energy (DMRE);
- Eastern Cape Department of Roads and Public Works (DRPW);
- Department of Water and Sanitation (DWS);
- Eastern Cape Parks and Tourism Agency (ECPTA);
- Eastern Cape Department of Transport; and
- South African National Biodiversity Institute (SANBI).

6.3 PUBLIC REVIEW OF DRAFT BAR

The Draft BAR was subject to a 30-day public review period. The Draft BAR was made available electronically on the CES website. Letters of notification were emailed and/or posted to the registered I&APs, notifying them of the commencement of the public review period and the availability of the Draft BAR (including the link to the CES website), as well as providing the contact details (telephone and email) of the EAP. Additionally, I&APs were provided the option of receiving a hardcopy version of the executive summary of the Draft BAR via registered post, upon request, in cases where they are unable to access the electronic version.

I&APs were invited to provide comment on the Draft BAR via a number of contact options, namely telephone, post, fax and/or email. The medium of correspondence were noted in the I&APs register (Appendix D2).

6.4 ISSUES RAISED BY I&APS

44 (1) *The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans, and that such written comments, including responses, are attached to the reports and plans that are submitted to the competent authority in terms of these regulations.*

The full Issues and Response Trail (IRT) to date is attached in Appendix D6 of the BAR.

7 ALTERNATIVES

7.1 FUNDAMENTAL, INCREMENTAL AND NO-GO ALTERNATIVES

7.1.1 FUNDAMENTAL ALTERNATIVES

Fundamental alternatives are developments that are different from the proposed project description and usually include the following:

- Alternative property or location where it is proposed to undertake the activity.
- Alternative type of activity to be undertaken.

7.1.2 INCREMENTAL ALTERNATIVES

Incremental alternatives relate to modifications or variations to the design of a project that provide different options to reduce or minimise environmental impacts. There are incremental alternatives that can be considered with respect to the road upgrade project, including:

- Alternative design or layout of the activity.

7.1.3 NO-GO ALTERNATIVE

It is mandatory to consider the “no-go” option in the EIA process. The “no-go” alternative refers to the current status quo and the risks and impacts associated with it. Some existing activities may carry risks and may be undesirable (e.g. an existing contaminated site earmarked for a development). The no-go is the continuation of the existing land use, i.e. maintain the status quo.

7.2 ALTERNATIVES CONSIDERED

7.2.1 LOCATION ALTERNATIVES

No location alternatives for the road upgrades are considered, as no deviations are planned, barring minor vertical alignment adjustments (to allow for greater clearance across bridges and rail crossings). These amendments are not anticipated to be significant, and as such are treated as an identical layout to the existing road.

Alternative:	Latitude (S):	Longitude (E):
• Starting point of the activity	30°21'0.29"S	28°49'55.07"E
• Middle/Additional point of the activity	30°23'12.81"S	29° 1'36.65"E
• End point of the activity	30°26'52.64"S	29°13'8.86"E

7.2.2 ACTIVITY ALTERNATIVES

Considering the high desirability of the upgrade and that the National Route R56 is an existing road, with the upgrades remaining within the road reserve, no activity alternatives have been considered.

7.2.3 DESIGN/LAYOUT ALTERNATIVES

Two layout alternatives were considered, namely:

- Layout Alternative 1: The preferred layout consists of resurfacing, widening and horizontal realignment of the National Route R56 road.
- Layout Alternative 2: The layout consists of resurfacing the National Route R56 existing road footprint with no widening or alignment changes.

The resurfacing, widening and realignment layout option was considered the preferred alternative due to the infrastructural, socio-economic and safety benefits.

7.2.4 TECHNOLOGY ALTERNATIVES

Two technology alternatives will be utilised:

- Due to a lack of alternative power sources, diesel generators will be used.
- Precast concrete culverts will be used as opposed to the construction of concrete bridges. The construction of concrete bridges will require specialised skills, as well as the mixing of concrete on site. This will be a time-consuming and expensive activity with increased environmental impacts.

7.2.5 OPERATIONAL ALTERNATIVES

No operational alternatives exist and have been assessed for the National Route R56 Section 8 road rehabilitation as the objective of the road upgrade is to use it as a transport route.

7.2.6 NO-GO ALTERNATIVE

The no-go alternative refers to the cessation of the project. This would mean the benefits of the project will not materialise (i.e. no job creation, no improved safety, and no transport linkage between towns and provinces), while the negative impacts (biodiversity impacts) will also not materialise. The expectation of increased future traffic along that route, in addition to the benefits obtained through the project, has been evaluated as greater in importance than the expected biodiversity impacts (after mitigation). The no-go alternative is thus not considered the preferred alternative in terms of this development.

7.3 EVALUATION OF ALTERNATIVES

According to NEMA, the evaluation of alternatives is determined "*through a detailed site selection process, which includes an identification of impacts and risks inclusive of identification of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment.*" This process was not applied at the outset due to the limited anticipated impact of the preferred alternative. Rather, the alternatives for the proposed development were identified in response to the need and desirability for the road upgrade namely, to improve road capacity and safety. The proposed alternatives were evaluated based on their advantages and disadvantages, as well as their feasibility and reasonability in meeting this need. Only feasible and reasonable alternatives were further evaluated in the impact assessment.

Table 7-1: Analysis of the proposed alternatives for the National Route R56 road rehabilitation.

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
Location	**Location / Route 1 – R56 (preferred)**	– Located along the existing road, within the existing road reserve. – Reduced environmental impact due to development occurring within existing reserve. – Improved traffic capacity, durability, structural integrity and safety of existing road during operational phase.	– Some impact to environment within the road reserve. – Traffic delays during construction phase.	YES	YES	Location alternatives were not dealt with further as an upgrade project, by necessity, can only occur on existing infrastructure, and as such no location alternative is available.
Layout	**Layout 1 – resurfacing, widening and realignment (preferred)**	– Improved capacity to accommodate expected future increase in traffic. – Improved durability and structural integrity. – Improved safety. – Overall upgrade in infrastructure in alignment with provincial and municipal IDPs and SDFs.	– Some impact to environment within the road reserve.	YES	YES	The resurfacing, widening and realignment layout option was considered the preferred alternative due to the infrastructural, socio-economic and safety benefits.
	Layout 2 – resurfacing only	– Improved durability and structural integrity. – Improved safety.	– No improvement in capacity to accommodate expected future increase in traffic. – Some impact to environment within the road reserve. – Traffic delays during construction phase.	NO	NO	

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
Technology	**Preferred Technology – Precast concrete culverts (preferred)**	- Less time consuming - Fewer environmental impacts		YES	YES	Precast concrete culverts were considered the best alternative due to their efficiency.
	Alternative technology – Construction of concrete bridges		– High cost – Time consuming – Higher environmental impacts	NO	NO	
No-go option	Site alternative remains in its existing condition.	– The environment will remain relatively undisturbed.	– No improvement in capacity to accommodate expected future increase in traffic. – No improvement to durability and structural integrity of road. – No improvements to safety of road. – No temporary and permanent job opportunities.	YES	YES	No adverse environmental impacts are foreseen for the no-go option. No further assessment deemed necessary.

8 SPECIALIST KEY FINDINGS AND IMPACTS

Appropriately qualified and experienced specialists were appointed to undertake the Specialist Impact Assessments. The specialists gathered baseline information relevant to the study and assessed impacts associated with the proposed road upgrade. The specialists have also made recommendations to mitigate negative impacts and enhance benefits. The resulting information has been synthesised in the section below, whilst the full specialist reports have been attached to the BAR in Appendix C.

ASSESSMENT	SPECIALIST	AFFILIATION
Heritage	Neels Kruger	Exigo Sustainability
Palaeontological	Gideon Groenewald	PGS Heritage
Aquatic	Shaun McNamara	Eco Pulse Environmental Consulting Services
	Ryan Kok	Eco Pulse Environmental Consulting Services
Ecology	Nicole Wienand	CES
	Elena Reljic	CES

8.1 HERITAGE ASSESSMENT

8.1.1 TERMS OF REFERENCE

Heritage specialist input into the Environmental Impact Assessment (EIA) process is essential to ensure that, through the management of change, developments still conserve our heritage resources. It is also a legal requirement for certain development categories which may have an impact on heritage resources. Thus, EIAs should always include an assessment of heritage resources. The heritage component of the EIA is provided for in the **National Environmental Management Act, (Act 107 of 1998)** and endorsed by section 38 of the **National Heritage Resources Act (NHRA - Act 25 of 1999)**. In addition, the NHRA protects all structures and features older than 60 years, archaeological sites and material and graves as well as burial sites. The objective of this legislation is to ensure that developers implement measures to limit the potentially negative effects that the development could have on heritage resources. Based hereon, this project functioned according to the following **terms of reference for** heritage specialist input**:**

- Provide a detailed description of all archaeological artefacts, structures (including graves) and settlements which may be affected, if any.
- Assess the nature and degree of significance of such resources within the area.
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess and rate any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.
- Propose possible heritage management measures provided that such action is necessitated by the development.
- Liaise and consult with the Eastern Cape Provincial Heritage Resources Authority (ECPHRA).

8.1.2 KEY FINDINGS

The proposed rehabilitation of National Route R56 Section 8 road had a HIA conducted by PGS Heritage & Grave Relocation Consultants (PGS) in 2016 which identified 10 sites of heritage potential; 8 Stone Age sites and 2 historical sites. CES was requested to reappraise the HIA findings and no additional heritage sites or features were noted in the project area during the updated site assessment. The proposed project is situated within an expanding peri-rural area where the landscape interface is between small towns and land used for agricultural use. Here, former large agricultural units or farms have been converted into a number of smaller properties or plots. Most of the route is underlain by Triassic aged rocks of the Tarkastad Subgroup and Jurassic aged dolerite of the Karoo Supergroup as well as Tertiary aged sediments associated with terrestrial deposits associated with wetlands in the study area.

During the site survey it might be assumed that the proposed project will result in a minimal (if any) impact on heritage resources. The following recommendations are made based on general observations in the proposed development footprint for the National Route R56 road rehabilitation in terms of heritage resources management.

- According to the South African Heritage Resources Agency Information System (SAHRIS) Palaeo Map, portions of the study area fall within a potentially high fossiliferous of the Tarkastad Subgroup, Beaufort Group of the Karoo Supergroup. Should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA, ECPHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.
- Due to the subterranean nature of many of the lithic sites identified in the proposed project area, it is recommended that an archaeological watching brief be implemented during the course of the construction work on the project. Such a watching brief would assist in the early identification of any Stone Age (or other archaeological) sites which may be located in a subterranean position within the proposed development footprint.
- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the study area along water sources and drainage lines and pans would often have attracted human activity in the past. Also, since Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development.

According to the Palaeontological Desktop Assessment procuded by PGS (2016), the potential palaeontological impact of the proposed rehabilitation of National Route R56 Section 8 road is Moderate to Very High, with a small section allocated a Very low palaeontological sensitivity, based on the fact that most of the route is underlain by Triassic aged rocks of the Tarkastad Subgroup and Jurassic aged dolerite of the Karoo Supergroup as well as Tertiary aged sediments associated with terrestrial deposits associated with wetlands in the study area.

An Early Stone Age site was identified during the fieldwork within the present study area and seven of the eight Stone Age sites were identified during the fieldwork of the present study area are also Middle Stone Age sites in the National Route R56 Section 8 road rehabilitation footprint areas and it is the opinion of the author of the Heritage Impact Assessment Report Site Management Memorandum that the project will not impact on sensitive heritage resources should the proposed mitigation measures be applied. This opinion is subject to desktop and site observations and requirements for site sensitivity verification (SSV) stipulated in Government Gazette 43110 published in Government Notice No. 320 on 20 March 2020. Further information can be obtained from the Heritage Impact assessment on Appendix C and section 11 of the DBAR.

8.2 AQUATIC ASSESSMENT

8.2.1 TERMS OF REFERENCE

The scope of work completed as part of this assessment was as follows:

- Contextualization of the study area in terms of important biophysical characteristics and freshwater conservation planning through a review of available spatial datasets and relevant conservation plans.
- Assessment of Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) for the seven selected watercourses included in the 2016 Baseline Aquatic Biodiversity Assessment (GIBB, 2016) (T3KINI-USMAT, T3MZIM-CMPSN, T3MZIM-EDNDL, T3MZIM-ALING, T3MZIM-DSR56, T3MZIM-RSTFN, T3MZIM-STRYD).
    - Aquatic PES was assessed using the Index of Habitat Integrity (IHI) tool (Kleyhans, 1996).
        - IHI assessments were informed by the following:
            - In situ water quality sampling.
            - Adapted Invertebrate Habitat Assessment System (IHAS).
            - Aquatic macroinvertebrate assessment using the South African Scoring System Version 5 (SASS5), including deriving an ecological category using the Dallas (2007) SASS5 interpretation guidelines.
            - Ichthyofaunal survey.
    - Assessment of river EIS (Ecological Importance & Sensitivity) using an EIS assessment method developed by Eco-Pulse adapted from the DWAF Resource Directed Measures EIS tools (Kleynhans, 1999 & Duthie, 1999).
- Description and assessment of the significance of wetland/aquatic impacts for the seven (7) assessed watercourses for all project phases (construction and operation).
- Application of the “DWS Risk Assessment Matrix” for the seven (7) assessed watercourses, as detailed in the General Authorization in terms of Section 39 of the National Water Act No. 36 of 1998 for Water Uses as defined in Section 21 (c) or Section 21 (i), as contained in

Government Gazette No. 40229, 26August 2016 and contained within the DWS document titled 'Section 21(c) and (i) Risk-based assessment and authorization, October 2014, Edition 2' to inform water licensing requirements for the project (i.e. full WULA vs GA).

- Provision of mitigation recommendations to avoid unnecessary impacts to the seven assessed watercourses.
- Reporting: Compilation of an Aquatic Biodiversity Assessment Report including all relevant maps and supporting information.

8.2.2 KEY FINDINGS

Soil and vegetation sampling in conjunction with the recording of terrain type enabled the delineation and classification of the following watercourses:

- Watercourse T3KINI-USMAT located along an unnamed non-perennial tributary of the Botsola (Kinira) River, immediately west of Matatiele;
- Watercourse T3MZIM-CMPSN located along an unnamed non-perennial tributary of the Mzimvubu River, directly upstream of a culvet crossing of the National Route R56;
- Watercourse T3MZIM-EDNDL locared along an unnamed tributary of the Mzimvubu River, upstream of a dam situated on parent farm Edendale 185 and downstream of bridge crossing of the National Route R56;
- Watercourse T3MZIM-ALING located along an unnamed tributary of the Mzimvubu River, immediately upstream of a small dam situated on the parent farm Alingthun 181, the site is downstream of a culvert crossing of the National Route R56;
- Watercourse T3MZIM-DSR56 located along the main stem of the Mzimvubu River upstream of the National Route R56 bridge crossing;
- Watercourse T3MZIM-RSTFN located along an unnamed tributary of the Con Amore Stream, directly downstream of a culvert crossing of the National Route R56; and
- Watercourse T3MZIM-STRYD located along the perennial stream referred to as the Con Amore Stream.

This study did not include any watercourse delineations. Sampling focused exclusively on instream aquatic fauna and surface water quality.

The following key findings were reported as part of the Present Ecological State (PES) Assessment:

- The in-situ water quality results revealed that dissolved oxygen saturation ranged between 80% and 90% for all sampled sites, except for site T3MZIM-DSR56 (Mzimvubu River) where a 62.3% oxygen saturation was measured. Dissolved oxygen concentrations along the sampled reach of the Mzimvubu River could therefore be a factor influencing aquatic faunal biodiversity. Electrical conductivity measurements were within acceptable limits for most aquatic biota at all sample sites, except for at site T3MZIM-EDNDL. Electrical conductivity was slightly elevated at this site during the most recent field visit (331.8 µS/cm). Electrical conductivity was similarly elevated at this site during the GIBB 2016 assessment (292.0 µS/cm). The sampling site is located immediately adjacent to a cultivated field that is irrigated by an overhead centre pivot. It is assumed that runoff of fertilizer from the crop area is resulting in increased concentrations of dissolved ions at this sample location. The pH varied from 7.4 to 7.6 across all sampled sites. This is considered normal for inland surface freshwater resources.
- pH varied from 7.4 to 7.6 across all sampled sites. This is considered normal for inland surface freshwater resources.
- The SASS5 river health classes were derived using the 'South Eastern Uplands– Lower' biological bands set out by (Dallas, 2007). A summary of SASS5 and IHAS results has been summarized below:
    - The sampled sites T3MZIM-EDNDL, T3MZIM-ALING and T3MZIM-DSR56 fall within the E/F category (seriously/critically modified);
    - For the sampled sites T3MZIM-EDNDL and T3MZIM-ALING the same ecological outcome was observed during the GIBB 2016 study, and the T3MZIM-DSR56 was placed in the C category (moderately modified), which shows a decline in health class;
    - The sampled sites T3MZIM-RSTFN and T3MZIM-STRYD both fall within the D category (largely modified); and
    - For the sampled sites T3MZIM-RSTFN a increased ecological outcome was observed in this study as compared to the GIBB 2016 study, which observed it as D (largely modified), whilst the GIBB 2016 study placed T3MZIM-STRYD at C category (moderately modified) which has decreased to D category (largely modified) in this study.
    - Overall, the low SASS5 and ASPT scores at the sample sites are considered to be mostly influenced by the generally poor habitat quality for diverse aquatic macroinvertebrate colonization. This is reflected in the 'poor' outcome for the IHAS assessments for each site, and the generally acceptable water quality (Table 7). In the days before the fieldwork for this aquatic assessment was completed, the study area received several high intensity and high-volume rainfall events. This caused the sampled watercourses to rise with many of them experiencing a level of flooding during sampling. This is expected to have caused 'drift' of some macroinvertebrates from the sampled reaches, which also likely had an affect on the outcomes of the assessment, with SASS5 assessments undertaken during flooding often not being considered representative of the biota at site (Dicken & Graham, 2002).

- The notable decline is the number of taxa, SASS5 score and ASPT for the Mzimvubu sample site between 2016 and 2022 is a result of this system being in flood at the time of sampling in 2022. This meant that sampling at this site was limited to the edges of the active channel as the channel area was extremely deep. Therefore, no stones or gravel were sampled at this site, which are biotopes known to typically host the greatest diversity of aquatic macroinvertebrates.

- The Ichthyofauna (Fish) Survey revealed the following:
  - The excepted native fish species within the sub quaternary reaches T31G-05071 and T31F-05134 in the study area include two species, namely *Enteromius anoplus* and *Anguilla mossambica*. Both species are considered moderately sensitive to physico-chemical (water quality) and 'no-flow' modifications according to the DWS (2014).
  - In addition to the expected species mentioned above, GIBB (2016) also recorded *Lepomis macrochirus* (bluegill) and *Micropterus punctulatus* (spotted bass) during their survey in 2016. Both species are introduced alien/ non-native species. GIBB (2016) also noted that several other alien species were expected to occur in the study area, including *Cyprinus carpio* (common carp), *Oncorhynchus mykiss* (rainbow trout) and *Perca fluviatilis* (European perch). *Tilapia sparrmanii* (banded tilapia) was also noted as an expected extralimital[2] species in the study area.
  - The only site at which indigenous fish were recorded was T3MZIM-STRYD. Here four (4) specimens of *Enteromius anoplus* were recorded. At T3MZIM-EDNDL, T3MZIM-DSR56, and T3MZIM-ALING only exotic / introduced fish were recorded, namely *Cyprinus carpio* and *Micropterus sp*. At T3MZIM-RSTFN no fish were recorded.
- The Index of Habitat Integrity (IHI), Version 2 (Kleynhans, 1996 - updated 2012) was applied to watercourse reaches associated with each monitoring sites. The water quality results, SASS5 findings and fish survey results were also used to inform aspects of the IHI assessments. The outcomes of the IHI assessment, including a summary of key impacts, are contained as follows:
  - Instream habitat condition was assessed as being 'C: moderately modified' for all assessed sites. Notable instream impacts include altered flow regime due to the establishment of dams along many of the watercourses, altered water quality due to runoff from agricultural lands, and channel scour (erosion) associated with altered catchment runoff processes. The presence of the Carp fish species in watercourses is also known to have an influence on instream habitat as they increase water column turbidity.
  - Riparian habitat condition was assessed as ranging from 'C: moderately modified' to 'D: largely modified'. Key impacts include, altered inundation of macro-bank areas due to the presence of dams along most of the sampled watercourses, bank erosion, and the infestation of macro-channel areas by woody invasive tree species.
  - Several of the sampled watercourses could be classified as wetland units and should therefore be assessed using the WET-Health Version present ecological state assessment tool. However, given that the GIBB (2016) baseline aquatic assessment applied the IHI assessment tool, this same tool was applied in 2022.
- The following key findings were reported as part of the Ecological Importance & Sensitivity (EIS):

- The instream / aquatic component of assessed reaches of the watercourses associated with sites T3KINI-USMAT, T3MZIM-CMPSN, T3MZIM-EDNDL, T3MZIM-ALING, and T3MZIM-RSTFN were all assessed as being of 'Low' overall EIS. This is due to the prevailing ephemeral / seasonal flow regime of these units with these watercourses having limited aquatic species and habitat diversity and providing limited habitat or refugia for aquatic biota. These watercourses are however likely to be moderately sensitive to changes in its flow regime, as even minor increases in flow volume or velocity could change natural hydrological and geomorphological processes. The assessed reach of the watercourse associated with T3MZIM-STRYD was assessed as being of 'Moderate' EIS. This watercourse was associated with seasonal flow conditions and is considered sensitive to changes in flow. The assessed reach of T3MZIM-DSR56 (Mzimvubu River) was rated as being of 'Moderate' EIS. The perennial nature of this system means that it serves as refuge and a migration corridor for flow dependent taxa.

8.3 ECOLOGICAL BIODIVERSITY ASSESSMENT

8.3.1 OBJECTIVES AND TERMS OF REFERENCE

Taking into account the purpose of the specialist studies, the objectives for the ecological impact assessment are as follows:

- Describe and map the vegetation types in the study area.
- Describe the biodiversity and ecological state of each vegetation unit.
- Establish and map sensitive vegetation areas showing the suitability for development and no-go areas.
- Identify plant and animal species of conservation concern (Red Data List, PNCO and TOPS lists). In the case of the fauna, this was done at a desktop level.
- Identify alien plant species, assess the invasive potential, and recommend management procedures.
- Identify and assess the impacts of development on the site's natural vegetation and faunal species in terms of habitat loss, fragmentation, and degradation of key ecosystems and where feasible, provide mitigation measures to reduce these impacts.

8.3.2 KEY FINDINGS

Based on the findings of the Department of Forestry, Fisheries and the Environment (DFFE) Environmental Screening Tool, the entire study area contained a "Very High" Terrestrial Ecological Theme, a "High Animal Species Theme and a "Medium" Plant Species theme. As such, a full Ecological Impact Assessment was required to be submitted with the Application for Environmental Authorisation (EA), and Basic Assessment Report (BAR) for consideration. The proposed development was found to traverses a Protected Area (PA), a terrestrial Critical Biodiversity Area (CBA) 1 and 2, a terrestrial Ecological Support Area (ESA) 1 and 2, as well as an aquatic Critical Biodiversity Area (CBA) 1, CBA 2 and Ecological Support Area (ESA) 1. From a terrestrial perspective, the proposed development footprint is contained within the road reserve for the most part, and therefore should not cause further negative impact of fauna within this habitat. The road works and the operation of the upgraded road are deemed unlikely to negatively impact upon instream habitat and aquatic

faunal assemblages or result a reduction in the instream ecological state of any assessed watercourses. It is therefore concluded that with the application of mitigation measures, coupled with the recommendations found within the Ecological Impact Assessment and the Aquatic Biodiversity Baseline Assessment compiled for this project, no irreversible impact should be caused to the above-mentioned biodiversity priority areas.

According to the SA VEGMAP (2018), the proposed development footprint falls within two (2) vegetation types, namely Mabela Sandy Grassland (CR) and East Griqualand Grassland (EN). Prior to the site visit, the current remaining extent of the threatened ecosystems in South Africa spatial dataset (SANBI, 2021) was consulted in order to identify sampling locations which would be representative of the two vegetation types expected to occur within the project area. Although sampling was focused around the predetermined sampling sites, it should be noted that the entire section of road from Matatiele (KM 130.15), passing through Cedarville to the KwaZulu-Natal Border at KM 168.71, was also surveyed by driving and walking slowly along the route and noting changes in vegetation composition, particularly areas invaded by alien plant species. A site visit was undertaken over the course of one (1) day, on the 24th of November 2022, to assess the site-specific ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities. The site visits also served to identify potential impacts of the proposed development, and its impact on the surrounding ecological environment. A night drive (visual survey) was also conducted along the gravel road which runs perpendicularly to the R56 during which cryptic and nocturnal species where identified.

Mabela Sandy Grassland occurs within flat valley basins (1440 – 1500 m) with poorly drained, low nutrient soils in the region of Cedarville to Matatiele and a small area in a basin of Simi and Ramohlakoana, Kinira River Valley, Transkei. The major indicator species include *Sporobolus pyramidalis* and *Aristida junciformis* (Mucina et al., 2006). It is classified as Critically Endangered (CR). and has a narrow distribution with high rates of habitat loss placing this ecosystem at risk of collapse (SANBI, 2021). East Griqualand Grassland occurs on hills and slopes (920-1740 m) within the Eastern Cape and KwaZulu-Natal Provinces, with a major portion of this vegetation type occurring within East Griqualand with Matatiele and Kokstad as centre. It is characterised by grassland with patches of bush clumps dominated by *Leucosidea sericea* in wet areas *and Diospyros lycioides*, *Vachellia karroo* and *Ziziphus mucronata* in low-lying and very dry areas (Mucina et al., 2006). It is classified as Endangered (EN) and has a narrow distribution with high rates of habitat loss placing this ecosystem at risk of collapse (SANBI, 2021).

Analysis of the current remaining extent of the threatened ecosystems in South Africa spatial dataset (SANBI, 2021) suggests that the development footprint traverses' portions of intact Mabela Sandy Grassland (CR) and East Griqualand Grassland (EN). However, the site visit confirmed that the majority of the vegetation within and surrounding the road reserve has been severely degraded most likely due to previous road-related construction activities and frequent mowing. The species composition is largely dominated by weedy alien plant species such as *Melilotus albus, Cyclospermum leptophyllum, Cirsium vulgare, Cosmos bipinnatus, Oenothera spp., Paspalum dilatatum, Verbena spp., Dactylis glomerata*, amongst others, and indigenous pioneer species such as *Arctotis arctotoides, A. venusta, Berkheya spp., Senecio spp., Gazania linearis, Lobelia flaccida, Plantago lanceolata*, and *Hermannia spp*., amongst others. Indigenous plant species diversity was relatively low within and surrounding the

road reserve. Common indigenous plant species recorded within the road reserve are included in the Ecological Impact Assessment (Appendix C). During the field assessment at only one (1) protected species, namely *Sensitive Species 1*, in terms of the 1974 Provincial. Nature and Environmental Conservation Ordinance were observed within the study area. Permits will be required before any of these species may be moved or destroyed during the construction or rehabilitation phases of the development.

According to the latest Important Bird and Biodiversity Areas (IBBAs) dataset the proposed development footprint does not overlap any IBBAs. However, the Matatiele Nature Reserve is approximately 660m away, is classified as an Important Bird Area (IBA) in the Eastern Cape Province (BirdLife, 2015). A checklist of birds for Matatiele Nature Reserve can be found in Appendix 4 (https://gobirding.birdlife.org.za/southern-drakensburgmatatiele-nature-reserve/). According to this list, approximately one-hundred-and-twenty-three (123) bird species are likely to occur within the project area, of which thirteen (13) are considered SCC. Additionally, five (5) species are Near Endemic and one (1) is Endemic. During the bird survey, sixty-seven (67) species were recorded based on sight and/or sound. Of the species observed, two (2) are Threatened, namely Grey Crowned Crane (*Balearica regulorum*) and Denham's Bustard (*Neotis denhami*), and one (1) is Near Threatened, namely Peregrine Falcon (*Falco perergrinus*). The proposed development boundary does also traverses the Cedarville Protected Environment and occur within 10 km of a number of protected areas. As no clear link exists between these areas, it was found that impacts to these areas would be unlikely.

According to Stuarts' Field Guide to Mammals of Southern Africa (2015), forty-eight (48) mammal species have a known distribution within the project area. Of the species listed, five (5) are considered Near Threatened, four (4) are considered Threatened, and one (1) is Data Deficient. A more comprehensive mammal list for the project area can be found in Ecological Impact Assessment (Appendix C). Seven (7) species are protected by PNCO (Act No. 15 1974) and five (5) by NEM:BA (2007). In addition, three (3) species are Endemic and two (2) are Near Endemic.

Figure 8-1: SCC which may occur within the study area.

SCIENTIFIC NAME	COMMON NAME	STATUS	LIKELIHOOD OF OCCURRENCE (LOW, MEDIUM, HIGH)
Mammals			
Aonyx capensis	African Clawless Otter	NT	Medium
Hydrictis maculicollis	Spotted-necked Otter	VU	Low
Poecilogale albinucha	African Striped Weasel	NT	Medium
Leptailurus serval	Serval	NT	Low
Redunca fulvorufula	Mountain Reedbuck	EN	Confirmed
Pelea capreolus	Grey Rhebok	NT	High
Otomys auratus	Vlei Rat	NT	High
Grammomys dolichurus	Mozambique Woodland Mouse	DD	Low
Mystromys albicaudatus	White-tailed Rat	VU	Low
Dasymys incomtus	African Marsh Rat	VU	Medium
Herpetofauna			

L. sylvicolus	Forest Thread Snake	DD	High

Eleven (11) ecological impacts were identified for the proposed rehabilitation and widening of the R56 road. The majority of these impacts are associated with the construction phase. Of the eleven impacts identified, four (4) impacts are of high significance and seven (7) are of moderate significance prior to mitigation. If the mitigation measures identified and specified in this report are implemented and adhered to, the significance of a number of these impacts could be reduced. Six (6) impacts are of moderate significance and five (5) impacts are of low significance after mitigation.

9 SENSITIVITY ANALYSIS

A site sensitivity analysis has been conducted based on specialist and general site information gathered. The site was classified into areas of low, conditional sensitivity and **NO-GO** development.

- **NO-GO** includes areas where no construction should take place.
- **High Sensitivity** areas will require considerable effort to design out, mitigate or manage negative environmental impacts. In many cases this will not be possible and in general these areas should be avoided. Only facilities that are location dependent should be permitted in these areas.
- **Moderate Sensitivity** areas can accommodate development, but there are constraints. Mitigation and management will be required to reduce significant environmental impacts to acceptable levels, and appropriate technology and design will be required to reduce impacts and ensure sustainability.
- **Low Sensitivity** areas can be easily developed, as there are only minor constraints, and little mitigation and management is required (aside from normal building design and construction restrictions outlined in the EMP).

9.1 AQUATIC ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

This section discusses the results of the Ecological Importance and Sensitivity (EIS) assessment. Ecological Importance (EI) is the expression of the importance of rivers in terms of the maintenance of biological diversity and ecological functioning at a local and landscape level (Kotze et al., 2020). Ecological Sensitivity (S) refers to ecosystem fragility or the ability to resist or recover from disturbance (Kotze et al., 2020).

The instream / aquatic component of assessed reaches of the watercourses associated with sites T3KINI-USMAT, T3MZIM-CMPSN, T3MZIM-EDNDL, T3MZIM-ALING, and T3MZIM-RSTFN were all assessed as being of 'Low' overall EIS. This is due to the prevailing ephemeral / seasonal flow regime of these units with these watercourses having limited aquatic species and habitat diversity and providing limited habitat or refugia for aquatic biota. These watercourses are however likely to be moderately sensitive to changes in its flow regime, as even minor increases in flow volume or velocity could change natural hydrological and geomorphological processes. The assessed reach of the watercourse associated with T3MZIM-STRYD was assessed as being of 'Moderate' EIS. This watercourse was associated with seasonal flow conditions and is considered sensitive to changes in flow. The assessed reach of T3MZIM-DSR56 (Mzimvubu River) was rated as being of 'Moderate' EIS. The perennial nature of this system means that it serves as refuge and a migration corridor for flow dependent taxa.

Table 9-1: Summary of EIS scores and rating for the Hartbeesspruit and Moretele Rivers.

BIOTA (RIPARIAN & INSTREAM)	T3KINI-USMAT	T3MZIM-CMPSN	T3MZIM-EDNDL	T3MZIM-ALING	T3MZIM-DSR56	T3MZIM-RSTFN	T3MZIM-STRYD
Rare & endangered (range: 4=very high - 0 = none)	0	0	0	0	0	0	0
Unique (endemic, isolated, etc.) (range: 4=very high - 0 = none)	0	0	0	0	0	0	0
Intolerant (flow & flow related water quality) (range: 4=very high - 0 = none)	1	1	1	1	1	1	1
Species/taxon richness (range: 4=very high - 1=low/marginal)	1	1	1	1	1	1	1
RIPARIAN & INSTREAM HABITATS							
Diversity of types (4=Very high - 1=marginal/low)	2	2	2	2	2	2	2
Refugia (4=Very high - 1=marginal/low)	1	1	1	1	1	1	1
Sensitivity to flow changes (4=Very high - 1=marginal/low)	2	2	2	2	2	2	2
Sensitivity to flow related water quality changes (4=Very high - 1=marginal/low)	3	3	3	3	3	3	3
Migration route/corridor (instream & riparian, range: 4=very high - 0 = none)	2	2	2	2	2	2	2
Importance of conservation & natural areas (range, 4=very high - 0=very low)	1	1	1	1	2	1	1
EIS Score	**1**	**1**	**1**	**1**	**1.5**	**1**	**1**
EIS Rating	**Low**	**Low**	**Low**	**Low**	**Moderate**	**Low**	**Moderate**

9.2 TERRESTRIAL SITE ECOLOGICAL IMPORTANCE AND SENSITIVITY

Vegetation has been used as a common biological indicator to identify the Present Ecological State (PES) or ecological health of ecosystems, given their overall ability to respond rapidly to disturbance. Conservative plant species are the most commonly affected species given their high conservatism status, high sensitivity, narrow distribution ranges and low tolerance to disturbance, these species are the first to be eradicated in disturbed conditions (Rocchio, 2007). The following table (Table 9-2) provides a summary of the Site Ecological Importance (SEI), which was assessment using the latest assessment methodology prescribed by SANBI (20220.

Table 9-2: Summary of the Site Ecological Importance (SEI) assessment

HABITAT	CONSERVATION IMPORTANCE (CI)	FUNCTIONAL INTEGRITY (FI)	BIODIVERSITY IMPORTANCE (BI)	RECEPTOR RESILIENCE (RR)	SITE ECOLOGICAL IMPORTANCE (SEI)
Secondary Grassland within the Road Reserve i.e., Project Area (including Wetlands)	Medium	Low	Low	High	Very Low
Mabela Sandy Grassland	Very High	Very High	High	Very High	High
Surrounding East Griqualand Grassland	High	Very High	High	High	Medium

The following sensitivity maps (Figure 9-1 and Figure 9-2) have been produced using the outcome of the assessment provided in Table 9-2 above. The following table (Table 9-3) provides an interpretation of the Site Ecological Importance scores, and their respective impact on the decision for this project.

Table 9-3: Summary of the SEI and the interpretation guidelines for the proposed development

SITE ECOLOGICAL IMPORTANCE (SEI)	INTERPRETATION OF THE SCORE AND ITS POTENTIAL IMPACT ON THE PROPOSED DEVELOPMENT
High	Avoidance mitigation wherever possible. Minimisation mitigation changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation development activities of medium to high impact acceptable and restoration activities may not be required.

9.3 HERITAGE AND PALAEONTOLOGICAL SITE IMPORTANCE AND SENSITIVITY

The potential Palaeontological Impact of the proposed Road Upgrade Development Matatiele to the KZN Border, Matatiele Local Municipality, Alfred Nzo District Municipality, Eastern Cape Province is Moderate to Very High, with a small section allocated a Very Low Palaeontological sensitivity, based on the fact that most of the route is underlain by Triassic aged rocks of the Tarkastad Subgroup and Jurassic aged dolerite of the Karoo Supergroup as well as Tertiary aged sediments associated with terrestrial deposits associated with wetlands in the study area. The two historic sites comprise an old bridge that was built in 1951 as well as an historic dwelling and church located on the western end of the town of Cedarville.

Table 9-4: Heritage and Paleontological site sensitivity of the proposed R56 road rehabilitation

HERITAGE AND PALEONTOLOGICAL	Paleontological sensitivity	Most of the route is underlain by Triassic aged rocks of the Tarkastad Subgroup and Jurassic aged dolerite of the Karoo Supergroup as well as Tertiary aged sediments associated with terrestrial deposits associated with wetlands in the study area	**MODERATE SENSITIVITY**
	Heritage sensitivity	The site has a Generally Protected B (GP.B) Medium Significance. Site has been sufficiently recorded and requires no further recording before destruction	**LOW SENSITIVITY**

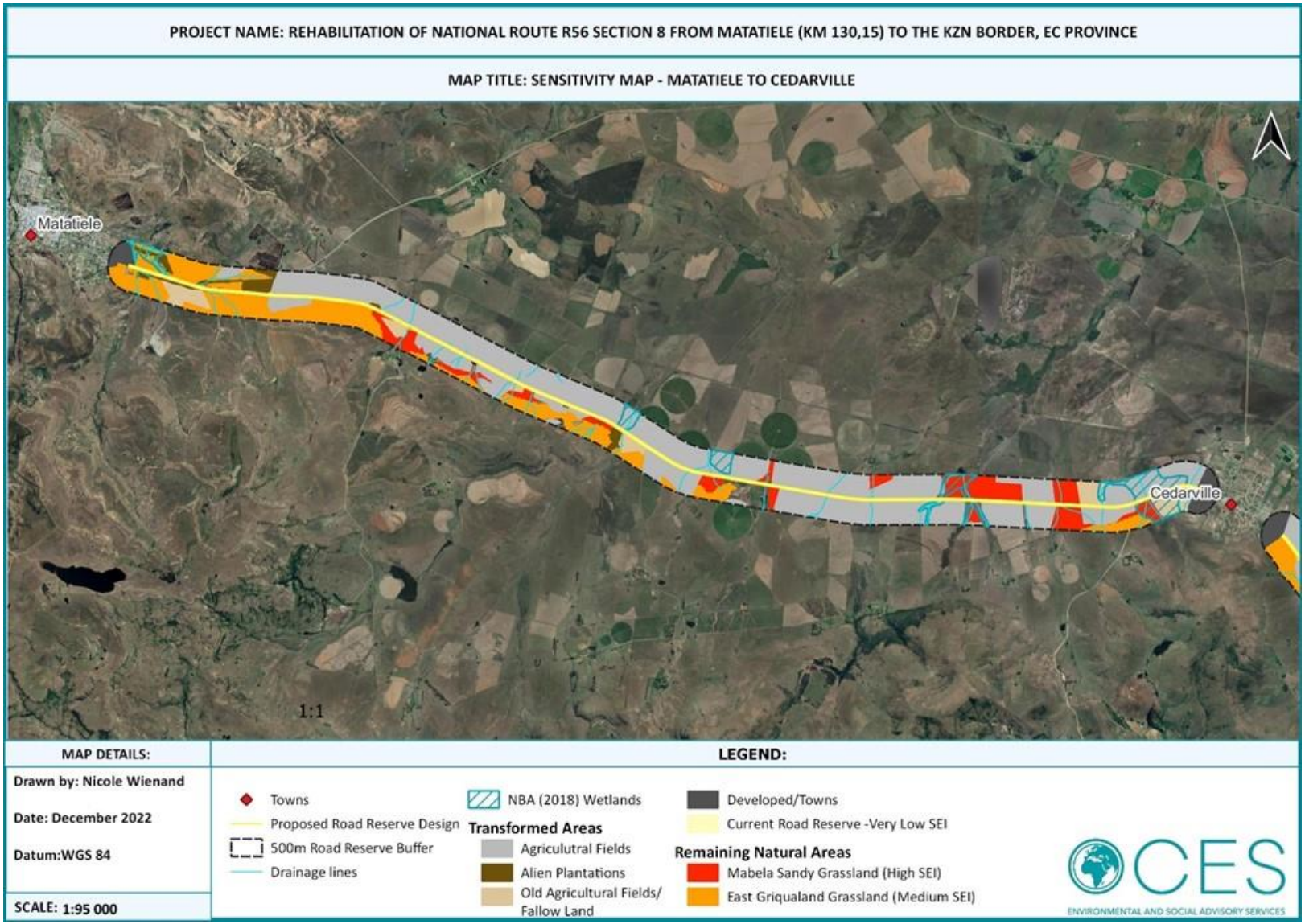

Figure 9-1: Site Ecological Importance of the National Route R56 from Matatiele to Cedarville (CES, 2023)

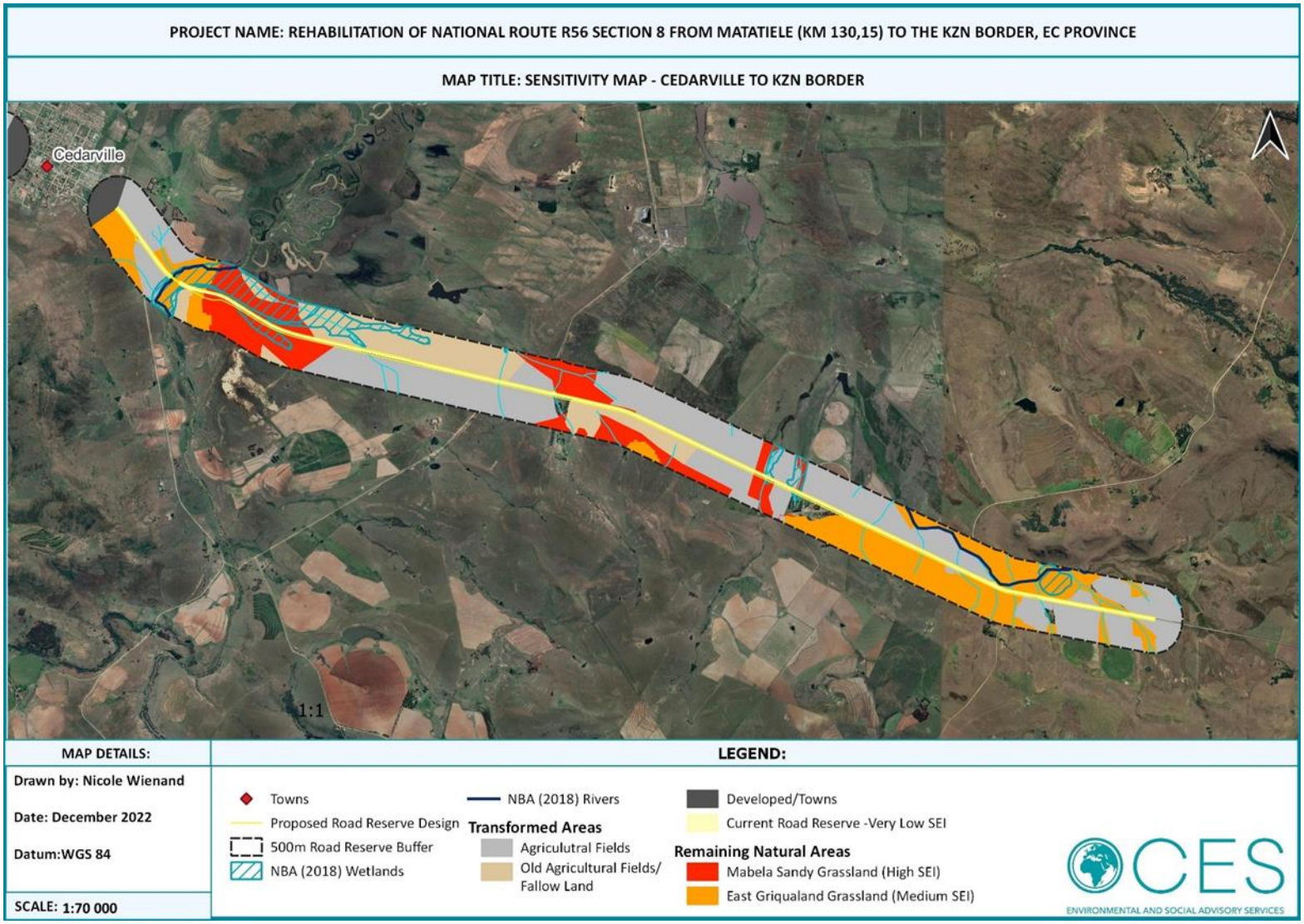

Figure 9-2: Sensitivity map indicating the SEI of the R56 from Cedarville to the KZN border (CES, 2023).

10 IMPACT METHODOLOGY

10.1 AIMS OF ENVIRONMENTAL IMPACT ASSESSMENT

The aim of Basic Assessments and Environmental Impact Assessments is to determine the consequences of proposed developments on the environments to better inform decision-making and the management of natural and social systems. This BA sought to assess the potential environmental impacts of the proposed development of the proposed National Route R56 rehabilitation.

10.2 IMPACT ASSESSMENT CRITERIA

CES has developed an evaluation criteria of impacts in accordance with the requirements outlined in Appendix 2 of the EIA Regulations (2014, as amended). This scale takes into consideration the following variables:

- Nature: negative or positive impact on the environment.
- Type: direct, indirect and/or cumulative effect of impact on the environment.
- Significance: The criteria in Table 10-2 are used to determine the overall significance of an activity. The impact effect (which includes duration; extent; consequence and probability) and the reversibility/mitigation of the impact are then read off the significance matrix in order to determine the overall significance of the issue. The overall significance is either negative or positive and will be classified as low, moderate or high (Table 10-1).
- Consequence: the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
- Extent: the spatial scale defines the physical extent of the impact.
- Duration: the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- Probability: the likelihood of impacts taking place as a result of project actions arising from the various alternatives. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- Reversibility: The degree to which an environment can be returned to its original/partially original state.
- Irreplaceable loss: The degree of loss which an impact may cause.
- Mitigation potential: The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in Table 10-1 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 10-1: Ranking of Evaluation Criteria

Nature	
Positive	Beneficial/positive impact.
Negative	Detrimental/negative impact.
Type	
Direct	Direct interaction of an activity with the environment.
Indirect	Impacts on the environment that are not a direct result of the project or activity.
Cumulative	Impacts which may result from a combination of impacts of this project and similar related projects.
Duration	
Short term	Less than 5 years.
Medium term	Between 5-20 years.
Long term	More than 20 years.
Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
Extent	
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
Study area	The proposed site and its immediate environments.
Municipal	Impacts affect the municipality, or any towns within the municipality.
Regional	Impacts affect the wider district municipality or the Eastern Cape Province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
Consequence	
Slight	Slight impacts or benefits on the affected system(s) or party(ies).
Moderate	Moderate impacts or benefits on the affected system(s) or party(ies).
Severe/ Beneficial	Severe impacts or benefits on the affected system(s) or party(ies).
Probability	
Definite	More than 90% sure of a particular fact. Should have substantial supportive data.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.
Reversibility	
Reversible	The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.
Irreversible	The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.
Irreplaceable loss	
Resource will not be lost	The resource will not be lost/destroyed provided mitigation measures are implemented.
Resource will be partly lost	The resource will be partially destroyed even though mitigation measures are implemented.
Resource will be lost	The resource will be lost despite the implementation of mitigation measures.
Mitigation potential	
Easily achievable	The impact can be easily, effectively and cost effectively mitigated/reversed.

Achievable	The impact can be effectively mitigated/reversed without much difficulty or cost.
Difficult	The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.
Very Difficult	The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.

Table 10-2: Description of significance ratings

Significance Rating		Description
LOW NEGATIVE	**LOW POSITIVE**	The impacts on this issue are acceptable and mitigation, whilst desirable, is not essential. The impacts on the issue by themselves are insufficient, even in combination with other low impacts, to prevent the development being approved. Impacts on this particular issue will result in either positive or negative medium to short term effects on the social and/or natural environment.
MODERATE NEGATIVE	**MODERATE POSITIVE**	The impacts on this issue are important and require mitigation. The impacts on this issue are, by themselves, insufficient to prevent the implementation of the project, but could in conjunction with other issues with moderate impacts, prevent its implementation. Impacts on this particular issue will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.
HIGH NEGATIVE	**HIGH POSITIVE**	The impacts on this issue are serious, and if not mitigated, they may prevent the implementation of the project (if it is a negative impact). Impacts on this particular issue would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment, and will result in severe effects or if positive, substantial beneficial effects.

10.3 ASSESSMENT OF CUMULATIVE IMPACTS

In terms of the NEMA EIA Regulations (2014), a cumulative impact is defined 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".

Project induced cumulative impacts should be considered, along with direct and indirect impacts, in order to better inform the developer's decision making and project development process. Cumulative impacts may be categorised into one or more of the following types:

- **Additive:** the simple sum of all the effects (e.g. the accumulation of ground water pollution from various developments over time leading to a decrease in the economic potential of the resource);
- **Synergistic:** effects interact to produce a total effect greater than the sum of individual effects. These effects often happen as habitats or resources approach capacity (e.g. the accumulation of water, air and land degradation over time leading to a decrease in the economic potential of an area);
- **Time crowding:** frequent, repetitive impacts on a particular resource at the same time (e.g. multiple boreholes decreasing the value of water resources);

- **Neutralizing:** where effects may counteract each other to reduce the overall effect (e.g. infilling of a wetland for road construction, and creation of new wetlands for water treatment); and,
- **Space crowding:** high spatial density of impacts on an ecosystem (e.g. rapid informal residential settlement)."

Cumulative impacts are, however, difficult to accurately and confidently assess, owing to the high degree of uncertainty, as well as their often being based on assumptions. It is therefore difficult to provide as detailed an assessment of cumulative impacts as is the case for direct and indirect project induced impacts. This is usually because of the absence of specific details and information related to cumulative impacts. In these situations, the EAP will need to ensure that any assumptions made as part of the assessment are made clear. Accordingly, this includes an overview and analysis of cumulative impacts related to a variety of project actions, and does not provide a significance rating for these impacts, as was done for direct project induced impacts. The objective is to identify and focus on potentially significant cumulative impacts so these may be taken into consideration in the decision-making process. It is important to realise these constraints, and to recognise that the assessment will not, and indeed cannot, be perfect. The potential for cumulative impacts will, however, be considered, rather than omitted from the decision making-process and is therefore of value to the project and the environment.

11 IMPACT ASSESSMENT

The impact assessment identified and assessed impacts across three phases of development:

- Planning & Design Phase;
- Construction Phase; and
- Operational Phase

An impact assessment was conducted based on site visits and information provided by Gibb Engineering and Science relating to the planning, construction and operation phases, as well as the no-go alternative, for the proposed road upgrade. A detailed impact assessment of all the identified impacts is provided in Appendix B. A breakdown of the assessment and mitigation measures is presented in the tables below.

Table 11-1: Summary of general impacts associated with the proposed road upgrade during the planning and design phase.

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
ENVIRONMENTAL POLICY					
Legal and policy compliance	All Alternatives	During the planning and design phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	**HIGH -**	• All relevant legislation and policy must be consulted and the proponent must ensure that the project is compliant with such legislation and policy. • These should include (but are not restricted to): NEMA and Local Municipal bylaws. • All relevant permits and authorisations including Water Use Licences or General Authorisations, Building Plan Approvals and plant removal permits must be in place prior to commencement of construction.	**LOW -**
BUILT ENVIRONMENT					
Infrastructure	All Alternatives	During the planning and design phase, planning and placement of structures and associated infrastructure in sensitive areas could lead to the damage and degradation of natural areas as well as to the structures themselves.	**MODERATE -**	• Planning for and placement of infrastructure must be done so as to avoid sensitive areas as far as possible.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Stormwater management	All Alternatives	During the planning and design phase, inadequate planning for stormwater during the construction and operational phases within the site could result in erosion and contamination of the soil and surrounding watercourses if there are not appropriate stormwater management structures in place.	**MODERATE -**	• A method statement must be developed by the project manager or contractor prior to construction, including considerations for stormwater, erosion, waste and alien vegetation management, as well as site rehabilitation and maintenance considerations. This method statement must be approved by the appointed ECO. • This method statement should include stormwater management considerations to control runoff prevent erosion of the site and its surroundings and mitigate the unnecessary loss of soil and sedimentation of watercourses during all phases of the project. • Regular monitoring of implementation of this method statement for the rehabilitation of disturbed areas must be conducted. • Appropriate stormwater structures, in alignment with the method statement, must be designed to minimise erosion of the surrounding environment to the extent required	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Waste management	All Alternatives	During the planning and design phase, failure to plan for the storage, handling and disposal of general and hazardous waste during the construction and operation phase may lead to littering and pollution of the surrounding environment, unsanitary conditions and health risks.	**MODERATE -**	A method statement must be developed by the project manager or contractor prior to construction, including considerations for stormwater, erosion, waste and alien vegetation management, as well as site rehabilitation and maintenance considerations. This method statement must be approved by the appointed ECO. • This method statement should include waste management considerations for handling onsite general and hazardous waste during the construction and operation phases must be developed and implemented during construction. • An appropriate area must be identified where waste can be stored before disposal. • All hazardous substances such as paints, diesel and cement must be stored in a secure bunded area with an impermeable surface beneath them.	**LOW -**
SOCIO-ECONOMIC					
Job creation	All Alternatives	During the planning and design phase, there will be some temporary job opportunities associated with planning and design of the proposed National Route R56 road rehabilitation.	**HIGH +**	N/A	**HIGH +**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Health and safety	All Alternatives	During the planning and design phase, failure to plan for potential health and safety risks during the construction and operation phase may result in the harm of labourers, staff, surrounding landowners and the public.	**MODERATE -**	A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be drawn up by and HSE officer prior to construction to ensure workers safety.	**LOW -**
On-site fire risk	All Alternatives	During the planning and design phase, failure to plan for accidental fires during the construction and operation phase could result in potential harm to the public and/or surrounding landowners and their property.	**MODERATE -**	• Emergency preparedness must be in place for both the construction and operational phases and before these phases commence. This should form part of the method statement. • SANRAL SOC must plan for and put measures in place to prevent and deal with fires including the provision of firefighting equipment.	**LOW -**
Traffic	All Alternatives	During the planning and design phase, inadequate planning for the transportation of mast materials and specialist construction equipment to the site could cause traffic congestion.	**MODERATE -**	• Consultation with the local Road Traffic Unit should be done early in the planning phase and if deemed necessary, road traffic permits should be obtained for transporting parts, containers, materials and construction equipment to the site to the extent required. • Make provision for traffic accommodation where construction activities impact on existing roads.	**LOW -**
REHABILITATION AND MAINTENANCE					
Inadequate rehabilitation and maintenance	All Alternatives	During the planning and design phase, inadequate planning for rehabilitation and maintenance of infrastructure could lead to degradation of the study area and surrounding areas.	**MODERATE -**	• A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
TERRESTRIAL BIODIVERSITY AND ECOLOGY					
Loss of Vegetation Communities	Preferred Alternative	The removal of existing natural vegetation creates 'open' habitats which favours the establishment of undesirable vegetation in areas that are typically very difficult to eradicate and could pose a threat to surrounding ecosystems.	**MODERATE -**	• All access to the proposed development must be limited to existing access roads and pathways. No ad hoc roadways should be permitted, without first being authorised by the ECO.	**MODERATE -**
Loss of Plant Species of Conservation Concern (SCC)	Preferred Alternative	During the field assessment one (1) protected plant species were recorded within the development footprint, namely *Sensitive Species 1.*	**MODERATE -**	• If any protected plant species are found within the construction footprint, they should be avoided as far as possible if avoidance is not possible, permits must be received before construction commences on site. • No plant species (SCC or common) must be harvested or removed from site without approval from the ECO or Applicant in writing. • If any protected species die during the translocation process, specimen loss must be offset at a ratio of 1:3.	**LOW -**
Fragmentation, Loss of Ecosystem Function and Edge Effects	Preferred Alternative	The project will result in the permanent habitat loss within the footprints of the proposed National Route R56 rehabilitation.	**HIGH -**	Mitigation Measures: • The proposed development footprint must be kept as small as possible and ensure that all non- operational areas are rehabilitate to a suitable condition.	**MODERATE -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		Portions of faunal habitat have already been lost due to existing buildings, roads and bare open ground and trampled field which have little to no surface roughness.	**HIGH -**	• Rehabilitation must extent into the PAOI and not only the proposed development footprint.	**MODERATE -**

Table 11-2: Summary of impacts associated with the proposed road upgrade during the construction phase.

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
ENVIRONMENTAL POLICY					
Legal and policy compliance	All Alternatives	During the construction phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	**HIGH -**	• All construction related conditions in the Environmental Authorisation, EMPr and other permits must be adhered to. • SANRAL SOC must employ an independent Environmental Control Officer (ECO) for the construction phase to ensure that construction is implemented according to specifications in the EA and EMPr. • Copies of all applicable licenses, permits and managements plans (EA, EMPr, etc.) must be available on-site at all times. • Environmental Awareness Training must be included in site meetings/talks with all workers.	**LOW -**
BUILT ENVIRONMENT					
Infrastructure	All Alternatives	During the construction phase, the disturbance/clearing of vegetation and construction activities within or within close proximity to sensitive areas may result in degradation of the surrounding environment.	**MODERATE -**	• Vegetation clearance must be limited to the area within the footprint of the designated area. • Vegetation disturbance outside of the development footprint should be minimized.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Stormwater management	All Alternatives	During the construction phase, failure to implement effective stormwater management measures may result in increased surface soil erosion and contamination of stormwater and resulting surrounding watercourses.	**MODERATE -**	• The construction site must be managed in a manner that prevents pollution to downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. • Berms and swathes must be placed in areas that may be prone to erosion. • Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.	**LOW -**
Waste management	All Alternatives	During the construction phase, poor management of handling, disposal and storage of general and hazardous waste may lead to the pollution of the surrounding environment.	**MODERATE -**	• All general waste must be disposed of in bins/waste skips labelled “general waste”. • Sufficient waste bins must be provided throughout the construction site for collecting waste. • All general waste collected on site must be disposed of at a licensed general waste disposal site. • All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. • Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site. • Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
				• Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages.	
		During the construction phase, the mixing of cement on site could result in ground water contamination from compounds in the cement. In addition, a large number of cement mixing stations on site could increase the presence of impermeable areas which in turn could increase rates of run-off and thereby increase the risk of localized flooding, soil erosion, silting, gully formation, etc.	**MODERATE -**	• Concrete and cement must take place on an impermeable surface, and dried waste concrete and cement must be disposed of with building rubble. • No concrete mixing must take place within 32 m of any watercourse.	**LOW -**
SOCIO-ECONOMIC					
Capital economic investment	All Alternatives	The upgrading of the R56 entails a capital investment in excess of R1 billion, which will benefit the local and national economy in the form of materials production and sales as well as the use of local SMMEs.	**VERY HIGH +**	• N/A	**VERY HIGH +**
Job creation	All Alternatives	During the construction phase, there will be some temporary job opportunities associated with building of the proposed National Route R56 rehabilitation.	**HIGH +**	• N/A	**HIGH +**
Health and safety	All Alternatives	During the construction phase, failure to comply with health and safety policies and protocols may result in the harm of labourers, staff, surrounding landowners and the public.	**MODERATE -**	• A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be adhered to and enforced by a HSE officer to ensure workers safety.	**LOW -**
Air quality and dust control	All Alternatives	During the construction phase, dust generated by construction vehicles and construction activities could result in significant dust during windy conditions.	**MODERATE -**	• During windy periods un-surfaced and un-vegetated areas must be dampened down. • Vegetation must be retained where possible as this will reduce dust travel.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	All Alternatives	During the construction phase poor maintenance and servicing of construction plant and vehicles may result in an increase in vehicle emissions in the areas.	**MODERATE -**	• Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register. • Vehicles and construction plant must be serviced regularly so as to reduce excessive vehicle emissions.	**LOW -**
On-site fire risk	All Alternatives	During the construction phase inadequate attention to fire safety awareness and fire safety equipment could result in uncontrolled fires, posing a threat to animals, vegetation and the surrounding landowners.	**MODERATE -**	In order to reduce the risk of fires: • All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. • Smoking must not be permitted near flammable substances. • All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. • No open fires must be allowed on site. • Fire extinguishers must be available onsite.	**LOW -**
REHABILITATION AND MAINTENANCE					
Inadequate rehabilitation and maintenance	All Alternatives	During the construction phase inadequate provision and implementation of rehabilitation measures may lead to the degradation of the surrounding environment.	**MODERATE -**	The rehabilitation plan must be implemented during and after the construction has been completed.	**LOW -**
TERRESTRIAL BIODIVERSITY AND ECOLOGY					

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of Plant Species of Conservation Concern	Preferred Alternative	During the field assessment one (1) protected plant species were recorded within the development footprint, namely Sensitive Species 1.	**MODERATE -**	• An Erosion Management Plan / Method Statement should be compiled and implemented during the Construction Phase. • If any protected species die during the translocation process, specimen loss must be offset at a ratio of 1:3. • Disturbed areas impacted during construction which do not form part of the road upgrade must be rehabilitated as soon as possible. • The site should be monitored regularly for signs of erosion. Remedial action must be taken at the first signs of erosion.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of faunal species of conservation concern	Preferred Alternative	During the field assessment evidence was observed that several mammal species occur within the study area. One of these species are Species of Conservation Concern (SCC) was observed, namely Redunca fluvoruful. According to Stuarts' Field Guide to Mammals of Southern Africa (2015), forty-eight (48) mammal species have a known distribution within the project area. Of the species listed, five (5) are considered Near Threatened, four (4) are considered Threatened, and one (1) is Data Deficient.	**LOW -**	Species-specific mitigations have therefore been proposed. • No killing of fauna must be tolerated. • The consumption of alcohol should not be tolerated on site. • Environmental awareness training must be conducted by the ECO before any new staff commence with work on site. This must include the adequate identification of the following species: ○ *Aonyx capensis;* ○ *Hydrictis maculicollis;* ○ *Poecilogale albinucha;* ○ *Leptailurus serval;* ○ *Redunca fulvorufula;* ○ *Pelea capreolus;* ○ *Otomys auratus;* ○ *Grammomys dolichurus;* ○ *Mystromys albicaudatus;* and ○ *Dasymys incomtus.* • Any recorded sightings of these species must immediately be reported to the ECO (especially if breeding or nesting nearby). Any nesting activities recorded within the development footprint must result in the immediate cessation of construction activities until instructed to commence again by the ECO and when safe to do so again. • Any recorded mortalities of the aforementioned species should be report	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		The study area was assessed using an active searching technique whereby suitable habitat such as crevices, rocks or boulders, holes in trees and riverbeds were inspected for herpetofauna. At the time of the fieldwork, only a few common species were observed. In addition to active searching during diurnal and nocturnal periods, a desktop assessment was conducted. Although only a few species were observed in-field the study area is still expected to have a moderate herpetofauna diversity and one SCC, namely L. sylvicolus with a total of 27 individual species were recorded within the QGS.	**LOW -**	to the CA and construction should be halted pending an investigation. • Any excavations or holes must be checked regularly for fauna that may have either occupied the area or may fallen in accidentally. The design of deep excavations should consider nearby fauna (especially reptiles). • Construction should not take place during the evening and should be restricted between 07h00 and 16h30. • Any lighting must not point outwards toward any natural habitat and should be focus downwards or towards the development. • All medium to large burrows (>50cm in diameter) must be activity searched. Relocation activities should take place if any animal species are found within a burrow (common or SCC).	**LOW -**
Fragmentation, Loss of Ecosystem Function and Edge Effects	Preferred Alternative	The project will result in the permanent habitat loss within the footprints of the proposed R56 road rehabilitation.	**HIGH -**	Mitigation Measures: • The proposed development footprint must be kept as small as possible and ensure that all non- operational areas are rehabilitated to a suitable condition. • Rehabilitation must extent into the PAOI and not only the proposed development footprint.	**MODERATE -**
		Portions of faunal habitat have already been lost due to existing buildings, roads and bare open ground and trampled field which have little to no surface roughness.	**HIGH -**		**MODERATE -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Invasion of Alien Plant Species	Preferred Alternative	Plant trees within properties (like that of hotel or resorts and municipal properties as well as open spaces which presumable were natural but have deteriorated over the years to form alien plant communities.	**LOW -**	Mitigation Measures: • An Alien Invasive Plant Species Control Plan must be developed by the Contractor and include both construction and operational phase requirements. • No dumping of cleared alien vegetation must be allowed on site. All cleared material must be appropriately disposed of at a registered landfill. • Alien invasive plant control regimes must include the entire site and PAOI.	**LOW -**
Loss of Vegetation Communities	Preferred Alternative	The removal of existing natural vegetation creates 'open' habitats which favours the establishment of undesirable vegetation in areas that are typically very difficult to eradicate and could pose a threat to surrounding ecosystems.	**MODERATE -**	Mitigation Measures: • The construction and operational footprint of the development must not extend past the footprint demonstrated within the proposed development plan. All construction laydown areas should be placed within existing disturbed areas and not within any sensitive habitat located nearby. • All access to the proposed development must be limited to existing access roads and pathways. No ad hoc roadways should be permitted, without first being authorised by the ECO.	**MODERATE -**
HERITAGE AND PALAEONTOLOGICAL RESOURCES					
Loss of archaeological feature	All Alternatives	The study identified no archaeological receptors which will be directly impacted by the proposed project and no impact on archaeological sites or features is anticipated.	**MODERATE -**	Archaeological monitoring of sites during construction phase. Should any significant deposits or artefacts be exposed, small-scale archaeological excavation work will be required which adheres to standard practice and method.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of historically significant building and structures	All Alternatives	The study identified no buildings or structures of historical or heritage significance. For the rest of the study area, the general landscape holds varied significance in terms of the built environment as the area comprises agricultural plots, peri-urban zones, and townlands. However, no impact on built environment sites is anticipated.	**LOW -**	No Mitigation Required	**LOW -**
Alternation of cultural landscape	All Alternatives	The larger area comprises a rich cultural horizon and the natural landscape surrounding the proposed project encompasses transformed open grasslands, hills and river valleys. The cultural landscape holds Stone Age, Colonial Period farmsteads and Historical settlements. However, the proposed project is unlikely to result in a significant impact on the cultural landscape of this area.	**LOW -**	No Mitigation Required	**LOW -**
Loss of paleontological significant remains	All Alternatives	Extensive excavation of topsoil and removal of more than 1.5m of soil cover is planned in this region, these rocks can contain very significant remains of plants and animals that can contribute significantly to the understanding of the palaeo-environments in this part of the Karoo Basin.	**VERY HIGH -**	Monitoring and subject to Phase 1 PIA assessments preferably simultaneous to the timing of initial excavations for construction of the upgrading of the road	**LOW-**

Disturbance to graves/human burial sites	All Alternatives	No human burials were documented in the study area and no impact on human remains is foreseen. It should be noted that graves and cemeteries often occur within settlements or around homesteads in the rural areas of the Eastern Cape, and they are also randomly scattered around archaeological and historical settlements. The probability of informal human burials encountered during development should thus not be excluded. In addition, human remains and burials are commonly found close to archaeological sites; they may be found in "lost" graveyards or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Human remains are usually observed when they are exposed through erosion. In some instances, packed stones or rocks may indicate the presence of informal pre-colonial burials. If any human bones are found during the course of construction work, then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial, they would need to be exhumed under a permit from the SAHRA BGG Unit (for pre-colonial burials as well as burials later than about AD 1500). Should any unmarked human burials/remains be found during the course of construction, work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the SAHRA BGG Unit. Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.	**LOW -**	Human remains are usually observed when they are exposed through erosion. In some instances packed stones or rocks may indicate the presence of informal pre-colonial burials. If any human bones are found during the course of construction work then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial they would need to be exhumed under a permit from SAHRA (for pre-colonial burials as well as burials later than about AD 1500). Should any unmarked human burials/remains be found during the course of construction, work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA). Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
AQUATIC AND WETLAND IMPACTS					
Direct ecosystem modification or destruction / loss impacts	All alternatives	Direct disturbance to river aquatic and riparian habitat for upgrade of the road crossing culverts and bridges. If rehabilitation is undertaken poorly, bank and bed impacts will remain with associated vegetation and alien invasive impacts, which will ultimately contribute to reduced PES and ecosystem services.	**MODERATE -**	**Please refer to Chapter 5 of the Aquatic Biodiversity Baseline Report (Eco Pulse Environmental Consulting Services, 2022) for a full list of recommendations and best practices. All mitigation measures must implemented in conjunction with any generic measures provided in the Environmental Management Programme (EMPr).** The following general mitigation measures have been summarized from the Aquatic and Wetland Report: • **Application of the mitigation hierarchy**, including the avoidance of new watercourse crossings, minimization of impact and remediation measures. • Implementation of **best practice culvert design** recommendations.	**MODERATELY-LOW -**
Indirect hydrological and geomorphological impacts	All alternatives	Erosion and/or sedimentation of aquatic ecosystems due to upslope catchment vegetation clearing and landcover disturbance during construction. Given the overall gentle topography of the site, the risk of erosion and sediment mobilisation can be easily reduced with proper onsite runoff, erosion and sediment management. Erosion and/or sedimentation of aquatic ecosystems due to the physical disturbance of riverbank and bed soils and vegetations during culvert / bridge upgrades at the river crossings. Erosion and/or sedimentation of aquatic ecosystems due to temporary flow diversions during culvert / bridge upgrades at the river crossings.	**MODERATE -**		**MODERATELY-LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Water quality impacts	All alternatives	Pollution of aquatic ecosystems on site and possibly also downslope, due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction (e.g. oil and diesel leaks and spills). Pollution of aquatic ecosystems on site and possibly also downslope, due to the rupture and damaging of sewerage pipelines within the road servitude if careful consideration of the location of existing services is not undertaken. Any erosion leading to sedimentation of streams onsite/downslope could also lead to raised water turbidity and suspended solids concentrations, also affecting water quality.	**MODERATELY-LOW -**	• Implementation of **best practice road stormwater management design** recommendations. • Adherence to the following construction phase mitigation measures in accordance with the Aquatic and Wetland Report: ○ Method statements for culvert / bridge upgrades. ○ Demarcation of 'No-Go' areas and construction corridors. ○ Confirmation and Demarcation of Existing Services. ○ Runoff, erosion and sediment control. ○ Hazardous substances / materials management. ○ Invasive Alien Plant control. ○ Noise, dust and light pollution minimization. ○ Prohibitions related to animals. ○ General rehabilitation guidelines. ○ Construction phase monitoring measures.	**LOW -**
Fragmentation and ecological disturbance impacts	All alternatives	Temporary decrease in riverine ecological connectivity at road crossing culverts / bridges to be upgraded. Expanded / more intense edge impacts could occur as a result of buffer zone encroachment, deterioration in vegetation quality and cover and the potential for increased alien invasive plant invasion due to disturbance causing activities near rivers. However, the majority of the riparian zones are already infested with alien vegetation. Rehabilitation may be beneficial in this regard in terms of alien vegetation removal. Noise pollution and vibrations associated with earthworks and the use of heavy machinery could affect local wildlife (birds, amphibians and small mammals especially).	**MODERATELY-LOW -**		**LOW -**

Table 11-3: Summary of impacts associated with the proposed road upgrade during the operational phase.

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
ENVIRONMENTAL POLICY					
Legal and policy compliance	All Alternatives	During the operation phase, failure to adhere to all permits, authorisations and regulations may lead to financial penalties and closure of the proposed National Route R56 rehabilitation.	**HIGH -**	• The proponent must ensure that operations of the R56 road rehabilitation is compliant with the relevant legislation and policy. • These should include (but are not restricted to): NEMA, EA, EMPr and any other permits/authorisations.	**LOW -**
BUILT ENVIRONMENT					
Infrastructure	All Alternatives	During the operation phase, the National Route R56 will improve road safety, reduce traffic congestion and road accidents.	**MODERATE +**	• Regular maintenance and inspections of all infrastructure and services must be undertaken.	**MODERATE +**
Stormwater management	All Alternatives	During the operation phase, failure of the stormwater system and or lack of maintenance of the stormwater system may result in the erosion and or pollution of the surrounding environment should the stormwater be contaminated.	**MODERATE -**	• Stormwater management measures such as attenuation structures, channels, etc. must be properly maintained and monitored. • If the stormwater management measures put in place are deemed insufficient, a qualified engineer must be approached to assist with additional storm water attenuation mechanisms and remediation.	**LOW -**
SOCIO-ECONOMIC					
Improvement of regional and national transport route	All Alternatives	The operation of the upgraded road will improve regional and national transport routes which will benefit the local and national economy.	**HIGH +**	• N/A	**HIGH +**
Job creation	All Alternatives	During the construction phase, there will be some temporary job opportunities associated with building of the proposed road upgrade of the National Route R56.	**HIGH +**	• N/A	**HIGH +**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Health and safety	All Alternatives	During the construction phase, failure to comply with health and safety policies and protocols may result in the harm of labourers, staff, surrounding landowners and the public.	**MODERATE -**	• A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be adhered to and enforced by a HSE officer to ensure workers safety.	**LOW -**
Air quality and dust control	All Alternatives	During the construction phase, dust generated by construction vehicles and construction activities could result in significant dust during windy conditions.	**MODERATE -**	• During windy periods un-surfaced and un-vegetated areas must be dampened down. • Vegetation must be retained where possible as this will reduce dust travel. • Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register. • Vehicles and construction plant must be serviced regularly so as to reduce excessive vehicle emissions.	**LOW -**
	All Alternatives	During the construction phase poor maintenance and servicing of construction plant and vehicles may result in an increase in vehicle emissions in the areas.			
On-site fire risk	All Alternatives	During the construction phase inadequate attention to fire safety awareness and fire safety equipment could result in uncontrolled fires, posing a threat to animals, vegetation and the surrounding landowners.	**MODERATE -**	In order to reduce the risk of fires: • All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. • Smoking must not be permitted near flammable substances. • All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. • No open fires must be allowed on site. • Fire extinguishers must be available onsite.	**LOW -**
REHABILITATION AND MAINTENANCE					

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Inadequate rehabilitation and maintenance	All Alternatives	During the operation phase inadequate rehabilitation of disturbed areas and lack of maintenance of infrastructure may lead to the degradation of the surrounding environment.	**MODERATE -**	Disturbed areas will be rehabilitated/prepared to allow natural re-vegetation.	**LOW -**
TERRESTRIAL BIODIVERSITY AND ECOLOGY					
Invasion of Alien Plant Species	Preferred Alternative	Failure to rehabilitate and monitor the establishment of alien plant species during the Construction (and Operation Phase) could lead to the spread and infestation of Alien Plant Species during the Operational Phase. Alien plant species often outcompete indigenous vegetation. Therefore, their establishment and spread could result in the loss of indigenous plant species.	**LOW -**	Mitigation Measures: • The site must be checked regularly for the presence of alien invasive species. When alien invasive species are found, immediate action must be taken to remove them. • The ECO must create a list with accompanying photographs of possible alien invasive species that could occur on site prior to construction. This photo guide must be used to determine if any alien invasive species are present. • An Alien Invasive Method Statement/ Management Plan must be compiled and implemented during the Construction and Operational Phase of the proposed project.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Disruption of ecological processes	Preferred Alternative	Sub-Escarpment grasslands are well-adapted to fire, and this is the most important ecosystem process that can be managed to maintain biodiversity and productivity in these ecosystems (SANBI, 2013). The development and expansion of infrastructure such as roads causes the fragmentation of habitats and the disruption of important ecological processes such as seed dispersal and fire as the management focus shifts to fire protection.	**MODERATE -**	Mitigation Measures: None identified. • The applicant only has jurisdiction over their development and not over other developments or activities in the area. As such, it is difficult to implement a fire management plan within the broader landscape to ensure the continuation of important ecological processes.	**MODERATE -**
Loss of Plant Species of Conservation Concern	Preferred Alternative	During the field assessment evidence was observed that several mammal species occur near the study area. One of these species are Species of Conservation Concern (SCC) was observed, namely Sensitive Species 1.	**MODERATE -**	• No plant species (SCC or common) must be harvested or removed from site without approval from the ECO or Applicant in writing. • If any protected species die during the translocation process, specimen loss must be offset at a ratio of 1:3.	**LOW -**
Loss of faunal species of conservation concern	Preferred Alternative	During the field assessment evidence was observed that several mammal species occur within the study area. One of these species are Species of Conservation Concern (SCC), namely Redunca fluvoruful. According to Stuarts' Field Guide to Mammals of Southern Africa (2015), forty-eight (48) mammal species have a known distribution within the project area. Of the species listed, five (5) are considered Near Threatened, four (4) are considered Threatened, and one (1) is Data Deficient.	**LOW -**	Species-specific mitigations have therefore been proposed: • No killing of fauna must be tolerated. • Any lighting must not point outwards toward any natural habitat and should be focus downwards or towards the development.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		The study area was assessed using an active searching technique whereby suitable habitat such as crevices, rocks or boulders, holes in trees and riverbeds were inspected for herpetofauna. At the time of the fieldwork, only a few common species were observed. In addition to active searching during diurnal and nocturnal periods, a desktop assessment was conducted. Although only a few species were observed in-field the study area is still expected to have a moderate herpetofauna diversity, with one SCC, namely L. sylvicolus with a total of 27 individual species were recorded within the QGS	**LOW -**		**LOW -**
Dispersal barrier and/or road mortalities	Preferred Alternative	Operational activities associated with the proposed development (e.g., wider road and increased traffic) can act as a barrier to dispersal and/or result in increased road mortalities. The ecological impacts are dependant on, for example, the current land uses, body size, taxonomy, season etc.	**HIGH-**	• Natural and semi-natural grassland areas, specifically that of East Griqualand Grassland (EN) and Mabela Sandy Grassland, must be avoided as far as feasibly possible during construction. • Where possible, scheme enhancements (e.g., road verges) must be implemented for roadside habitat creation, or the relinking of severed patches and improvement of degraded habitat links.	**MODERATE -**
AQUATIC AND WETLAND					

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Direct ecosystem modification or destruction / loss impacts	All alternatives	Accidental direct impacts to riverine habitat and vegetation by heavy machinery during infrastructure repair and maintenance activities.	**MODERATELY-LOW -**	**Maintenance and management:** • It is the applicant's responsibility to ensure the proper functioning of the road stormwater system. Importantly, the drainage / stormwater management system and related infrastructure is likely to require regular on-going maintenance in the form of the silt and debris/litter clearing, and maintenance and repair of surface drains and/or outlets in order to ensure the optimal functioning of such systems. • It is the applicant's responsibility to ensure the proper functioning of infrastructure that is likely to require regular on-going maintenance. • It is important that the location and extent of the rivers in the vicinity of project activities be incorporated into all formal maintenance and repair plans for the project. • In terms of management, alien invasive plant control must be practiced on an on-going basis in line with the requirements of Section 2(2) and Section 3 (2) the National	**LOW -**
Indirect hydrological and geomorphological impacts	All alternatives	Erosion and/or sedimentation of aquatic ecosystems as a result of the increased hardened surfaces and stormwater discharges from the upgraded stormwater system.	**MODERATE -**		**LOW -**
Water quality impacts	All alternatives	Pollution of onsite and downstream rivers due to the mishandling of hazardous substances and/or improper maintenance of machinery during repair and maintenance activities (e.g. oil and diesel leaks). Pollution of onsite and downstream rivers from contaminated runoff generated by the upgraded road i.e. hydrocarbons, oils and particulate matter. This is however an existing impact. The widening of the road will result in a small increase in road surface with a concomitant small increase in contaminants. Any erosion leading to sedimentation of rivers onsite/downstream could also lead to raised water turbidity and suspended solids concentrations, also affecting water quality.	**MODERATELY-LOW -**		**LOW -**

Fragmentation and ecological disturbance impacts	All alternatives	Expanded / more intense edge impacts could occur as a result of buffer zone encroachment / reduction, deterioration in vegetation quality and cover and the potential for increased alien invasive plant invasion due to disturbance causing activities taking place near the rivers.	**MODERATELY-LOW -**	Environmental Management: Biodiversity Act (NEM:BA), which obligates the landowner/developer to control IAPs on their property. **Monitoring:** • It will be important that long-term monitoring of the potential freshwater ecosystem impacts be undertaken to proactively identity any environmental issues and impacts that may arise as a result of the operational phase of the project. The following key aspects should be monitored: • Erosion and/or sedimentation below stormwater discharge points. • Erosion and/or sedimentation below upgraded road crossing culverts / bridges. • Flow impoundment and/or debris accumulation upstream of the upgraded road crossing culverts / bridges. • Presence of alien invasive plants within areas directly impacted /crossed. **Remediation / Rehabilitation:** Where appreciable direct vegetation/habitat impacts or indirect erosion/sedimentation impacts result from the proposed activity, these impacts must be reported immediately to the relevant environmental authorities, and an independent freshwater ecologist appointed to conduct a site inspection to assess the residual impacts and determine the need for any onsite remediation or rehabilitation requirements. Following this assessment, an implementable	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
				remediation and/or watercourse rehabilitation plan may need to be compiled and implemented to the satisfaction of DWS.	

12 CONCLUSIONS AND RECOMMENDATIONS

This Chapter of the BAR provides a summary of the findings of the proposed rehabilitation of the and a comparative assessment of the positive and negative implications of the proposed project and identified alternatives. In addition, this Chapter provides the EAP's opinion as to whether the activity should or should not be authorised as well as the reason(s) for the opinion.

12.1 DESCRIPTION OF THE PROPOSED ACTIVITY

SANRAL proposes to rehabilitation and upgrade of National Route R56 Section 8, from Matatiele (KM 130.15) passing through Cedarville to the KwaZulu Natal border (KM 168.71) (see Figure 2-1). The project route falls across several farm portions within Wards 19, 20 and 26 of the Matatiele Local Municipality, Eastern Cape Province (Table 2-1). The study area is bordered by the Matatiele town to the west, transects through Cedarville and the KwaZulu Natal border to the east.

This section of National Route R56 consists of a two-lane road that has an average paved width of 7.0 m with gravel shoulders and a 40 m wide road reserve. The general objective of this project is to improve the road in order to relieve congestion to acceptable levels of service, improve road safety, and provide adequate pavement capacity for the design period. The proposed design to implement The proposed road improvement will entail the following: half of the 38.56 km section of the R56 will be resealed or overlaid and the other half rehabilitated; rehabilitation of the existing R56 using the in-situ material as part of the new pavement by adding 3 metre shoulders with a centerline offset of approximately 6 to 7 metres resulting in a two way traffic scenario; rehabilitate the existing R56 using the in-situ material as part of the new pavement by adding 1.5 metres shoulders with a centerline offset of approximately 3 metres resulting in a Stop-Go scenario; reconstructing the R56 on a new off-set alignment (while traffic continues to use the existing R56). This will include the widening of river bridges, major and minor culverts where necessary as well as the extensive relocation of services, e.g. main sewer lines, water lines and electrical overhead lines.

12.2 SUMMARY OF KEY ENVIRONMENTAL FINDINGS

This section provides an overview of the environmental impacts associated with the upgrade with the National Route R56 project route. Table 12-1 provides an overall summary of the negative (cost) and positive (benefit) environmental impacts associated with the proposed upgrade. Overall, the tables above indicates that there are several potential negative impacts (environmental costs) associated with the proposed upgrade. However, the significance of these can be reduced to an acceptable level by implementing appropriate mitigation measures. There are a few positive impacts (benefits) associated with the proposed road upgrade. These relate primarily to the improvement of the road infrastructure and associated safety benefits, and the creation of temporary jobs.

Table 12-1: Summary of impacts before and after mitigation across phases.

THEME	BEFORE MITIGATION					AFTER MITIGATION				
	LOW	MOD LOW	MOD	HIGH	V HIGH	LOW	MOD LOW	MOD	HIGH	V. HIGH
Environmental policy				*-3*		*-3*				
Built environment			*-9(+1)*			*-8*		*(+1)*		
Socio-economic			*-11*	*(+4)*	*(+1)*	*-11*			*(+4)*	*(+1)*
Rehabilitation and maintenance			*-3*			*-3*				
Terrestrial Biodiversity and Ecology	*-6*		*-6*	*-5*		*-10*		*-7*		
Heritage	*-3*		*-1*		*-1*	*-5*				
Aquatic and wetland		*-5*	*-3*			*-6*	*-2*			
Total	-9	-5	-34(+1)	-8 (+4)	-1 (+1)	-46	-2	-7(+1)	(+4)	(+1)

12.3 ASSUMPTIONS, UNCERTAINTIES AND GAPS

The following general assumptions have been made during the BA process:

- The site camp(s) will be established away from sensitive areas on previously transformed areas where possible so as not to trigger additional listed activities.
- Vegetation clearance will be kept to a minimum during the construction phase.
- **Aquatic and Wetland Ecosystem Assessment:**
  - This report deals exclusively with a defined area and the extent and nature of wetland and aquatic ecosystems in that area.
  - Additional information used to inform the assessment was limited to data and GIS coverage's available for the province at the time of the assessment.
  - All field assessments were limited to day-time assessments.
  - At the request of CES the same sample sites used in the 2016 baseline aquatic assessment (GIBB, 2016) were sampled for this present study.
  - During the field visit it was determined by Eco-Pulse that several of the aquatic sampling sites included in 2016 assessment by GIBB were located within wetlands. However, to achieve consistency in this study and the study from 2016, the same aquatic sampling techniques and assessment were employed at each site. This assessment therefore focused on the instream components of all assessed watercourses.
  - This study did not include any watercourse delineations. Sampling focused exclusively on instream aquatic fauna and surface water quality.
  - Sampling by its nature means that not all parts of the study area were visited. The assessment findings are thus only applicable to those areas sampled, which were extrapolated to the rest of the study area. A sampling map from the site visit is displayed in Annexure A.
  - With ecology being dynamic and complex, there is the likelihood that some aspects (some of which may be important) may have been overlooked.
  - Sampling for the baseline aquatic biodiversity assessment in October 2022. One infield visit does not fully cover the seasonal variation in conditions at the site. Nevertheless, seasonality is not a key factor for the target study area surveyed, and no further seasonal surveys will be required.

- The PES and EIS assessments make use of qualitative assessment tools and thus the results are open to professional opinion and interpretation. We have tried to substantiate all claims where applicable and necessary.
- The EIS assessment did not specifically address all the finer-scale ecological aspects of the water resources such as a detailed list of all aquatic fauna likely to occur (i.e., amphibians) within and make use of these systems.

- **Ecological Impact Assessment**
  - The report is based on a project description received from the client.
  - A detailed faunal survey was not conducted. The faunal survey was mainly a desktop study, using information from previous ecological surveys conducted in the area, supplemented by recording animal species and calls that were observed and heard during the site survey ad night drive.
  - Species of Conservation Concern (SCC) are difficult to find and difficult to identify, however, every effort was made to identify SCC likely to occur on site.
  - Sampling could only be carried out at one stage in the annual or seasonal cycle, in this case the survey was conducted in late November (late Spring), the optimal survey period for the Grassland Biome according to the Species Environmental Assessment Guideline (SANBI, 2020). Although the survey falls within the optimal survey period for the Grassland Biome, early and/or late flowering species could have been missed.
  - The site survey was carried out over the course of one (1) day.
  - Sampling could only be conducted from and within the road reserve and not on the neighbouring properties as the specialist did not have access/landowner consent to access to these farms.
  - Despite the abovementioned assumptions and limitations, the time available in the field and information gathered during the survey was sufficient to provide enough information to determine the status of the affected area.

12.4 CONSIDERATION OF ALTERNATIVES

12.4.1 LOCATION ALTERNATIVES

No location alternative are considered, as no deviations are planned, barring minor vertical alignment adjustments (to allow for greater clearance across bridges and rail crossings). These amendments are not anticipated to be significant, and as such are treated as an identical layout to the existing road. Location alternatives are therefore not dealt with further as an upgrade project, by necessity, can only occur on existing infrastructure, and as such no location alternative is available.

12.4.2 LAYOUT ALTERNATIVES

Two layout alternatives were considered, namely:

- Layout Alternative 1: The preferred layout consists of resurfacing, widening and horizontal realignment of the National Route R56 Section 8 road.
- Layout Alternative 2: The layout consists of resurfacing the National Route R56 Section 8 road existing road footprint with no widening or alignment changes.

The resurfacing, widening and realignment layout option was considered the preferred alternative due to the infrastructural, socio-economic and safety benefits.

12.4.3 TECHNOLOGY ALTERNATIVES

Due to a lack of alternative power sources, diesel generators will be used. Precast concrete culverts will be used as opposed to the construction of concrete bridges. The construction of concrete bridges will require specialised skills, as well as the mixing of concrete on site. This will be a time-consuming and expensive activity with increased environmental impacts.

12.4.4 OPERATIONAL ALTERNATIVES

No operational alternatives exist and have been assessed for the R56 Section 8 road.

12.4.5 NO-GO ALTERNATIVE

The no-go alternative refers to the cessation of the project. This would mean the benefits of the project will not materialise (i.e. no job creation, no improved safety), while the negative impacts (biodiversity impacts) will also not materialise. The expectation of increased future traffic along that route, in addition to the benefits obtained through the project, has been evaluated as greater in importance than the expected biodiversity impacts (after mitigation). The no-go alternative is thus not considered the preferred alternative in terms of this development.

12.5 OPINION OF THE EAP

The EAP hereby provides the following opinion concerning the proposed upgrade:

- It is the opinion of CES that **NO FATAL FLAWS** are associated with the proposed rehabilitation of the National Route R56 Section 8 road (KM 130.15 – KM 168.71) and that all impacts can be adequately mitigated to reduce the risk or significance of impacts to an acceptable level, provided all recommendations contained in the specialist reports and Environmental Management Programme are strictly adhered to.
- It is the opinion of CES that the Basic Assessment Report contains sufficient information to allow the competent authority to make an informed decision.
- It is the recommendation of the EAP that the SANRAL National Route R56 Section 8 project can be considered acceptable from an environmental perspective provided that all mitigations as proposed in this report are implemented correctly. Based on the nature and extent of the proposed project, the potential impacts associated with the proposed project can be mitigated to an acceptable level. As such, it can be authorised for the preferred, provided that all mitigation measures as stated below are strictly adhered to. WUL recommendations issued in 2016 with Reference number 27/2/2/T631/1/4 must be read in conjunction with this document.

12.6 RECOMMENDATION OF THE EAP

It is the recommendation of CES that the proposed National Route R56 Section 8 road rehabilitation and upgrade should be approved provided that the proposed mitigation measures are implemented and that the EMPr is implemented, maintained and adapted to incorporate relevant legislation, standard requirements and audit reporting, throughout the life of the development. The mitigation

measures for all impacts identified in the BAR must be incorporated into the EMPr and must be used by the engineers during the detailed Planning & Design Phase, by the contractors during the Construction Phase and by SANRAL during the Operation Phase.

The following recommendations must be included into the final EMPr:

- The project construction site must be demarcated prior to commencement of activities on site. All areas outside the demarcation will be considered as No-Go areas during construction.
- A qualified, independent ECO must be appointed prior to commencement of any activity on site.
- All mitigation measures indicated in this report must be included into the EMPr
- The following Management Plans must be developed prior to clearing and implemented during construction and operations of the proposed development. These management plans include:
    - Storm Water & Contingency Management Plan;
    - Erosion Action Plan;
    - Road verge vegetation maintenance plan;
    - Rehabilitation Management Plan
    - Alien Vegetation Management Plan

The period for which the Environmental Authorisation (if granted) is required is ten years. The activity is permanent, and is therefore not expected to be concluded in the short to medium term.

13 REFERENCES

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14 APPENDICES

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