APPENDIX E –
ENVIRONMENTAL MANAGEMENT PROGRAMME

ENVIRONMENTAL MANAGEMENT PROGRAMME

SANRAL SOC LTD REHABILITATION OF NATIONAL ROUTE R56 SECTION 8 FROM MATATIELE (KM 130,15) TO THE KWAZULU NATAL BORDER (KM 168,71) WITHIN THE MATATIELE LOCAL MUNICIPALITY OF THE ALF, EASTERN CAPE PROVINCE

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LIST OF 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
DFFE	Department of Forestry, Fisheries and the Environment
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GN	Government Notice
IDP	Integrated Development Plan
I&AP	Interested and Affected Party
MEC	Member of the Executive Council
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Area
NDP	National Development Plan
OHL	Overhead Line
PPP	Public Participation Process
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SCC	Species of Conservation Concern
SG	Surveyor General

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1 INTRODUCTION

An Environmental Management Programme (EMPr) must consist of a set of mitigation, monitoring and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan also includes the actions needed to implement these measures.

An EMPr can be defined as, "*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced*". The EMPr is an important tool used to ensure the sound environmental management of projects, provided the specifications are implemented and the user understands the contents of the report and the reasons for the implementation of certain specifications.

The EMPr has the following objectives:

- To state standards and guidelines which are required to be achieved in terms of environmental legislation;
- To set out the mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts and where possible to improve the condition of the environment;
- To provide guidance regarding method statements which are required to be implemented to achieve the environmental specifications;
- To define corrective actions, this must be taken in the event of non-compliance with the specifications; and
- To prevent long-term or permanent environmental degradation.

There are four broad categories of EMPrs: Design EMPr, Construction EMPr, Operational EMPr and Decommissioning EMPr. The objectives of these EMPrs are all the same and include identifying the possible environmental impacts of the proposed activity and developing measures to minimise, mitigate and manage the negative impacts while enhancing the positive ones. The difference between these EMPrs is related to the different mitigation measures required for the different stages of the project life cycle.

1.1 CONSTRUCTION EMPR

The Construction EMPr details the environmental management system/framework within which construction activities will be governed for the Construction Phase. The Construction EMPr consists of various actions, initiatives, and systems (such as a Standard Operating Procedure – SOP, or a Method Statement) that the contractor will have to ensure are in place and are implemented and complied with. The Construction EMPr consists of both a management system (in so far as it explains responsibilities and lines of reporting), and environmental specifications which contain detailed specifications related to achieving specific mitigation measures that will need to be undertaken or adhered to by the contractor.

The Construction EMPr must be developed in parallel with the final design stages, and constructive input must be invited from the selected contractor. This is required not to soften the document, but rather to ensure that the requirements in the Construction EMPr are practical, cost effective and implementable. Sound environmental management is orientated around pragmatic, unambiguous but enforceable guidelines and specifications, and for this reason it is imperative that the contractor, while being bound by the EMPr, fully understands it and has had input into its final development. For this reason, the final construction EMPr will need to be signed off after input from the selected contractor, and prior to the initiation of construction activities. It should, however, be noted that the contractor must tender on the existing document and that in areas of uncertainty, a precautionary approach to the environmental guidelines and specifications must be adopted (by, for example, providing Prime Cost and Provisional Sum amounts).

1.2 OPERATIONAL AND MAINTENANCE EMPR

The operational phase EMPr provides specific guidance related to operational activities associated with a particular development. Operational EMPrs are sometimes referred to as an Environmental Management System (EMS). Impacts during the operational phase of a development of this nature (i.e., OHL) will be few in number and low in intensity. By taking proactive measures during the construction phase, potential operational phase environmental impacts will be minimised. Monitoring of certain issues, such as the stormwater runoff, erosion control and waste management will be necessary in the operational phase. The final Operational EMPr must be developed in conjunction with any other relevant stakeholders prior to the adoption thereof.

1.3 CONTENTS OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

The contents of the *Environmental Management Programme (EMPr)*, as defined the 2014 Environmental Impact Assessment (EIA) Regulations published as Government Notice (GN) No R. 982 (amended in 2021 in GN R 326) and Chapter 5 of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended) is presented in Table 1.1 below.

Table 1.1: Contents of an EMPr

EMPr REQUIREMENTS ACCORDING TO APPENDIX 4 OF THE 2014 EIA REGULATIONS (AS AMENDED IN APRIL 2017)	SECTION OF REPORT
An EMPr must comply with section 24N of the Act and include- *a. Details of:* *i. the EAP who prepared the EMPr; and*	Section 3.5 and Annexure 3
ii. the expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Annexure 3
b. a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Chapter 3
c. a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Annexure 4

EMPr REQUIREMENTS ACCORDING TO APPENDIX 4 OF THE 2014 EIA REGULATIONS (AS AMENDED IN APRIL 2017)	SECTION OF REPORT
d. a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Chapter 4
i. Planning and design	
ii. Pre-construction activities	
iii. Construction activates	
iv. rehabilitation of the environment after construction and where applicable post closure; and	
v. where relevant, operation activities;	
f. description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to -	Section 3.2 – Section 3.4 and Chapter 5
a. avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
b. comply with any prescribed environmental management standards or practices;	
c. comply with any applicable provisions of the Act regarding closure, where applicable; and	
d. comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	
g. the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 5 and Chapter 6
h. the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 6
i. an indication of the persons who will be responsible for the implementation of the impact management actions;	
j. the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	
k. the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	
l. a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	
m. an environmental awareness plan describing the manner in which-	Section 5.2.17
a. the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
b. risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
n. any specific information that may be required by the competent authority.	Nothing specified at this stage

2 BACKGROUND INFORMATION

2.1 PROJECT DESCRIPTION

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 Road 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 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 The general roadworks activities are summarised in Table 2.1.

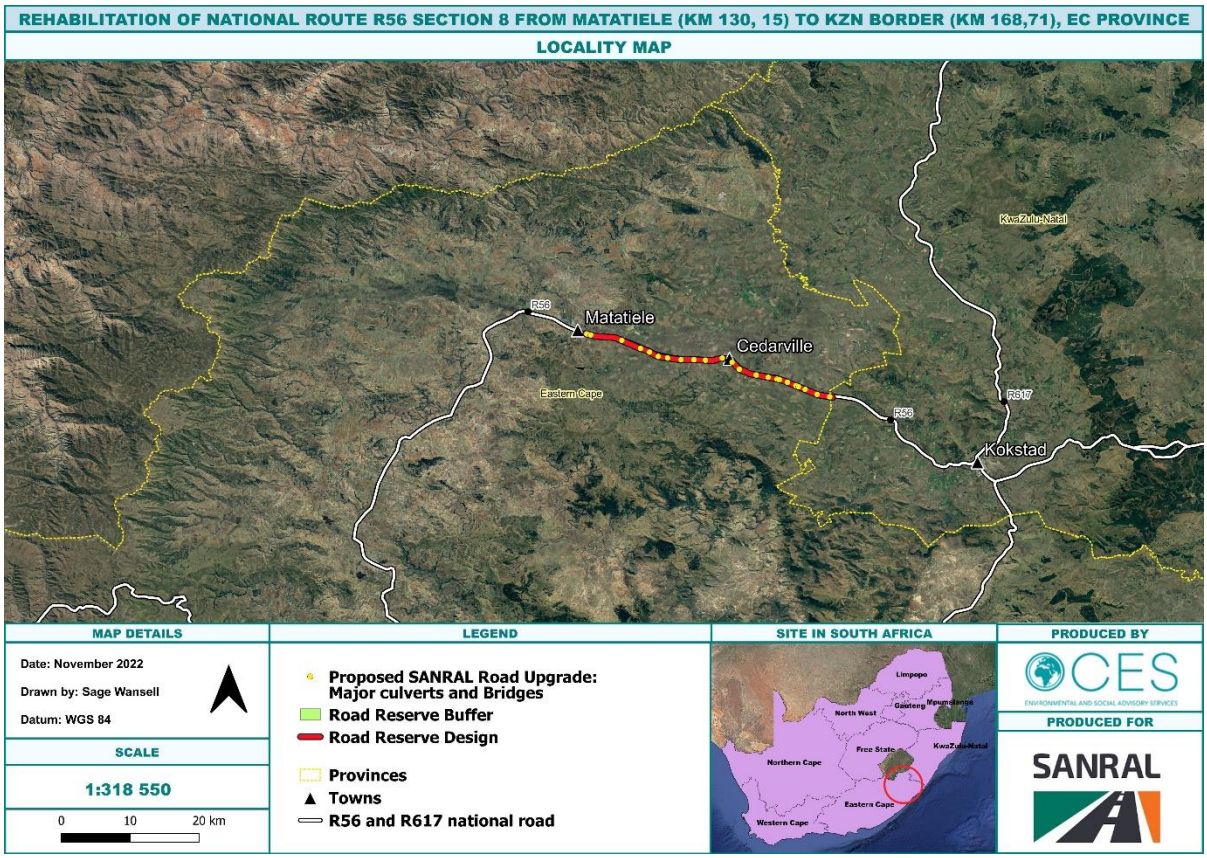

Figure 2.1: Locality map of the proposed SANRAL SOC Ltd National Route R56 Section 8 Study Area.

In terms of the Environmental Impact Assessment (EIA) regulations of 2014 (as amended), the SANRAL 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. R327 and No. 324 respectively). As such, the BA Process needs to be followed.

Table 2.1: Summary of technical details for phase 2A

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.

2.2 ENVIRONMENTAL OBJECTIVES AND TARGETS

In order to meet the commitments detailed within the Environmental Management Policy, as well as those included within the environmental specifications of this EMPr, the contractor must develop environmental objectives and targets. The objectives and targets must conform to, and comply with, the following criteria:

- The objectives and targets must constitute the overall goals for environmental performance identified in the environmental policy and strategy;
- When establishing objectives and targets, the contractor must take into account the identified environmental aspects and associated environmental impacts, as well as the relevant findings from environmental reviews and/or audits;
- The targets must be set to achieve objectives within a specified timeframe;
- Targets must be specific and measurable;
- When the objectives and targets are set, the contractor must establish measurable Key Performance Indicators (KPIs). The latter will be used by the contractor as the basis for an Environmental Performance Evaluation System and can provide information on both the environmental management and the operational systems. Objectives and targets need to apply broadly across the contractor's operations, as well as to site-specific and individual activities; and
- Objectives and targets must be reviewed from time to time in view of changed operational circumstances and/or changes in environmental legal requirements and need to take into consideration the views of the Interested and Affected Parties (I&APs).

This EMPr informs all relevant parties, which are in this case, the Project Coordinator, the Contractor, the Environmental Control Officer (ECO) and all other staff employed by GIBB Engineering and South African National Roads Agency Ltd. (SANRAL) at the site as to their duties in the fulfilment of the legal requirements for the construction and operation of the road upgrade with particular reference to the prevention and mitigation of anticipated potential environmental impacts.

2.3 ENVIRONMENTAL LEGISLATION AND GUIDELINES

Construction must be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the contractor as to their duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project.

The Contractor should note that obligations imposed by the approved EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail. The Contractor shall identify and comply with all South African national and provincial environmental legislation, including associated regulations and all local by-laws relevant to the project. Key legislation currently applicable to the design, construction and implementation phases of the project must be complied with. The list of applicable legislation provided below is intended to serve as a guideline only and is not exhaustive (Table 2.2).

Table 2.2: Relevant legislation applicable to the project

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 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	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
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 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.	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
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). 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:	Riparian zones must be protected, and appropriate steps must be implemented to prevent pollution of water courses and other water resources. Construction/operations within a river, within the regulated area of a watercourse (100 meters from a river), and within	Department of Human Settlements, Water and Sanitation

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
(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: • Cease, modify or control any act or process causing the pollution; • Comply with any prescribed waste standard or management practice;	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
• 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;	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
(e) In terms of an exemption under section 7(1)(b) or 24(6); or 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*	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
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 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

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
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 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.	All health and safety aspects will be adhered to on the site.	Department of Health
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 <u>outdoor</u> 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.	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
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, 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	The need & desirability of the project is in line with the district municipality's IDP	Alfred Nzo District Municipality

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY
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),		
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
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;	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
• 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; • 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.		

2.4 DETAILS OF EAP

Environmental Assessment Practitioner (EAP): Dr Alan Carter
Company: CES Environmental and Social Advisory Services (CES) – East London Office
Report Author – Ms Sinazo Bhengu
EAP address 39 Harewood Dr, Nahoon, East London, 5241
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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.

We adopt a scientific approach to our studies, underpinned by an informed and holistic view of the environment and a pragmatic approach to sustainable development. This results in deliverables that are robust, defensible, and credible. This is important for both the development and EIA processes, and as a result the outputs of our studies demonstrate objectivity, sincerity, and professionalism. We believe that a balance between development and environmental protection can be achieved by skilful and careful planning, and that our outputs reflect this. Our track record across twenty (20) African countries as well as in the Middle East and Asia is evidence of the value add we bring to the environmental and social advisory services we provide and has contributed to our deep understanding of the environmental and social challenges associated with establishing and operating facilities and infrastructure in emerging markets.

Dr Alan Carter
(Role: Principal Environmental Consultant, Environmental Assessments Practitioner [EAP])
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 18 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.

3 IMPACT ASSESSMENT AND MITIGATION SUMMARY

This section provides a summary of the pre-mitigation significance as well as the post-mitigation significance of the social and environmental impacts that may result from the major activities associated with the development.

3.1 SUMMARY OF IMPACTS ASSOCIATED WITH THE DEVELOPMENT

Table 3.1 below shows the significance of the impacts after mitigation is taken into account:

Table 3.1: Summary of impacts and their post mitigation significance

IMPACTS			SIGNIFICANCE RATING OF IMPACTS AFTER MITIGATION
Planning, and design phases			
1.	Environmental policy	Legal and policy compliance	Low -
2.	Built environment	Infrastructure	Moderate -
		Stormwater management	Low -
		Waste management	Low -
3.	Socio-economic	Job creation	High +
		Healthy and Safety	Low -
		On-site fire risk	Low -
		Traffic	Low -
4.	Rehabilitation and maintenance	Inadequate rehabilitation and maintenance	Low -
5.	Terrestrial Biodiversity and Ecology	Loss of vegetation communities	Moderate -
		Loss of Plant Species of Conservation Concern (SCC)	Low -
		Fragmentation, Loss of Ecosystem Function and Edge effects	Moderate -
6.	Heritage and Palaeontological Resources	Loss of archaeological feature	Low -
		Loss of historically significant building and structures	Low -
		Alternation of cultural landscape	Low -

IMPACTS			SIGNIFICANCE RATING OF IMPACTS AFTER MITIGATION
		Loss of paleontological significant remains	Low -
		Disturbance to graves/human burial sites	Low -
Construction phase			
1.	Environmental policy	Legal and policy compliance	Low -
2.	Built environment	Infrastructure	Low -
		Material stockpiling	Low -
		Stormwater management	Low -
		Waste management	Low -
3.	Socio-economic	Job creation	High +
		Health and safety	Low -
		Air quality and dust control	Low -
		On-site fire risk	Low -
4.	Rehabilitation and maintenance	Inadequate rehabilitation and maintenance	Low -
5.	Terrestrial biodiversity and ecology	Loss of Plant Species of Conservation Concern	Low -
		Loss of Faunal Species of Conservation Concern	Low -
		Fragmentation, Loss of Ecosystem Function and Edge Effects	Moderate -
		Invasion of Alien Plant Species	Low -
		Loss of Vegetation Communities	Moderate -
6.	Heritage and cultural resources	Loss of archaeological feature	Low -
		Loss of historically significant building and structures	Low -
		Alternation of cultural landscape	Low -
		Disturbance to graves/human burial sites	Low -
7.	Aquatic and Wetland impact	Direct ecosystem modification or destruction / loss impacts	Moderately Low -
		Indirect hydrological and geomorphological impacts	Moderately Low -
		Water quality impacts	Low -
		Fragmentation and ecological disturbance impacts	Low -
Operation phase			

IMPACTS			SIGNIFICANCE RATING OF IMPACTS AFTER MITIGATION
1.	Environmental policy	Legal and policy compliance	Low -
2.	Built environment	Infrastructure	Moderate +
		Stormwater management	Low -
3.	Socio-economic	Job creation	High +
		Loss of agricultural job opportunities	Low -
		Health and Safety	Low -
4.		Air quality and dust control	Low -
		On-site fire risk	Low -
5.	Rehabilitation and maintenance	Inadequate rehabilitation and maintenance	Low -
6.	Terrestrial biodiversity and ecology	Invasion of Alien Plant Species	Low -
		Loss of Vegetation Communities	Moderate -
		Loss of Plant Species of Conservation Concern	Low -
		Loss of Faunal Species of Conservation Concern	Low -
7.	Aquatic and Wetland impact	Direct ecosystem modification or destruction / loss impacts	Low -
		Indirect hydrological and geomorphological impacts	Low -
		Water quality impacts	Low -
		Fragmentation and ecological disturbance impacts	Low -

3.2 SUMMARY OF MITIGATION MEASURES

Table 3.2 - Table 3.3 below shows the mitigation measures which must be applied in order to negate and/or reduce each of the various impacts:

Table 3.2: Mitigation measures associated with each impact during design, planning and construction phase

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		
LEGAL AND POLICY COMPLIANCE	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.	• 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.
INFRASTRUCTURE	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.	• 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.
MATERIAL STOCKPILING	During the construction phase, inappropriate location and management of material stockpiles may result in erosion.	• Material stockpiles must be located away from sensitive areas and they must be monitored for erosion and alien vegetation. • Material stockpile locations must be approved by the ECO.

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		
STORMWATER MANAGEMENT	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.	• 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.
WASTE MANAGEMENT	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.	• 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. • 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.	• 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.

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		
CAPITAL ECONOMIC INVESTMENT	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.	• N/A
JOB CREATION	During the construction phase, there will be some temporary job opportunities associated with building of the proposed National Route R56 rehabilitation.	• N/A
HEALTH AND SAFETY	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.	• 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.
AIR QUALITY AND DUST CONTROL	During the construction phase, dust generated by construction vehicles and construction activities could result in significant dust during windy conditions. During the construction phase poor maintenance and servicing of construction plant and vehicles may result in an increase in vehicle emissions in the areas.	• 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.

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		
ON-SITE FIRE RISK	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.	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.
INADEQUATE REHABILITATION AND MAINTENANCE	During the construction phase inadequate provision and implementation of rehabilitation measures may lead to the degradation of the surrounding environment.	The rehabilitation plan must be implemented during and after the construction has been completed.
LOSS OF PLANT SPECIES OF CONSERVATION CONCERN	During the field assessment one (1) protected plant species were recorded within the development footprint, namely Sensitive Species 1.	• 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.

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		

LOSS OF FAUNAL SPECIES OF CONSERVATION CONCERN	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 Sensitive Species 2.
	
	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.
		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;*
		  ○ *Sensitive Species 2;*
		  ○ *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 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.

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		
	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 Sensitive Species 3 with a total of 27 individual species were recorded within the QGS.	• 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).
FRAGMENTATION, LOSS OF ECOSYSTEM FUNCTION AND EDGE EFFECTS	The project will result in the permanent habitat loss within the footprints of the proposed R56 road rehabilitation. 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.	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.

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		
INVASION OF ALIEN PLANT SPECIES	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 which is mirrored throughout the site, especially in the south.	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.
LOSS OF VEGETATION COMMUNITIES	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.	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.
LOSS OF ARCHAEOLOGICAL FEATURE	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**.**	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.
LOSS OF HISTORICALLY SIGNIFICANT BUILDING AND STRUCTURES	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**.**	No Mitigation Required

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		
ALTERNATION OF CULTURAL LANDSCAPE	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.	No Mitigation Required
LOSS OF PALEONTOLOGICAL SIGNIFICANT REMAINS	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.	Monitoring and subject to Phase 1 PIA assessments preferably simultaneous to the timing of initial excavations for construction of the upgrading of the road

DISTURBANCE TO GRAVES/HUMAN BURIAL SITES	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	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.

	statutory procedures required for grave relocation have been met.	

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		

DIRECT ECOSYSTEM MODIFICATION OR DESTRUCTION / LOSS IMPACTS	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.	**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.
		• 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.

INDIRECT HYDROLOGICAL AND GEOMORPHOLOGICAL IMPACTS	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.	

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		
WATER QUALITY IMPACTS	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.	○ Construction phase monitoring measures.

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
PLANNING AND DESIGN PHASE		
FRAGMENTATION AND ECOLOGICAL DISTURBANCE IMPACTS	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).	

Table 3.3: Summary of mitigation measures associated with the operational phase

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
OPERATIONAL PHASE		
LEGAL AND POLICY COMPLIANCE	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.	• 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.
INFRASTRUCTURE	During the operation phase, the R56 road rehabilitation will improve road safety, reduce traffic congestion and road accidents.	• Regular maintenance and inspections of all infrastructure and services must be undertaken.
STORMWATER MANAGEMENT	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.	• 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.
IMPROVEMENT OF REGIONAL AND NATIONAL TRANSPORT ROUTE	The operation of the upgraded road will improve regional and national transport routes which will benefit the local and national economy.	• N/A
HEALTH AND SAFETY	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.	• 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.

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
OPERATIONAL PHASE		
INADEQUATE REHABILITATION AND MAINTENANCE	During the operation phase inadequate rehabilitation of disturbed areas and lack of maintenance of infrastructure may lead to the degradation of the surrounding environment.	Disturbed areas will be rehabilitated/prepared to allow natural re-vegetation.
INVASION OF ALIEN PLANT SPECIES	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.	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.
DISRUPTION OF ECOLOGICAL PROCESSES	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.	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.
LOSS OF PLANT SPECIES OF CONSERVATION CONCERN	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.	• 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.

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
OPERATIONAL PHASE		
LOSS OF FAUNAL SPECIES OF CONSERVATION CONCERN	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 Sensitive Species 2. 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.	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.
	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 Sensitive Species 3 with a total of 27 individual species were recorded within the QGS	

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
OPERATIONAL PHASE		
DISPERSAL BARRIER AND/OR ROAD MORTALITIES	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.	• 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.
DIRECT ECOSYSTEM MODIFICATION OR DESTRUCTION / LOSS IMPACTS	Accidental direct impacts to riverine habitat and vegetation by heavy machinery during infrastructure repair and maintenance activities.	**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.
INDIRECT HYDROLOGICAL AND GEOMORPHOLOGICAL IMPACTS	Erosion and/or sedimentation of aquatic ecosystems as a result of the increased hardened surfaces and stormwater discharges from the upgraded stormwater system.	

ACTIVITY		MITIGATION AND/OR MANAGEMENT MEASURES
OPERATIONAL PHASE		
WATER QUALITY IMPACTS	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.	• 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 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 remediation and/or watercourse rehabilitation plan may need to be compiled and implemented to the satisfaction of DWS.
FRAGMENTATION AND ECOLOGICAL DISTURBANCE IMPACTS	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.	

4 ENVIRONMENTAL MANAGEMENT SYSTEM

4.1 REPORTING

4.1.1 ADMINISTRATION

Before the contractor begins construction in sensitive areas (e.g. river crossings and areas of indigenous vegetation), the Contractor must give the ECO and engineer a written method statement setting out the following:

- The type of construction activity;
- Locality where the activity will take place;
- Identification of impacts that might result from the activity;
- Identification of activities or aspects that may cause an impact;
- Methodology and/or specifications for impact prevention for each activity or aspect;
- Methodology and/or specific actions for impact containment for each activity or aspect;
- Emergency/disaster incident and reaction procedures; and
- Treatment and continued maintenance of impacted environment.

The contractor must provide such information in advance of any or all construction activities provided that new submissions will be given to the ECO and/or engineer whenever there is a change or variation to the original. The ECO and/or engineer must provide comment on the methodology and procedures proposed by the Contractor, but he must not be responsible for the contractor's chosen measures of impact mitigation and emergency/disaster management systems. However, the contractor must demonstrate at inception and at least once during the contract that the approved measures and procedures function properly. An example of a Method Statement is provided in Annexure 1.

4.1.2 RECORD KEEPING

The engineer and the ECO will monitor the contractor's adherence to the approved impact prevention procedures and the engineer must issue to the contractor a notice of non-compliance whenever transgressions are observed. The ECO must document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The non-compliance must be documented and reported to the engineer in the monthly report. These reports must be made available to the authorities when requested.

The Contractor must ensure that an electronic filing system identifying all documentation related to the EMPr is established. A list of reports likely to be generated during all phases of the project is provided below, and all applicable documentation must be included in the environmental filing system catalogue or document retrieval index:

- Environmental Management Programme;
- Final design documents and diagrams issued to and by the Contractor;

- All communications detailing changes of design/scope that may have environmental implications;
- Complaints register;
- Medical reports;
- Incident and accident reports;
- Emergency preparedness and response plans;
- Copies of all relevant environmental legislation;
- All relevant permits; and
- All method statements from the Contractor for all phases of the project.

4.1.3 DOCUMENT CONTROL

The Contractor and resident engineer must be responsible for establishing a procedure for electronic or hard copy document control. The document control procedure must comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person;
- Every document must identify the personnel and their positions, who drafted and compiled the document, who reviewed and recommended approval, and who finally approved the document for distribution; and
- All documents must be dated, provided with a revision number and reference number, filed systematically, and retained for a five year period.

The Contractor must ensure that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations essential to the functioning of the EMPr are performed.

4.2 CONSTRUCTION PHASE

4.2.1 CLEARING OF THE SITE

In all areas where the contractor intends to, or is required to clear the natural vegetation and soil, either within the construction area, or at designated or instructed areas outside the construction area, a method statement must first be submitted to the ECO for his approval. The EMPr must contain a photographic record and change/land reference of the areas to be disturbed. This must be submitted to the engineer and ECO for their records before any disturbance/stockpiling can occur. The record must be comprehensive and clear, allowing for easy identification during subsequent inspections.

The contractor must be responsible for the re-vegetation within the development boundaries for all areas disturbed during construction. This includes, for example, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for, or from, road construction has to be stored temporarily or otherwise within the construction area, or at designated or instructed areas outside the construction area. This responsibility must extend until expiry of the defects notification period.

4.2.2 EXCAVATION, HAULING AND PLACEMENT

The contractor must provide the engineer with detailed plans of his intended construction processes prior to starting any cut or fill or layer. The plans must detail the number of personnel and plant to be used and the measures by which the impacts of pollution (noise, dust, litter, fuel, oil and sewage), erosion, vegetation destruction and deformation of landscape will be prevented, contained and rehabilitated. The contractor must demonstrate his "good housekeeping", particularly with respect to closure at the end of every day so that the site is left in a safe condition from rainfall overnight, or over periods when there is no construction activity.

4.2.3 CONSTRUCTION ACTIVITIES AND EQUIPMENT

- Construction will be restricted to daytime working hours;
- All noise-making equipment must be turned off when not in use;
- All equipment must be kept in good working order;
- All equipment must be operated within specifications and capacity (i.e. do not overload machines);
- Compliance with the appropriate legislation with respect to noise is mandatory;
- The Contractor will familiarise himself with, and adhere to, any local bylaws and regulations regarding the generation of noise;
- Construction staff must be given "noise sensitivity" training;
- The Contractor will endeavour to keep noise generating activities associated with construction activities to a minimum;
- Modern low noise emission vehicles and equipment must be favoured on site; and
- A well planned and co-ordinated "fast track" procedure is implemented to complete the total construction process in the area in the shortest possible time.

4.2.4 GOOD HOUSEKEEPING

The contractor must undertake "good housekeeping" practices during construction. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods that leave the area in a safe state and must also include the care for and preservation of the environment within which the site is situated.

4.2.5 SOLID WASTE MANAGEMENT

- No on-site burning, burying or dumping of any waste materials, litter or refuse must occur.
- The Contractor must provide vermin and weatherproof bins with lids of sufficient number and capacity to store the solid waste produced on a daily basis. The lids must be kept firmly closed on the bins at all times.
- Bins must not be allowed to become overfull and must be emptied at least once a day.
- The waste from bins must be temporarily stored on site in a central waste area that is weatherproof and scavenger-proof, and which the ECO has approved.

- Recyclable waste must be disposed of into separate skips/bins and removed off-site for recycling.
- All solid waste must be disposed of at the existing waste site on the farm.
- Any hazardous waste will need to be disposed of off-site at an approved registered landfill site. The Contractor must supply the ECO with the appropriate disposal certificates.
- The Contractor must submit a solid waste management plan as part of the Pollution Control Method Statement to the ECO.

4.2.6 WATER USE

- All sources of water for construction purposes must be sourced from existing, approved water supply points located on the farm. It is recommended that borehole water be made available.
- Where possible all wash water will be recycled for use, as wash water again or for dust suppression where applicable.

4.2.7 CONTAMINATED WATER

- No machinery must be parked overnight within 50 m of the rivers/wetlands.
- All stationary machinery must be equipped with a drip tray to retain any oil leaks.
- Chemicals used must be stored safely on bunded surfaces in the site camp.
- Cement mixing must take place on a contained and impermeable surface, must it be undertaken on site.
- Emergency plans, and spill kits, must be in place in case of accidental spillages on site.
- No ablution facilities must be located within 50 m of any river or wetland system.
- Chemical toilets must be regularly maintained/ serviced to prevent ground or surface water pollution.
- Any hazardous substances/waste must be stored in impermeable bunded areas or secondary containers 110% the volume of the contents within it.
- All general waste temporarily stored on site must be done so in windproof/sealable containers before being disposed of at a registered landfill site.
- Construction materials and chemicals that could be a potential pollutant of any kind and in any form must be kept, stored, and used in such a manner that any escape can be contained and that the water table and surface water is not endangered. Water containing pollutants such as chemicals, washing detergents, sewerage, fuels, paints, solvents and hydrocarbons must be contained and discharged into an impermeable storage facility for removal from the site or for recycling. This particularly applies to runoff from fuel depots/workshops/truck washing areas.
- Wash down areas must be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted. The Contractor must notify the ECO immediately of any pollution incidents on Site.
- As part of the Pollution Control Method Statement, the Contractor must submit a plan to the ECO detailing how the contaminated water will be managed on site.

4.2.8 HAZARDOUS SUBSTANCES

- The transportation and handling of hazardous substances must comply with the provisions of the Hazardous Substances Act (Act No.187 of 1993) and associated regulations as well as SABS 0228 and SABS 0229.
- The Contractor must also comply with all other applicable regional and local legislation and regulations with regard to the transport, use and disposal of hazardous substances. Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) used during construction must be stored in secondary containers. The relevant Material Safety Data Sheets (MSDS) must be available on site. Procedures detailed in the MSDSs must be followed in the event of an emergency situation.
- The Contractor must be responsible for the training and education of all personnel who will be handling hazardous materials about their proper use, handling and disposal.
- If potentially hazardous substances are to be stored or used on site, the Contractor must submit a Method Statement to the ECO detailing the substances / materials to be used, together with the transport, storage, handling and disposal procedures for the substances.

4.3 CEMENT AND MIXING OF CONCRETE

- The proposed location of cement mixing areas (including the location of cement stores and sand and aggregate stockpiles) must be indicated on the site layout plan and approved by the ECO.
- All wastewater generated from the operation and cleaning of concrete mixing equipment and other sources of concrete must be passed through a concrete wastewater settlement system. The water from this system must not be allowed to flow into any “no go” area or water course but must permeate through the ground before it reaches any such water course. The accumulated sludge in the settlement system must be regularly cleaned out and appropriately disposed of as solid waste.
- The Contractor must ensure that minimal water is used for washing of concrete and cement mixing equipment.
- Washing and cleaning of equipment must also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion.
- Used cement bags must be disposed of in weatherproof bins on site to prevent the generation of wind-blown cement dust, and the bags from blowing away.
- During construction, the contractor must ensure that concrete is mixed on mortar boards, and that all visible remains of concrete are removed and disposed of as waste, and that all surplus aggregate is removed.
- As part of the Pollution Control Method Statement, a plan detailing all actions to be taken to comply with these requirements must be submitted to the ECO.

4.3.1 FUEL (PETROL AND DIESEL) AND OIL

4.3.1.1 Fuel Storage

- All fuels and oil must be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination into nearby rivers or drainage lines. These sites must be re-vegetated after construction has been completed.
- The location of the fuel storage area will be approved by the ECO. All necessary approvals with respect to fuel storage and dispensing must be obtained from the appropriate authorities. Symbolic safety signs depicting “No Smoking”, “No Naked Lights” and “Danger” conforming to the requirement of SABS 1186 must be prominently displayed in and around the fuel storage area. There must be adequate fire-fighting equipment at the fuel storage area.
- The Contractor must ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and under lock and key at all times. The capacity of the tank must be clearly displayed and the product contained within the tank clearly identified using the emergency information system detailed in SABS 0232 part 1. Fuel storage tanks must have a capacity not exceeding 9 000 litres and must be kept on site only for as long as fuel is needed for construction activities, on completion of which they must be removed.
- Tanks on site must not be linked or joined via any pipe work, but must remain as separate entities. The tanks must be situated on a smooth impermeable base with a bund. The volume inside the bund must be 110% of the total capacity of the largest storage tank. The base must be constructed of concrete, or of plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The impermeable lining must extend to the crest of the bund. The floor of the bund must be sloped to enable any spilled fuel and/or fuel-contaminated water to be removed. Appropriate material, approved by the ECO that absorbs / breaks-down or encapsulates minor hydrocarbon spillage and which is effective in water must be installed in the sump. Contaminated soil must be taken off site to a disposal site approved by the ECO, and the material that absorbs / breaks-down or encapsulates minor hydrocarbon spillage must be replenished.
- Only empty and externally clean tanks can be stored on the bare ground. Empty and externally dirty tanks must be sealed and stored in an area where the ground has been protected.
- Adequate precautions must be provided to prevent spillage during the filling of any tank and during the dispensing of the contents. The dispensing mechanism for the fuel storage tanks must be stored in a waterproof container when not in use.
- As part of the required site layout for the construction camp, a plan must be submitted to the ECO detailing the design, location and construction of the fuel storage area as well as for the filling and dispensing from storage tanks; and for the type of absorbing / breaking-down or encapsulating material to be used.

4.3.1.2 Refuelling

- Where reasonably practical, the plant must be refuelled at a designated re-fuelling area/depot or at a workshop as applicable. If this is not reasonably practical then the surface under the refuelling area must be protected and appropriately bunded against pollution to the reasonable satisfaction of the ECO prior to any refuelling activities.
- Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any drainage line or waterbody.
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment must be used, and the drum must not be tipped in order to dispense fuel. The Contractor must ensure that the appropriate fire-fighting equipment is present during refuelling operations.
  The Contractor must ensure that there is always a supply of absorbent material readily available to absorb/breakdown or where possible, be designed to encapsulate minor hydrocarbon spillages. The quantities of such materials must be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill.

4.3.1.3 Used oil and hydrocarbon contaminated materials

- Used oil must be stored at a central location on site prior to removal off site for disposal at an approved disposal or recycling site.
- Old oil filters and oil, petrol and diesel-soaked material must be treated as hazardous waste. The Contractor must remove all oil, petrol, and diesel-soaked sand immediately and must dispose of it as hazardous waste or treat it on site with material that breaks-down or encapsulates such spillages, as approved by the ECO.

4.3.2 ABLUTION FACILITIES

- Washing, whether of the person or of personal effects, and acts of excretion and urination are strictly prohibited other than at the facilities provided. The Contractor must provide the necessary ablution facilities for all his personnel prior to the commencement of work and must ensure that his personnel make use of the facilities.
- Toilet facilities must be supplied by the Contractor for the workers at a ratio of at least 1 toilet per 20 workers in areas approved by the ECO. Every 1-man urinal will be taken as supplying the equivalent of 5 men in addition to the 20 men per toilet on site. No toilets will be erected within 20 m of any “no go” areas. Toilets must be situated within 200m of any area where work is taking place in numbers sufficient to meet the ratio depicted above for the workers in the area.
- The facilities must be maintained in a hygienic state and serviced regularly. Toilet paper must be provided. Temporary / portable toilets must be secured to the ground to prevent them toppling due to wind or any other cause, to the satisfaction of the ECO.
- Discharge into the environment and burial of waste is strictly prohibited. The Contractor must ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site. Toilets must be emptied before the Contractors’ holidays or any other temporary site closure.

4.3.3 EATING AREAS

- The Contractor must designate eating area(s), subject to the approval of the ECO. No cooking is allowed outside of the Contractor's camp area on site.
- At meal times all workers must eat in designated eating areas. These areas must have shade for the workers. The eating areas must be in existing structures or in temporary / transportable structures that must be well constructed using wood or metal for the frame and screened on the top and sides with shade cloth/canvas or other material to the satisfaction of the ECO. These areas must be well demarcated and in locations approved by the ECO and must not be within 20 m of any "no go" areas, on or adjacent to the site.
- Sufficient bins must be present in these areas. All disposable food packaging must be disposed of in the bins after every meal.
- The area must be cleaned after every meal.
- The feeding or leaving of food for animals is strictly prohibited.

4.3.4 SITE STRUCTURES

- All site establishment components (as well as equipment) must be positioned to limit visual intrusion on neighbours and the size of the land area disturbed. The type and colour of roofing and cladding materials to the Contractor's temporary structures must be selected to reduce reflection.
- The Contractor must supply and maintain adequate and suitable sheds for the storage of materials. Sheds for the storage of materials that may deteriorate or corrode if exposed to the weather must be weatherproof, adequately ventilated and provided with raised floors.

4.3.5 LIGHTS

- The Contractor must ensure that any lighting installed on the site for his activities does not cause a reasonably avoidable disturbance to the naturally occurring fauna.

4.3.6 NOISE

- The Contractor must take precautions to minimise noise generated on site (e.g. install and maintain silencers on machinery).
- The Contractor must comply with the Noise Induced Hearing Loss Regulations published under the Occupational Health and Safety Act.
- Appropriate directional and intensity settings are to be maintained on all hooters and sirens.
- Work will be limited to daylight hours
- No amplified music must be allowed on site. The Contractor must not use sound amplification equipment on Site unless in emergency situations.

4.3.7 DUST CONTROL

- Dust generated during the construction phases must comply with the National Dust Control Regulations (GN No. R. 827 of 1 November 2013), promulgated in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004). These regulations prohibit a person from conducting any activity in such a way as to give rise to dust in such quantities and concentrations that the dust, or dust fall, has a detrimental effect on the environment, including health.
- The Contractor will be responsible for the continued control of dust arising from his operations. The Contractor must take all reasonable measures to minimize the generation of dust as a result of construction activities to the satisfaction of the ECO.
- Given that the site is located within a water scarce region, commercial dust binders (such as Hydropam or Dustex), planting of cleared space, rotovating straw bales, and scheduling of dust-generating activities must be the preferred mitigation measures for alleviating dust. The use of water for spraying and dampening must be used as a last resort. Potable water must not be used.
- Damping of all gravel haul and access roads (if constructed) with water or binding with a commercial dust binder must be ongoing. Should dust still be a problem on any specific road, the allowable speed will be reduced to 20km/h. If dust is still a problem the road must be treated with a commercial dust binder, as required, to form a cohesive layer that will control the dust on the road.
- Where recycled water is to be used, this must be of a suitable quality so as not to cause any severe/repeated pollution to soil or surface water resources.
- Areas that are to have the topsoil stripped for construction purposes must be limited, and only stripped when work is about to take place.
- Other activities and situations that could result in a dust nuisance include: site clearance and other earth moving operations, open cleared space, stockpiles of topsoil or sand and activities associated with concrete mixing.
- The appropriate health and safety equipment (e.g. dust masks) must be worn by workers during the phases of dust-producing construction activity.
- During periods of strong winds, construction work which tends to produce large amounts of dust must be paused until such a time that the wind subsides.

4.3.8 ENVIRONMENTAL AWARENESS TRAINING

- An environmental awareness induction training course must be run for all personnel on site (See Annexure 2 for a proposed Basic Environmental Education Course). The course must be run in the morning during normal working hours at a suitable venue provided by the Contractor. All attendees must remain for the duration of the course and sign an attendance register on completion that clearly indicates participant's names, a copy of which must be handed to the ECO.
- The environmental awareness training course for site staff and labour must be presented by the Contractor's SHE Officer from material provided by the ECO unless otherwise required by the Project Specification. The course will be approximately one-hour long.

- Notwithstanding the specific provisions of this clause it is incumbent upon the Contractor to convey the sentiments of the EMPr to all personnel and Subcontractors involved with the Works.

4.3.8.1 Construction personnel information posters

- The Contractor must erect and maintain information posters for the information of his employees depicting actions to be taken to ensure compliance with the Environmental EMPr. Construction personnel information posters must be laminated and erected in all eating areas, workshops and site offices. The Contractor must ensure that the construction personnel information posters are not damaged in any way, and must replace them if any part becomes illegible.
- Examples of these posters will be supplied to the Contractor by the ECO in electronic format.

4.3.9 FIRE CONTROL

- The Contractor must take all the necessary precautions to ensure that fires are not started as a result of his activities on site.
- No open fires must be permitted on the site.
- Smoking must not be permitted in those areas where there is a fire hazard. Such areas must include the workshop and fuel storage areas and any areas where the vegetation or other material could support the rapid spreading of an initial flame.
- The Contractor must appoint a Fire Officer who must be responsible for ensuring immediate and appropriate actions in the event of a fire and must ensure that employees are aware of the procedures to be followed. The Contractor must forward the name of the Fire Officer to the ECO for his approval within 7 days of being on site.
- The Contractor must ensure that there is basic fire-fighting equipment available on site at all times. This must include at least rubber beaters when working in natural areas, at least one fire extinguisher of the appropriate type in the mess and cooking area, and at least one fire extinguisher of the appropriate type when welding or other “hot” activities are undertaken.
- The Contractor must be liable for any expenses incurred by any organisations called to assist with fighting fires that were started as a result of his activities or personnel, and for any cost relating to the rehabilitation of burnt areas, or consequential damages.

4.3.10 EMERGENCY PROCEDURES

- Emergency procedures, including the names and contact details of responsible personnel and emergency services must be made available to all staff and must be clearly displayed at relevant locations at the site. The Contractor must advise the ECO of any emergencies on site, together with a record of action taken, within 24 hours of the emergency occurring.
- Telephone numbers of emergency services must also be posted conspicuously in the Contractor’s office near the telephone.
- The Contractor must submit a Method Statement covering the procedures for the following emergencies:

4.3.10.1 Fire

- The Contractor must advise the relevant authority of a fire as soon as one starts and must not wait until he can no longer control it.
- The Contractor must ensure that his employees are aware of the procedures to be followed in the event of a fire.

4.3.10.2 Accidental leaks and spillages

- The Contractor must ensure that his employees are aware of the procedures to be followed for dealing with spills and leaks, which must include notifying the ECO and the relevant authorities. The Contractor must ensure that all the necessary materials and equipment for dealing with spills and leaks are available on site at all times. Treatment and remediation of the spill areas must be undertaken to the reasonable satisfaction of the ECO.
- In the event of a hydrocarbon spill, the source of the spillage must be isolated and the spillage contained. The area must be cordoned off and secured. The Contractor must ensure that there is always a supply of absorbent material readily available to absorb/ breakdown or where possible, be designed to encapsulate minor hydrocarbon spillages. The quantities of such materials must be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill.
- Any spills must be cleared and the contaminated soil/sludge disposed of in an appropriate manner, approved by the ECO, or at a licensed hazardous waste disposal site.
- in accordance with section 30 of the NEMA, 1998, in the event of a significant spill or leak of hazardous substances (e.g. petrol, diesel, etc.) used during the proposed activities, such an incident(s) must be reported to the relevant authorities, including the Directorate of Pollution and Chemicals Management

4.3.11 PROTECTION OF NATURAL FEATURES

- The Contractor must not deface, paint, damage or mark any natural features (e.g. rock formations) situated in or around the site for survey or other purposes unless agreed beforehand with the ECO. Any features affected by the Contractor in contravention of this clause must be restored / rehabilitated to the satisfaction of the ECO.
- The Contractor must not permit his employees to make use of any natural water sources for the purposes of swimming, personal washing and the washing of machinery or clothes.

4.3.12 PROTECTION OF FLORA AND FAUNA

- All clearing activities must deploy search and rescue teams in-front of clearing machinery to assist in relocating slower moving faunal species e.g. tortoises.
- Protected plant species must be removed from the designated construction footprint and relocated to adjacent areas of similar habitat that will not be affected by construction and used in landscaping once construction is complete. The required permits must be obtained prior to moving any species.

- Except to the extent necessary for the carrying out of the works, flora must not be removed, damaged or disturbed nor must any vegetation be planted.
- The removal and stockpiling of topsoil must also be carried out in accordance with the EMPr.
- Trapping, poisoning and/or shooting of animals is strictly forbidden by employees and contractors.
- The use of chemicals of all forms must be carefully controlled and monitored to avoid contamination of areas.
- The environmental education programme must explain to staff why species of concern are of ecological significance.

4.3.13 PROTECTION OF HERITAGE FEATURES

- Construction managers/foremen must be informed before construction starts regarding the possible types of heritage sites and cultural material they may encounter, and the procedures to follow when they find sites.
- If concentrations of palaeontological/archaeological heritage material and human remains are uncovered during construction, all work must cease immediately and be reported to the Eastern Cape Provincial Heritage Resources Authority (043 745 0888) and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/ excavation can be undertaken.
- Any person who causes intentional damage to archaeological or historical sites and/or artefacts could be penalised or legally prosecuted in terms of the National Heritage Resources Act 25 of 1999.

4.3.14 VEGETATION CLEARANCE

- Vegetation clearing and trampling must be avoided in areas demarcated as no-go areas.
- Temporary infrastructure such as the site camp, lay down areas and storage areas must be placed outside the 32m buffer from the river.
- Vegetation clearing must occur in parallel with the construction progress to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the river.
- The Contractor must work according to a plan, which demarcates areas to be cleared. The plan must be part of the Project Layout Plan developed in the Site Design Phase.
- The minimum amount of vegetation clearance must take place.
- All plants not interfering with construction must be left undisturbed.
- Collection or wilful damage to any plants outside of the areas demarcated for clearing is not allowed.

4.3.15 ALIEN VEGETATION CLEARANCE

- The construction phase must employ eradication programmes to remove any new invasive species, especially those categorized as 1, 2 and 3 on the NEMBA list. This must be undertaken in accordance with the site-specific Alien Plant Management Plan

- Long-term operational eradication programs to eradicate invasive species must be implemented if possible.

4.3.16 REVEGETATION

- All areas disturbed during construction must be reinstated to a state that approximates or betters the state that they were in before construction.
- Cut and fill areas must be restored and reshaped.
- Areas compacted by vehicles during construction must be scarified to allow penetration of plant roots and the regrowth of natural vegetation.
- The revegetation programme must take cognisance of the climatic and seasonal conditions with the most favourable period being in spring and early summer.
- The rehabilitated areas will be weeded by the nominated rehabilitation contractor for a period of 1 year.
- Species indigenous and or endemic to the area, and suitable for rehabilitation, must be identified and used in preference to exotic species.
- Where possible, indigenous species cleared for construction, must be used to revegetate disturbed areas.
- It is also advised that the Environmental Control Officer, to be appointed during the construction phase, must have a good understanding of the local flora. The ECO must be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas, using species selected by an appropriate botanist. All alien plant re-growth must be monitored and should it occur these plants must be eradicated.

4.3.17 TOPSOIL STRIPPING AND STOCKPILING

- Topsoil can only be stripped from the areas as indicated below:
    - Any area which is to be used for temporary storage of materials
    - Areas which could be polluted by any aspect of the construction activity; and
    - Areas designated for the dumping of soil.
- Stripping of topsoil will be undertaken in such a manner as to minimise erosion by wind or runoff.
- Outside of the development footprint, topsoil will be stripped to a depth not exceeding 150mm from the original ground level.
- Areas from which the topsoil is to be removed will be cleared of any foreign material including bricks, rubble, any waste material, litter, excess vegetation and any other material which could reduce the quality of the topsoil.
- The Contractor must ensure that subsoil and topsoil are not mixed during stripping, excavation, reinstatement and rehabilitation. If mixed with clay sub-soil the usefulness of the topsoil for rehabilitation of the site will be lost.
- Soils must be exposed for the minimum time possible once cleared.
- Topsoil will be temporarily stockpiled, separately from (clay) subsoil and rocky materials.
- Topsoil will be stockpiled in areas designated by the ECO.
- Soil must not be stockpiled near the river without prior consent from the ECO.

- Stockpiles will either be vegetated with indigenous grasses or covered by a suitable fabric to prevent erosion and invasion of weeds.
- Stockpiled topsoil will not be compacted.

4.3.18 STORMWATER MANAGEMENT

- A storm water management plan must be designed and approved by the Environmental Auditor prior to construction commencing.
- Mitigation measures must be aimed at reducing contact between stormwater and hazardous chemicals. This needs to be considered during the planning of the stormwater drainage system for the project facilities.
- In terms of minimising discharge of pollutants and run-off quantity requiring treatment, all stormwater run-off must be properly segregated and clean water run-off diverted to prevent it mixing with water containing a high solids content.
- All run-off from wash areas must pass through an oil trap and must be treated as hazardous due to the presence of hydrocarbons. All other run-off water must pass through a sediment trap to remove the majority of suspended solids prior to discharge to the environment. All settled material must be disposed of at an assigned landfill.
- Natural run-off must be diverted to stormwater drains where these are available. The Contractor must take appropriate measures to prevent sand, silt and silt-laden waters from entering the river.

4.3.19 EROSION AND SEDIMENTATION CONTROL

- The Contractor must take all reasonable measures to limit erosion and sedimentation due to construction activities.
- Re-vegetate areas that have been disturbed as soon as possible.
- Where erosion and/or sedimentation, whether on or off the site, occurs despite the Contractor complying with the foregoing, rectification must be carried out in accordance with details specified by the ECO. Where erosion and/or sedimentation occur due to the fault of the Contractor, rectification must be carried out to the reasonable requirements of the ECO and at the expense of the Contractor.
- No removal of vegetation is to take place within 50m of any river, artificial or natural wetland, except for the control of alien vegetation.
- Construction vehicles and machinery must not encroach into identified ‘no-go’ areas or areas outside the project footprint.
- Activities within 32m of a watercourse must obtain the necessary Water Use License prior to the commencement of such activities.

4.3.20 AESTHETICS

- The Contractor must take reasonable measures to ensure that construction activities do not have an unreasonable impact on the aesthetics of the area.

4.3.21 COMMUNITY RELATIONS

- If so required by the Project Specification, the Contractor must erect and maintain information boards in the positions, quantities, designs and dimensions specified. Such boards must include contact details for complaints by members of the public in accordance with details provided by the ECO.
- The Contractor must keep a "Complaints Register" on site. The Register must contain all contact details of the person who made the complaint, and information regarding the complaint itself and note the date and time that the complaint was resolved.
- The ECO must be responsible for responding to queries and/or complaints and may request assistance from the Contractor's Management Staff.
- Construction materials and other purchases relating to the project must be done, where possible, within the nearby community and at local shops.

5 ENVIRONMENTAL MANAGEMENT PROTOCOL

5.1 ROLES AND RESPONSIBILITIES

5.1.1 APPLICANT/DEVELOPER

The applicant is the responsible entity for monitoring the implementation of the EMPr and compliance with the authorisation. However, if the applicant appoints a contractor to implement the project and hence implement the proposed mitigation measures documented in this EMPr on their behalf, then the successful contractor's responsibilities are outlined as per the section that follows.

5.1.2 CONTRACTOR

The successful contractor must:

- Be responsible for the finalisation of the EMPr in terms of methodologies which are required to be implemented to achieve the environmental specifications contained herein, and the relevant requirements contained in the Environmental Authorisation (EA).
- Be responsible for the overall implementation of the EMPr in accordance with the requirements of the developer and the EA.
- Ensure that all third parties who carry out all or part of the contractor's obligations under the contract comply with the requirements of this EMPr.
- Ensure that the appointments of the ECO are subject to the approval of the developer.

5.1.3 ENVIRONMENTAL CONTROL OFFICER

For the purposes of implementing the conditions contained herein, the contractor must appoint an ECO for the contract. The ECO will be the responsible person for ensuring that the provisions of the EMPr as well as the EA are complied with during the construction period. The ECO will be responsible for issuing instructions to the contractor and where environmental considerations call for action to be taken. The ECO will submit monthly written environmental monitoring reports to the applicant and the environmental authority during the construction phase.

The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr and conditions of the environmental authorisation by the contractor. The ECO's duties in this regard will include, *inter alia*, the following:

- Confirming that all the environmental authorisations and permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Monitoring and verifying that the EMPr, EA and contract are adhered to at all times, and taking action if specifications are not followed.
- Monitoring and verifying that environmental impacts are kept to a minimum.
- Reviewing and approving construction method statements with input from the engineer, where necessary, in order to ensure that the environmental specifications contained within this EMPr and EA are adhered to:

- Inspecting the site and surrounding areas on a regular basis regarding compliance with the EMPr, EA and contract.
- Monitoring the undertaking by the contractor of environmental awareness training for all new personnel on site.
- Ensuring that activities on site comply with all relevant environmental legislation.
- Ordering the removal of, or issuing spot fines for person/s and/or equipment not complying with the specifications of the EMPr and/or environmental authorisation.
- Undertaking a continual internal review of the EMPr and submitting any changes for applicant and authority review and approval as applicable.
- Checking the register of complaints kept on site and ensuring that the correct actions are/were taken in response to these complaints.
- Checking that the required actions are/were undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance.
- Conducting monthly environmental performance audits in respect of the activities undertaken relating to the project. The ECO must also submit compliance audit reports to the competent authority, in accordance with the requirements of the environmental authorisation. Such reports must be reviewed by the applicant, prior to submission.
- Keeping a photographic record of progress on site from an environmental perspective.
- Recommending additional environmental protection measures, should this be necessary.
- Providing report back on any environmental issues at site meetings.

Given the relatively small scope of the construction activities, a full time ECO will not be required. It is anticipated that upfront activities would include defining laydown and no-go areas, assisting with the development of method statements, presenting the environmental awareness and training programmes and revising this EMPr if details on the construction programme necessitate such changes. Thereafter monthly site audits will likely be sufficient to ensure compliance with this EMPr, provided the developer's Resident Engineer has been capacitated to identify any non-compliances.

5.1.4 ENVIRONMENTAL AUDITOR

Regulation 34 of the NEMA EIA Regulations, 2014 (as amended) requires that an environmental audit report is prepared and submitted to the authorities at regular intervals. The auditor must be an independent person with relevant environmental auditing expertise and cannot be the ECO or the EAP who undertook the EIA. The environmental auditor will be required to undertake the following:

- Ensure that the development is compliant with the EA and EMPr.
- Provide verifiable findings to the competent authority in a structured report
- Where it is found that there are insufficient mitigation of environmental impact or insufficient levels of compliance with the EA and EMPr, recommendations to amend the EMPr to rectify the shortcomings must be submitted to the competent authority.
- Such recommendations must have been submitted to a public participation process, including organs of state.

It is important to note that within seven days of the date of submission of the environmental audit

report to the competent authority, the holder of the EA must notify all potential and registered interested and affected parties of the submission of that report and ensure that the report is readily available to anyone who requests it as well as publicly accessible on the CES website.

During the construction phase it is recommended that an environmental audit is undertaken every six months with a final audit being undertaken 6 months after the conclusion of construction activities. The contents of the environmental audit report must comply with Appendix 7 of the NEMA EIA Regulations, 2014 (as amended).

5.2 COMPLIANCE MONITORING AND CORRECTIVE ACTION

The EMPr reporting and documentation requirements must be based on best practice principles, e.g. ISO 14001, which must take the following requirements into account:

- Documents associated with the EMPr must be reviewed regularly and updated by all environmental management parties.
- Audits of the environmental performance of the construction phase of the project will be undertaken every six months by an accredited auditor in fulfilment of likely conditions of EA in this regard.
- The findings of external, internal and informal environmental reviews will be recorded and items requiring action will be identified from the recommendations made. Corrective actions must be taken within 30 days of receiving the monitoring report and/or auditors report.
- The construction contractors will be contractually obliged to fulfil any reasonable recommendations, and implementation of these actions will be assessed in the above audit.

Meetings, where required, should take place onsite. Internal auditing and reporting must be subject to external review by the auditor during the compliance audits, undertaken during the construction phase.

Non-compliance with the conditions of the EMPr must be viewed as a breach of appointment Contract for which the construction contractors will be held liable. The latter is deemed NOT to have complied with the EMPr if:

- There is evidence of contravention of the EMPr, its environmental specifications or the Method Statements developed by the Contractor within the boundaries of the construction site or areas of contractor responsibility.
- Construction related activities take place outside the defined boundaries of the site.
- Environmental damage ensues due to negligence.
- The Contractor fails to comply with corrective or other instructions issued by the ECO within a specific time; or
- The Contractor fails to respond adequately to complaints from the public or authorities.

The Applicant and the construction contractors are liable for any construction rehabilitation costs associated with their non-compliance with this EMPr. This rehabilitation will be undertaken to the satisfaction of the Environmental Auditor. The construction contractors will have the right to appeal any punitive action undertaken by the Environmental Auditor or the Applicant.

5.3 ADDITIONAL MITIGATION MEASURES

As part of the implementation and monitoring requirements, the employees involved in the proposed development must be trained in implementing and monitoring compliance with the EMPr and EA and to undertake the necessary monitoring and implementation of the prescribed mitigation measures detailed here.

5.3.1 PRE-CONSTRUCTION

- Notice must be given to surrounding landowners and businesses informing them of the intended date of commencement of construction.
- The necessary management plans need to be compiled. These include Traffic, Waste, Alien Vegetation and Archaeological Site Management Plans.

5.3.2 CONSTRUCTION PHASE

- An ECO must be appointed to ensure that the construction activities remain within the designated area and that no unauthorised activities occur.
- The ECO must submit site monitoring reports detailing the applicant's compliance with the EMPr.
- An independent auditor must be appointed to undertake site audits that are in compliance with Regulation 34 of the NEMA EIA Regulations, 2014 (as amended).
- An efficient stormwater management system must be implemented during construction.
- Workers must be educated on environmental management aspects.

5.3.3 OPERATIONAL PHASE

- Eradication of the already established alien invasive species onsite within the demarcated construction footprint; and
- An ECO must be present during maintenance work.

5.4 MONITORING

Construction activities have the potential to impact on a range of biophysical habitats as well as neighbouring communities. The monitoring programme which requires development by the Applicant, ECO and Contractor must, inter alia, allow for analysis of:

1) Air quality (such as dust);
2) Hydrocarbon pollution;
3) Success of local labour employment;
4) Success of local procurement policies;
5) Ambient and workplace noise;
6) Health and safety incidents;
7) Success of traffic management measures; and
8) Contamination and soil erosion.

Monitoring must continue into the operational phase and will require development with the applicant and an external environmental auditor. This monitoring must allow for the analysis of:

1) Hydrocarbon pollution;
2) Ambient and workplace noise;
3) Health and safety incidents;
4) Success of traffic management measures; and
5) Contamination and soil erosion.

6 MONITORING AND EVALUATION

The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. The overall monitoring and auditing of the site will be the responsibility of the ECO; however SANRAL / GIBB must provide the necessary environmental control and audit measures and integrate these through their Environmental Management Systems. The monitoring protocol which must be adhered to for the proposed development is included below (Table 6.1). In addition to the monitoring provisions included in Table 6.1, the following monitoring protocol should be included at a minimum:

- Invasive species monitoring, control and eradication for land/activities under the control of the proponent should be developed as part of the method statement in accordance with CARA and NEMBA;
- Post construction monitoring must occur for one year after completion of the site, at quarterly intervals, to ensure that the site is re-vegetated; and
- The operational phase of the proposed development is predicted to continue into perpetuity. It is recommended that the DEO conduct quarterly monitoring for the first year following the completion of construction to ensure that the revegetation of the disturbed areas has been completed successfully.

Below lists the impact management actions (mitigation measures) for the proposed development. Each impact management action must undergo a monitoring method (e.g., visual inspections), at a specific frequency (e.g., monthly), by a specific role player (e.g. the ECO), at a particular phase or at particular phases of the development (e.g. construction) and will need to be reported via a specific reporting mechanism (e.g. an ECO audit report). Certain mitigation measures will only be relevant during certain phases of the development, while others will remain applicable in perpetuity.

Table 6.1: Monitoring of the implementation of the impact management actions during the construction and operational phases.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Legal and policy compliance	• 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.	Visual inspection of record keeping, including licenses, permits, management plans and registers of toolbox talks, as well as visual inspection of construction compliance.	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly (i.e. once per month)	ECO		Monthly ECO audit reports.
	• The proponent must ensure that operations of the R56 road upgrade is compliant with the relevant legislation and policy. • These should include (but are not restricted to): NEMA, EA, EMPr and any other permits/authorisations.	Visual inspection	Once off	ECO	Operational phase	Post-construction ECO audit report.
		Regular road maintenance inspections	Annually	SANRAL		Annual road maintenance reports.
Infrastructure	• 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.	Visual inspection of record keeping (management plans on file on site), as well as visual inspection of site demarcation.	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
	• Regular maintenance and inspections of all infrastructure and services must be undertaken.	Regular road maintenance inspections	Annually	SANRAL	Operational phase	Annual road maintenance reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Material Stockpiling	• Material stockpiles must be located away from sensitive areas and they must be monitored for erosion and alien vegetation. • Material stockpile locations must be approved by the ECO.	Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
Stormwater management	• 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.	Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
	• 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.	Visual inspection	Once off	ECO	Operational phase	Post-construction ECO audit report.
		Regular road maintenance inspections	Annually	SANRAL		Annual road maintenance reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Waste Management	• 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. • Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages. • 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.	Visual inspection of record keeping, (including waste removal slips/receipts), as well as visual inspection of compliance on site.	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
			Monthly	ECO		Monthly ECO audit reports.
Health and safety	• 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.	Visual inspection of record keeping, including incidence reports and registers of toolbox talks, as well as visual inspection of compliance.	Weekly	DEO	Construction phase	Weekly DEO checklists.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
	• 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.	Regular road maintenance inspections	Annually	SANRAL	Operational phase	Annual road maintenance reports.
Air quality and dust control	• 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.	Visual inspection of record keeping, including vehicle service records, as well as visual inspection of compliance.	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
			Monthly	ECO		ECO audit reports.
On-site fire risk	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.	Visual inspection of record keeping, including extinguisher service records and incidence reports, as well as inspection of compliance on site.	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
			Monthly	ECO		Monthly ECO audit reports.
			Monthly	ECO		Monthly ECO audit reports.
Inadequate rehabilitation and maintenance	• The rehabilitation plan must be implemented during and after the construction has been completed.	Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
	• Disturbed areas will be rehabilitated/prepared to allow natural re-vegetation.	Visual inspection	Once off	ECO	Operational phase	Post-construction ECO audit report.
		Regular road maintenance inspections	Annually	SANRAL		Annual road maintenance reports.
Aquatic and wetland specialist input						
Direct ecosystem modification or		Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
destruction / loss impacts Indirect hydrological and geomorphological impacts	**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 be implemented in conjunction with any generic measures provided in the Environmental Management Programme (EMPr).**		Monthly	ECO		Monthly ECO audit reports.
Indirect hydrological and geomorphological impacts	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. • 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.	Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly Monthly ECO audit reports.
Water quality impacts		Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
Fragmentation and ecological disturbance impacts		Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
	○ General rehabilitation guidelines. ○ Construction phase monitoring measures.		Monthly	ECO		Monthly ECO audit reports.
Direct ecosystem modification or destruction / loss impacts Indirect hydrological and geomorphological impacts	**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 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	Visual inspection Regular road maintenance inspections	Once off	ECO	Operational phase	Post-construction ECO audit report.
			Annually	SANRAL		Annual road maintenance reports.
Indirect hydrological and geomorphological impacts		Visual inspection Regular road maintenance inspections	Once off	ECO	Operational phase	Post-construction ECO audit report.
			Annually	SANRAL		Annual road maintenance reports.
Water quality impacts		Visual inspection Regular road maintenance inspections	Once off	ECO	Operational phase	Post-construction ECO audit report.
			Annually	SANRAL		Annual road maintenance reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Fragmentation and ecological disturbance impacts	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 remediation and/or watercourse rehabilitation plan may need to be compiled and implemented to the satisfaction of Gauteng Department of Agriculture and Rural Development (GDARD) and DWS.	Visual inspection Regular road maintenance inspections	Once off	ECO	Operational phase	Post-construction ECO audit report.
			Annually	SANRAL		Annual road maintenance reports.
Terrestrial specialist input						

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Loss of Plant Species of Conservation Concern	• 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.	Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
	• 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.	Visual inspection	Once off	ECO	Operational phase	Post-construction ECO audit report.
		Regular road maintenance inspections	Annually	SANRAL		Annual road maintenance reports.
Loss of Vegetation Communities	• 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.	Visual inspection	Once off	ECO	Operational phase	Post-construction ECO audit report.
		Regular road maintenance inspections	Annually	SANRAL		Annual road maintenance reports.
Loss of faunal species of conservation concern	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;*	Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
	○ *Hydrictis maculicollis;* ○ *Poecilogale albinucha;* ○ *Leptailurus serval;* ○ *Sensitive species 2;* ○ *Pelea capreolus;* ○ *Otomys auratus;* ○ *Grammomys dolichurus;* ○ *Mystromys albicaudatus; and* ○ *Dasymys incomtus.* • Any recorded sightings of these species must immediately be reported to the ECO immediately (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 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).					

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
	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.	Visual inspection	Once off	ECO	Operational phase	Post-construction ECO audit report.
		Regular road maintenance inspections	Annually	SANRAL		Annual road maintenance reports.
Fragmentation, Loss of Ecosystem Function and Edge Effects	• The proposed development footprint must be kept as small as possible and ensure that all non- operational areas are rehabilitate to a suitable condition. • Rehabilitation must extent into the PAOI and not only the proposed development footprint.	Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
Invasion of Alien Plant Species	• 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.	Visual inspections	Weekly	DEO	Construction phase	Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
	• An Alien Invasive Plant Species Control Plan must be developed by the Contractor and include both construction and operational phase requirements.	Visual inspection	Once off	ECO	Operational phase	Post-construction ECO audit report.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
	• 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.	Regular road maintenance inspections	Annually	SANRAL		Annual road maintenance reports.
Heritage specialist input						
Loss of archaeological feature	• No Mitigation Required	Visual inspections	Daily	Contractor	Construction phase	Immediately report historical/heritage findings if or when found.
			Weekly	DEO		Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
Loss of historically significant building and structures	• No Mitigation Required	Visual inspections	Daily	Contractor	Construction phase	Immediately report historical/heritage findings if or when found.
			Weekly	DEO		Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
Alternation of cultural landscape	• No Mitigation Required	Visual inspections	Daily	Contractor	Construction phase	Immediately report historical/heritage findings if or when

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
						found.
			Weekly	DEO		Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.
Disturbance to graves/human burial sites	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.	Visual inspections	Daily	Contractor	Construction phase	Immediately report historical/heritage findings if or when found.
			Weekly	DEO		Weekly DEO checklists.
			Monthly	ECO		Monthly ECO audit reports.

7 ENVIRONMENTAL AWARENESS

Contractors must ensure that its employees and any third party who carries out all or part of the Contractor's obligations are adequately trained with regard to the implementation of the EMPr, as well as regarding environmental legal requirements and obligations. Training must be conducted by an independent person where necessary. Environment and health awareness training programmes must be targeted at two distinct levels of employment, i.e., management and labour. Environmental awareness training programmes must contain the following information:

- The names, positions and responsibilities of personnel to be trained;
- The framework for appropriate training plans;
- The summarised content of each training course; and
- A schedule for the presentation of the training courses.

The person conducting training must ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr. The training records must verify each of the targeted personnel's training experience.

The Developer must ensure that adequate environmental training takes place. All employees must have been given an induction presentation on environmental awareness and the content of the EMPr. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training must, as a minimum, include the following:

- The importance of conformance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- Details regarding floral/faunal species of special concern and protected species, and the procedures to be followed should these be encountered during the construction of the bridge, main access roads, approach roads or construction camps;
- The importance of not littering;
- The importance of using supplied toilet facilities;
- The need to use water sparingly;
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible; and
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered.

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, a translator must be called to the site to further explain aspects of environmental or social behaviour that are unclear. An environmental training and awareness course has been provided in Annexure 2.

8 CONCLUSION

Although all foreseeable actions and potential mitigations or management actions are contained in this document, the EMPr must be seen as a day-to-day management document. The EMPr thus sets out the environmental standards that are required to minimise the negative impacts and maximise the positive benefits of the proposed construction of powerline, as detailed in the Basic Assessment Report (BAR). The EMPr is a “live document”, and if continuously reviewed and managed correctly can result in successful construction and operation of the proposed development.

All attempts must be made to have this EMPr available, as part of any tender documentation, so that the contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these. Further guidance must also be taken on any conditions contained in the EA, if the project is granted approval, and that these conditions must be incorporated into the final EMPr.

ANNEXURE 1: METHOD STATEMENTS

Method statements need to be compiled by the Contractor for approval by the ECO. For the purposes of the environmental specification, a method statement is defined as a written submission by the Contractor to the ECO setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, in such detail that the ECO is enabled to assess whether the Contractor's proposal is in accordance with the EMPr and / or will produce results in accordance with the EMPr.

The method statement must cover applicable details with regard to:

- Construction procedures,
- Materials and equipment to be used,
- Transporting the equipment to and from site,
- How the equipment/ material will be moved while on site,
- How and where material will be stored,
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- Timing and location of activities,
- Compliance/ non-compliance with the Specifications, and
- Any other information deemed necessary by the Engineer.

The Contractor must abide by these approved method statements, and any activity covered by a method statement must not commence until the ECO has approved the method statement. The method statement must be submitted to the ECO not less than 20 days prior to the intended date of commencement of the activity, or as directed by the ECO.

METHOD STATEMENT

CONTRACT:…….. **DATE**:…….

PROPOSED ACTIVITY (give title of method statement):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

Start Date:	End Date:

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated sketches and plans where possible):

* Note: please attach extra pages if more space is required

DECLARATIONS

1) ENVIRONMENTAL CONTROL OFFICER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

_____ _____

(Signed) (Print name)

Dated:._____

2) PERSON UNDERTAKING THE WORKS

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ECO will audit my compliance with the contents of this Method Statement

_____ _____

(Signed) (Print name)

Dated: _____

ANNEXURE 2: BASIC ENVIRONMENTAL EDUCATION COURSE OUTLINE

http://www.webweaver.nu/clipart/environmental.shtml

Reasons why should we look after the environment

- We have a right to a clean environment
- A clean environment is essential to healthy living
- All our basic needs come from the environment
- A contract has been signed – development vs the environment
- Penalties / fines could be issued

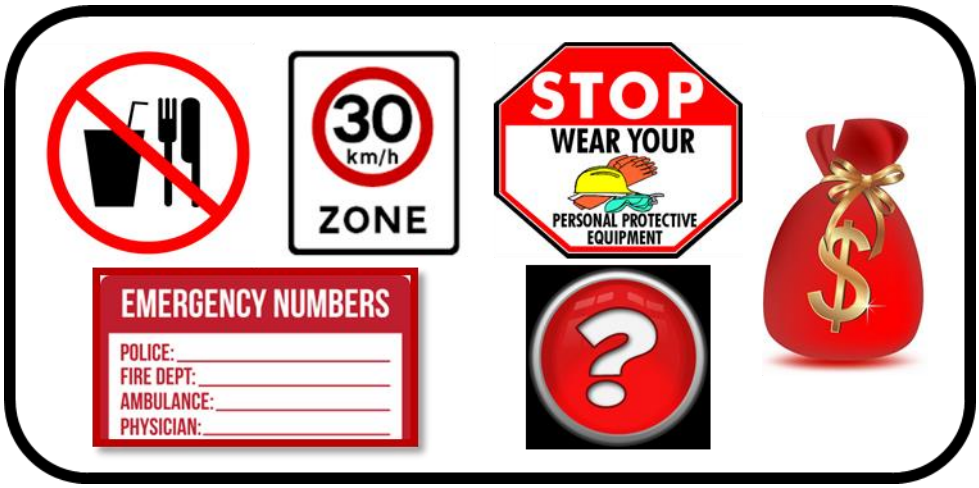
How to look after the environment

- Report issues
- Teamwork
- Follow the set rules and guidelines (EA, EMPr, Method statements etc.)
- Conserve, reuse and recycle

Tips and Guidelines

- Workers and equipment should not be allowed outside demarcated areas
- No swimming or polluting of water bodies allowed
- No damage / disturbance to vegetation or water bodies without consent / permits
- No disturbance allowed in no-go areas
- No hunting of animals
- Report all fires
- No burning or burying of waste
- No smoking near hazardous materials
- Training on fire fighting equipment
- Hazardous materials to be stored in designated and bunded areas
- Spill kits and drip trays a must
- Report all spills
- Control dust and Noise
- Maintain construction vehicles
- Availability and maintenance of sanitation facilities


CAUTION
Spill Hazard
SLOW
DOWN
NO
DUST


30
km/h
ZONE
STOP
WEAR YOUR
PERSONAL PROTECTIVE
EQUIPMENT
EMERGENCY NUMBERS
POLICE:
FIRE DEPT:
AMBULANCE:
PHYSICIAN:

ANNEXURE 3: DETAILS AND CVS OF THE PROJECT TEAM

Please refer to the Basic Assessment Report for details and CVs of the project team.

ANNEXURE 4: SITE SENSITIVITY MAPS

Figure 8.1: Sensitivity map indicating Site Ecological Importance of the R56 from Matatiele to Cedarville (CES, 2023)

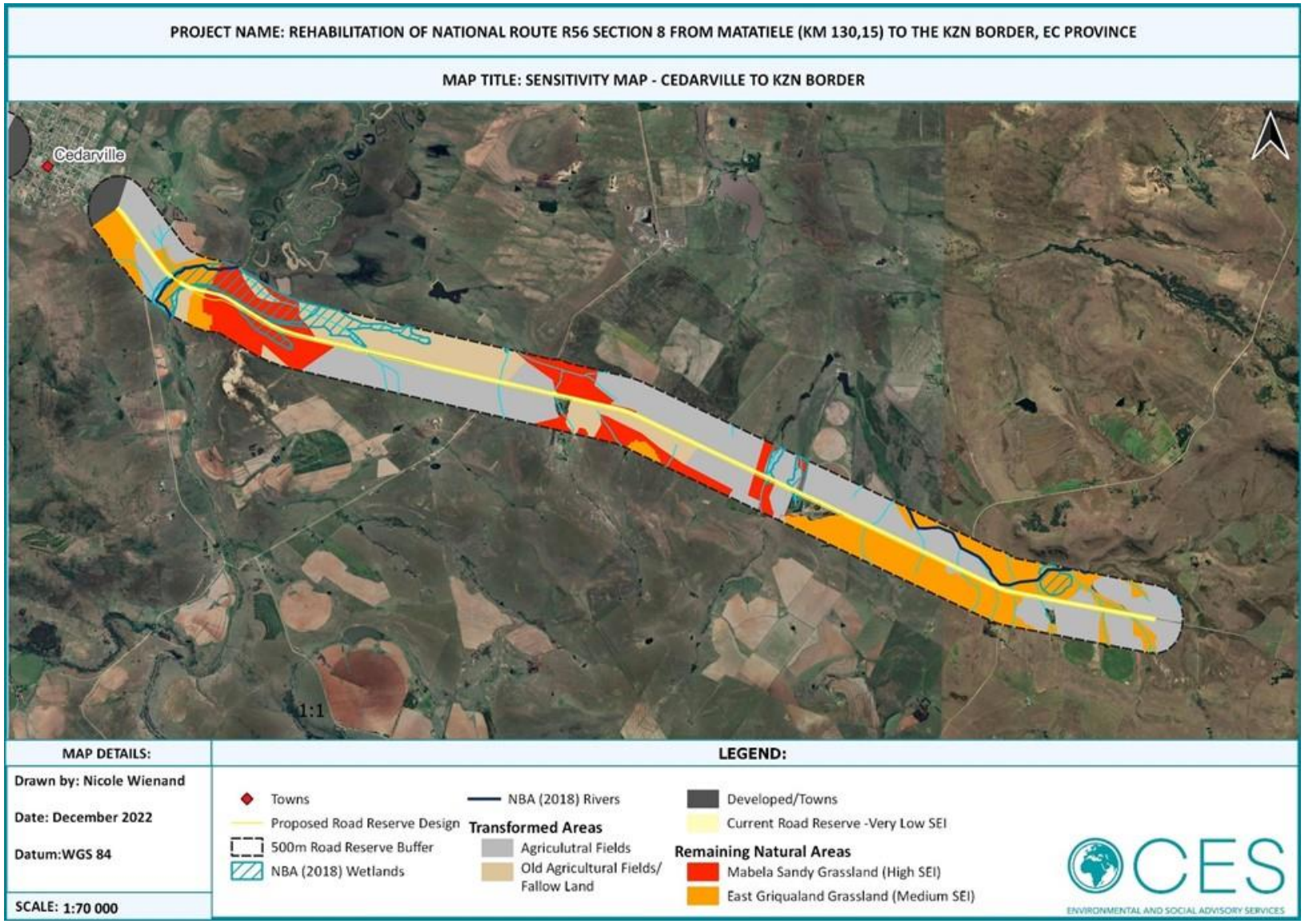


Figure 8.2: Sensitivity map indicating Site Ecological Importance of the R56 from Cedarville to KZN border (CES, 2023)

ANNEXURE 5: PLANT SEARCH AND RESCUE

SEARCH AND RESCUE OF PROTECTED VEGETATION SPECIES

SANRAL Rehabilitation of the R56 section 8 from Matatiele to KZN Border, Eastern Cape

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

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

DFFE Reference: **14/12/16/3/3/1/2706**

RELOCATION OF PROTECTED VEGETATION SPECIES

Prepared for:

GIBB
ENGINEERING & SCIENCE

Under the direction of:
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Regional Manager
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March 2023

REVISIONS TRACKING TABLE

CES Report Revision and Tracking Schedule

Document Title:	Plant Search and Rescue Report for the proposed 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		
Client Name:	SANRAL SOC Ltd		
Document Reference:	DFFE Reference number for BAR: 14/12/16/3/3/1/2706		
Status:	Final		
Issue Date:	March 2023		
Lead Author:	Sage Wansell		
Reviewer:	Robyn Thomson & Alan Carter		
Study Leader/ Registered Environmental Assessment Practitioner – Approval:	Alan Carter		
Report Distribution	***Circulated to***	***No. of hard copies***	***No. electronic copies***
	DFFE		1
	Gibb (Pty) Ltd		1
Report Version	***Date***		
	March 2023		

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1 INTRODUCTION

1.1 BACKGROUND

The South African National Roads Agency SOC Limited, hereafter referred to as SANRAL, proposes to rehabilitate 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. The development was previously authorised (EC 14/12/16/3/3/1/1580), however the Environmental Authorisation (EA) has subsequently lapsed, therefore a new application for EA is required.

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 (1.5 m on either side of the road) with a centreline 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 centreline offset of approximately 3 metres resulting in a temporary Stop-Go scenario;
- → Reconstructing the R56 on a new off-set alignment (while traffic continues to use the existing R56); and the
- → The construction of a Hard Rock Quarry for material sources (authorised 21 June 2021 DMRE reference EC 30/5/1/3/3/3/00083BPEM).

Coastal and Environmental Services (Pty) Ltd, trading as 'CES' has been appointed as the Environmental Assessment Practitioner (EAP) to apply for EA by conducting a Basic Assessment (BA) Process inclusive of the relevant specialist studies. This report details the biophysical environment and assess the ecological impacts associated with the proposed Rehabilitation of the National Route R56 Section 8 From Matatiele (KM 130,15) to the Kwazulu-Natal Border (KM 168,71) within the Matatiele Local Municipality of the Alfred Nzo District Municipality, Eastern Cape Province (Figure 1.1 and Figure 1-2)

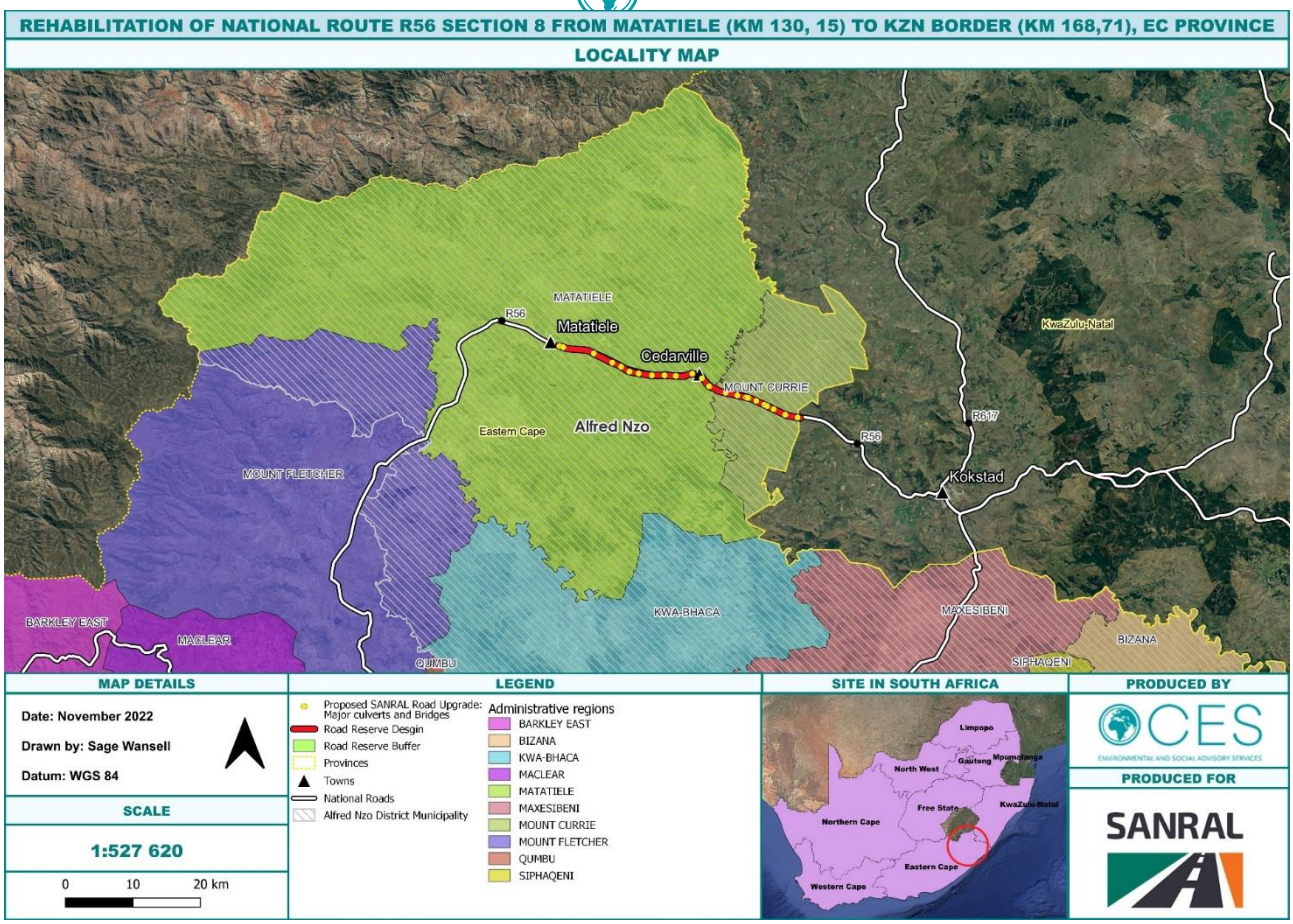

Figure 1-1. Locality map of the proposed SANRAL SOC Ltd National Route R56 Section 8 Study Area.

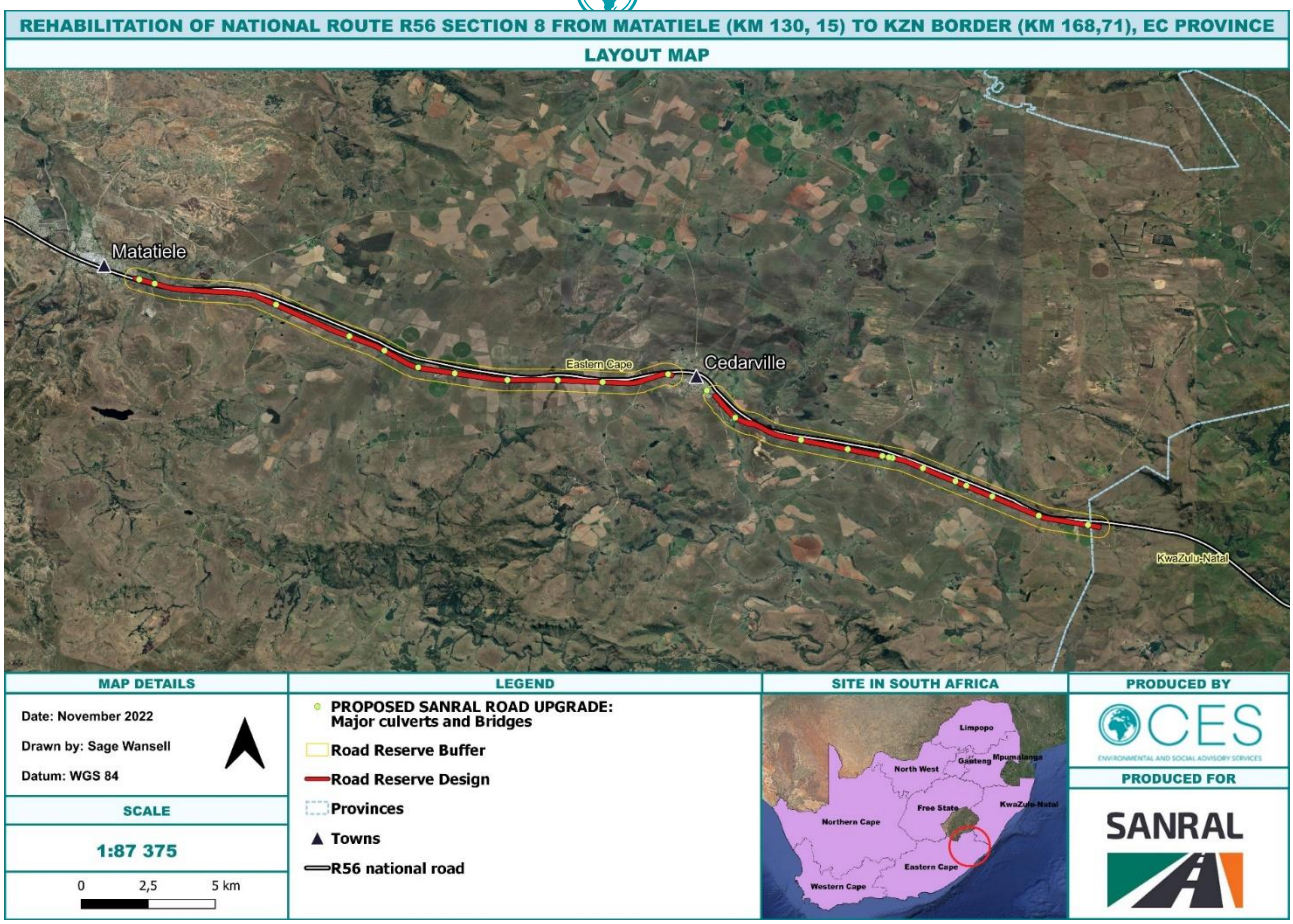

Figure 1-2. Locality map of the proposed SANRAL SOC Ltd National Route R56 Section 8 Study Area.

1.2 PERMIT APPLICATION

Prior to construction phase of the proposed project, permit applications will be needed for all plant species protected under the following legislation qualify as plant Species of Special Concern (SSC):

- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) – Threatened or Protected Species List (NEMBA)
- Nature and Environmental Conservation Ordinance (No. 19 of 1974) (NECO)
- Department of Agriculture, Forestry and Fisheries List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998) (DAFF).

All trees protected under the National Forestry Act (No 84 of 1998; NFA) qualify as plant Species of Conservation Concern (SSC). These SSC require approval from the Department of Forestry, Fisheries and the Environment (DFFE) prior to being impacted.

1.3 ACTIVITY DISCRIPTION

The following activities will occur during the construction and operational phase of the proposed project:

❖ **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 1-2. The proposed road improvement general roadworks activities are present in the Basic Assessment Report, with detailed descriptions. This has been tabulated below:

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).

❖ **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.

❖ **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 crashes 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 as follows:

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.

- **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.

- **WASTE MANAGEMENT**

The wate management for the construction phase is outlined in the Final Basic Assessment Report.

- **NOISE**

This is highlighted in the Final Basic Assessment Report.

- **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.

2 SITE DESCRIPTION

Based off of information for the Ecological Impact Assessment report for the proposed project (Wienand & Reljic, 2022), the following information describes the site:

According to the SA NLC (2020), there are a number of land uses within the road reserve buffer including *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* (Figure 3.6).

The site visit conducted by the Ecological Specialists confirmed the findings of the SA NLC (2020). The project area includes the 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.

The study area spans one vegetation type as defined by Mucina and Rutherford (2007), as amended in the National Vegetation Map 2012 and 2017 spatial information (**Error! Reference source not found.**), namely Buffels Thicket (AT 12). This vegetation unit is not considered under NEM:BA as a Threatened Ecosystem, even though it forms part of the important Albany Thicket Biome. This vegetation type, delineated during the Succulent Thicket Ecosystem Programme, is distributed in river valleys around East London stretching between 40 and 50 km inland and occurs in a small area in the Great Kei River Valley between about 10 and 20 km from the coast.
This vegetation occurs on steep slopes of river valleys in highly dissected hills and moderately undulating plains, where short, dense and tangled thicket stands reach up to 10 m. The dense thicket grades into more open, shorter thornveld at the edges of the valley slopes. This vegetation is classified as Vulnerable

The proposed project falls within the Grassland Biome. Grasslands in South Africa boast remarkable biodiversity and cover approximately one third of South Africa's total land surface area, stretching over the majority of the Eastern Cape and KwaZulu-Natal Provinces. These ecosystems provide important habitat for a range of the country's rare, endangered, and endemic animal and plant species, with plant diversity of the grassland biome only second to that of the fynbos biome. The incredible diversity and provision of ecosystem services has contributed to the classification of this ecosystem as an important biodiversity asset of global significance. Grasslands are considered important water production landscapes and provide various ecosystem services particularly for rural communities in South Africa (SANBI, 2013).

Approximately 40% of the grassland biome in South Africa has been transformed, while almost 60% of the remaining grassland areas are classified as threatened due to the loss of vital aspects of their composition, structure, and functioning. Only 3% of this valuable ecosystem is formally conserved. The fragmentation and degradation of grassland ecosystem severely affects the ecosystems' ability to provide valuable ecosystem services such as soil formation, water filtration, climate regulation, carbon sequestration, and erosion

prevention. As such, development within the remaining natural grassland areas should be well informed and err on the side of caution (SANBI, 2013).

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). 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). They are characterised by long-lived forbs that are adapted to frequent aboveground disturbance (such as fire) after which they are able to resprout due to the storage of carbohydrates in underground storage organs. Most species reproduce through vegetative reproduction. Reproduction through seedlings is infrequent and seedlings are generally only viable for a short period. Sub-Escarpment Grasslands are adapted to warm, wet summers with high rainfall and dry, temperate winters with moderate to heavy frost and soils depleted of nutrients.

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. This vegetation type is characterised by low species diversity and low tussock dominated, sour grasslands. Indigenous trees are absent. The major indicator species include Sporobolus pyramidalis and Aristida junciformis (Mucina et al., 2006). Mabela Sandy Grassland is classified as **Critically Endangered (CR)**. It has a narrow distribution with high rates of habitat loss over the past 28 years, placing this ecosystem at risk of collapse. Its historical extent amounted to 492.91 km2 of which only 31% currently remains. The Conservation Target for this vegetation type is 23%. It is not protected, and the major threats include agriculture, overgrazing and erosion (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). East Griqualand Grassland is classified as **Endangered (EN).** It has a narrow distribution with high rates of habitat loss over the past 28 years, placing this ecosystem at risk of collapse. Its historical extent amounted to 8727.99 km2 of which only 54% currently remains. It is considered poorly protected and the major threats include agriculture, plantations, erosions and invasion by Acacia dealbata and A. mearnsii (SANBI, 2021).

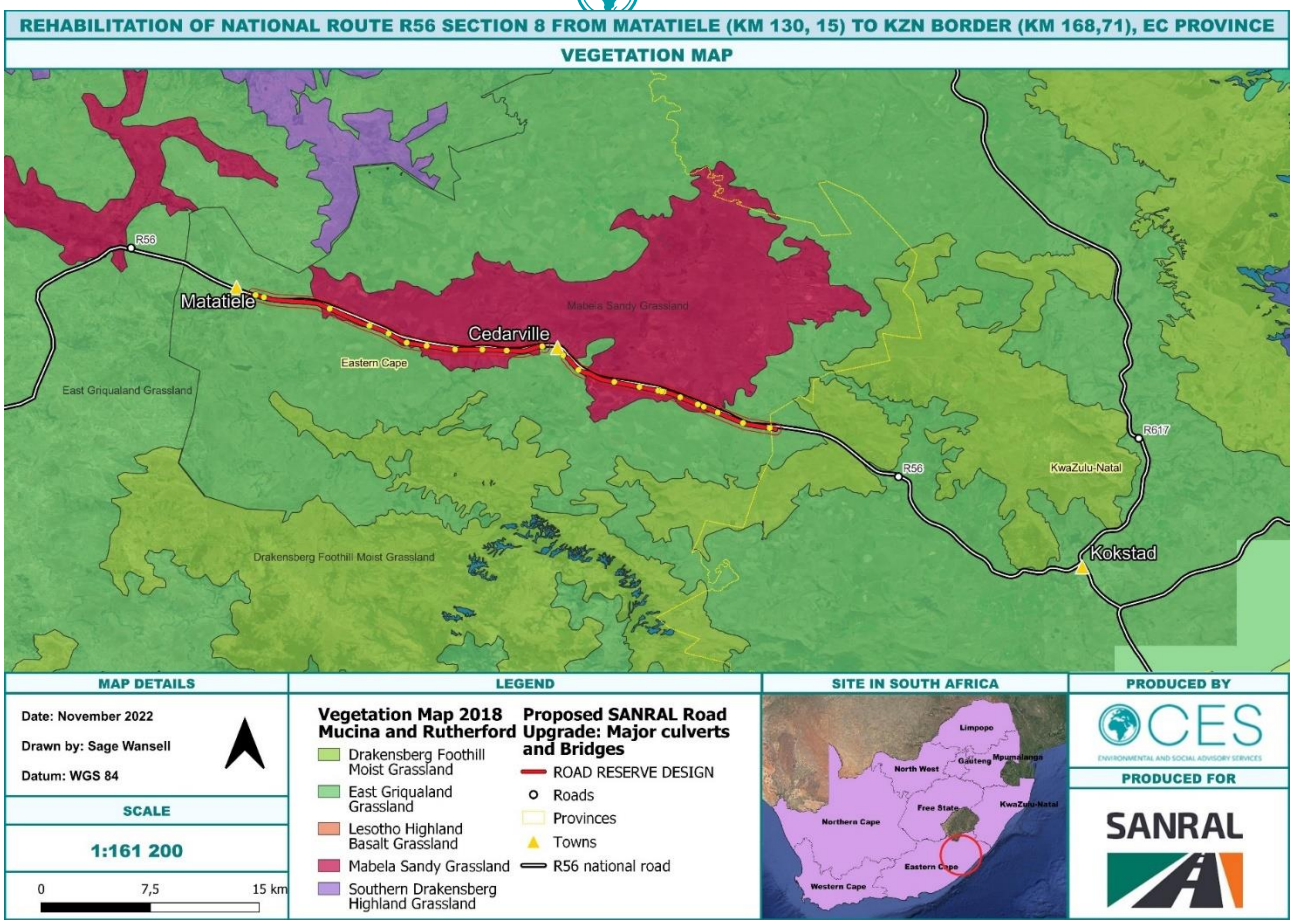

Figure 2-1. According to SANBI (Mucina and Rutherford, 2018) the study area falls within Mabela Sandy Grassland and East Griqualand Grassland.

2.1 SITE CONFIRMATION

The Ecological Specialist Study undertaken as part of the application for Environmental Authorisation of the proposed SANRAL Rehabilitation of R56 project, undertaken in 2022, identified the following:

- 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.

- 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 (Mucina et al., 2006).

- Indigenous plant species diversity was relatively low within and surrounding the road reserve. Common indigenous plant species recorded within the road reserve includes *Albuca setosa, A. virens, Bulbine narcissifolia, Berkheya spp., Felicia muricata, Helichrysum rugulosum, H. ammitophilum, Nidorella podocephala, Wahlenbergia undulata, Convolvulus sagittatus, Cyperus spp., Diclis reptans, Elionurus muticus, Eragrostis capensis*, *Hermannia althaeifolia, Hermannia depressa, Hypoxis rigidula, H. obtuse, H. angustifolia, Lactuca inermis, Ledebouria ovatifolia, Melinis repens, Monopsis decipiens, Pelargonium abrotanifolium, P. alchemilloides, P. luridum, Ranunculus multifidus*, and *Themeda triandra* (refer to Appendix 1 of the Ecological Report for the full list of species recorded within the road reserve).

- Large, monospecific stands of *Bromus catharticus* and *Dactylis gomerata* (Plate 3.2 in the Ecological report) were also observed along the road reserve. Stands of woody alien plant species were also present, particularly around entrances to adjacent homesteads and farms. Evidence of erosion was observed, particularly along the hillside just northeast of Matatiele (Plate 3.3 in the Ecological report).

- Very small portions of Mabela Sandy Grassland (approximately 11 ha) and East Griqualand Grassland (approximately 9.6 ha) occurs within the development footprint. However, even in most of these areas the grassland has been impacted to some extent by livestock grazing, alien plant species, and frequent access by vehicles.

- The Mabela Sandy Grassland within the project area was largely dominated by *Bulbine narcissifolia*, *Monopsis decipiens, Diclis reptans, Pelargonium alchemilloides, P. abrotanifolium, Polygala hottentotta, Lobelia flaccida, Albuca virens, Helichrysum rugulosum, Rhynchosia caribaea, Ledebouria marginata, Felicia muricata, Vigna vexillata, Aristida junciformis, Themeda triandra, Sporobolus pyramidalis, Urochloa serrata, Cyperus esculentus*, *Aristida junciformis*, *Abildgaardia ovata*, *Setaria sphacelata*, *Andropogon eucomus*, *Paspalum distichum*, *Elionurus muticus*, *Cynodon incompletus*, *Brachiaria serrata*, amongst others, whilst the East Griqualad Grassland within the project area was dominated by *Senecio speciosus, Hermannia depressa, Gazania linearis, Hypoxis obtusa, H. rigidula, Convolvulus sagittatus, Helichrysum rugulosum, Centella asiatica, Arctotis arctotoides, Xysmalobium undulatum, Felicia muricata, Searsia pyroides, Pelargonium abrotanifolium, Nidorella podocephala, Ledebouria ovatifolia, Brachiaria serrata, Melinis repens, Aristida junciformis, Elionurus muticus, Setaria nigrirostris, Eragrostis capensis, E. curvula*, and *Themeda triandra*. Scattered bush clumps characteristic of East Griqualand Grassland was largely absent within the project area, except for a few scattered *Searsia pyroides* shurbs.

- Only one (1) SCC, Dierama *tysonii*, was identified along the boundary of the road reserve.

During the ground-truthing conducted by the Ecological Specialist during November 2022 for the Ecological Specialist Report, only one (1) SCC species, Dierama *tysonii*, 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. The clearance of vegetation and rehabilitation of the National Route 56 could result in the loss of Dierama tysonii individuals identified along the boundary of the road reserve. This species is classified as Vulnerable and protected in terms of the Eastern Cape Nature and Environmental Conservation Ordinance 19 of 1974. Loss of any individuals will have a high impact on the population of this species.

A list of twelve (12) threatened SCC was compiled for the project area for the ecological report, of which only one (1), *Dierama tysonii* (VU), was considered highly likely to occur on site and confirmed during the site survey. The probability of occurrence on site for three (3) of the SCC has been classified as moderate and the probability of occurrence on site for seven (7) of the SCC has been classified as low. *Alepidea duplidens* is classified as Data Deficient – Taxonomically Problematic and there is currently a lack of information regarding the distribution and habitat requirements for this species. According to Raimondo (2008), it has been recorded in the Eastern Cape and KwaZulu-Natal Provinces. Based on the lack of available information, the probability of occurrence of site for this species could not been classified.

3 PROTECTED SPECIES

The species listed in Table 3-1 below were observed in the general area by the Ecological Specialist when the study was done in November2022, N. Wienand and E. Reljic, CES (Pty) Ltd, Ecological Assessment for the proposed Rehabilitation of National Route R56 Section 8 from Matatiele (Km 130,15) to the Kwazulu Natal Border (Km 168,71) within the Matatiele Local Municipality of the Alfred Nzo District Municipality, Eastern Cape Province. The listed species highlighted in orange depicts the SCC species observed.

Table 3-1 Species observed in the area during the Ecological Study (November 2022)

Family	Species	Red List Category	PNCO	TOPS	Protected Tree	Sample Site Number
Anacardiaceae	*Searsia pyroides*	LC	-	-	-	N1; N4
Apiaceae	*Notobubon laevigatum*	LC	-	-	-	N3; N7
Apiaceae	*Centella asiatica*	LC	-	-	-	N1; N2
Apocynaceae	*Xysmalobium undulatum*	LC	-	-	-	N1
Asphodelaceae	*Bulbine narcissifolia*	LC	-	-	-	N2; N4; N5; N7
Asteraceae	*Arctotis arctotoides*	LC	-	-	-	All sites
Asteraceae	*Arctotis venusta*	LC	-	-	-	N2
Asteraceae	*Berkheya umbellata*	LC	-	-	-	N1; N3; N7
Asteraceae	*Berkheya heterophylla*	LC	-	-	-	N1; N2
Asteraceae	*Berkheya bipinnatifida ssp. bipinnatifida*	LC	-	-	-	N1; N2
Asteraceae	*Berkheya setifera*	LC	-	-	-	N2; N4; N7
Asteraceae	*Felicia muricata*	LC	-	-	-	N2; N6; N7
Asteraceae	*Gazania linearis*	LC	-	-	-	N2; N4; N7
Asteraceae	*Helichrysum rugulosum*	LC	-	-	-	N1; N2; N4; N5; N6; N7
Asteraceae	*Helichrysum ammitophilum*	LC	-	-	-	N2; N3; N4; N7
Asteraceae	*Nidorella podocephala*	LC	-	-	-	N3, N4; N7
Asteraceae	*Senecio sp.*		-	-	-	All sites
Asteraceae	*Senecio speciosus*	LC	-	-	-	N1; N3
Asteraceae	*Lactuca inermis*	LC	-	-	-	N1, N4
Campanulaceae	*Wahlenbergia undulata*	LC	-	-	-	All sites
Convolvulaceae	*Convolvulus sagittatus*	LC	-	-	-	N1; N3; N5: N6
Cyperaceae	*Abildgaardia ovata*	LC	-	-	-	N5; N6; N7

Family	Species	Red List Category	PNCO	TOPS	Protected Tree	Sample Site Number
Cyperaceae	*Fuirena pubescens*	LC	-	-	-	N2
Cyperaceae	*Cyperus congestus*	LC	-	-	-	N2
Cyperaceae	*Cyperus semitrifidus*	LC	-	-	-	N2
Cyperaceae	*Cyperus esculentus*	LC	-	-	-	N2; N5
Cyperaceae	*Cyperus uitenhagensis*	LC	-	-	-	N6
Cyperaceae	*Cyperus macranthus*	LC	-	-	-	N5
Cyperaceae	*Schoenoplectus decipiens*	LC	-	-	-	N2
Euphorbiaceae	*Euphorbia striata*	LC	-	-	-	All sites
Fabaceae	*Rhynchosia caribaea*	LC	-	-	-	N6; N7
Fabaceae	*Vigna vexillata*	LC	-	-	-	N6
Geraniaceae	*Pelargonium abrotanifolium*	LC	-	-	-	N3; N6
Geraniaceae	*Pelargonium alchemilloides*	LC	-	-	-	N5
Geraniaceae	*Pelargonium luridum*	LC	-	-	-	N2
Gentianaceae	*Sebaea sp.*		-	-	-	N2
Hyacinthaceae	*Ledebouria marginata*	LC	-	-	-	N6
Hyacinthaceae	*Ledebouria ovatifolia*	LC	-	-	-	N2; N3; N4; N7
Hyacinthaceae	*Albuca setosa*	LC	-	-	-	N2; N4
Hyacinthaceae	*Albuca virens*	LC	-	-	-	N6
Hypoxidaceae	*Hypoxis rigidula*	LC	-	-	-	N1
Hypoxidaceae	*Hypoxis obtusa*	LC	-	-	-	N1; N4
Hypoxidaceae	*Hypoxis angustifolia*	LC	-	-	-	N2
Iridaceae	*Dierama tysonii*	VU	Schedule 4	-	-	N2
Lobeliaceae	*Lobelia flaccida*	LC	-	-	-	All sites
Lobeliaceae	*Monopsis decipiens*	LC	-	-	-	N2; N5
Malvaceae	*Hermannia althaeifolia*	LC	-	-	-	N2
Malvaceae	*Hermannia depressa*	LC	-	-	-	N1; N2; N3, N6
Malvaceae	*Hibiscus microcarpus*	LC	-	-	-	N6
Plantaginaceae	*Plantago lanceolata*	LC	-	-	-	All sites
Poaceae	*Aristida junciformis*	LC	-	-	-	N3; N5; N7
Poaceae	*Andropogon eucomus*	LC	-	-	-	N5; N7

Family	Species	Red List Category	PNCO	TOPS	Protected Tree	Sample Site Number
Poaceae	*Digitaria eriantha*	LC	-	-	-	N2
Poaceae	*Brachiaria serrata*	LC	-	-	-	N3: N7
Poaceae	*Cynodon incompletus*	LC	-	-	-	N3; N5; N7
Poaceae	*Elionurus muticus*	LC	-	-	-	N2; N3; N6
Poaceae	*Eragrostis capensis*	LC	-	-	-	N2; N3, N4
Poaceae	*Eragrostis curvula*	LC	-	-	-	N1; N2
Poaceae	*Helictotrichon turgidulum*	LC	-	-	-	N1; N2
Poaceae	*Melinis nerviglumis*	LC	-	-	-	N1; N3; N4; N7
Poaceae	*Pennisetum sphacelatum*	LC	-	-	-	N1; N3
Poaceae	*Setaria sphacelata*	LC	-	-	-	N2; N5; N6
Poaceae	*Setaria nigrirostris*		-	-	-	N3, N4
Poaceae	*Setaria sp.*		-	-	-	N2 (Mabela Sandy Grassland)
Poaceae	*Sporobolus pyramidalis*	LC	-	-	-	N5; N7
Poaceae	*Urochloa serrata*	LC	-	-	-	N6
Poaceae	*Themeda triandra*	LC	-	-	-	N2; N4; N5; N7
Polygalaceae	*Polygala hottentotta*	LC	-	-	-	N3
Ranunculaceae	*Ranunculus multifidus*	LC	-	-	-	N2; N3; N6
Scrophulariaceae	*Diclis reptans*	LC	-	-	-	N2; N5
Scrophulariaceae	*Manulea buchneroides*	LC	-	-	-	N2
Scrophulariaceae	*Nemesia fruticans*	LC	-	-	-	N2

The following plants will require a permit application from DEDEAT:

Name: *Dierama tysonii* (Schedule 4 PNCO, Red List Category VULNERABLE)

Family: Iridaceae

The only plant SCC identified on site, includes Dierama tysonii, classified as VU (B1ab(ii,iii,iv,v)). This species is known from approximately 10 locations and has an EOO of 2024 km². However, this was an isolated population and was observed along the boundary of the road reserve. Observed on sample site number N2 circled in Figure 2-2. The *Dierama tysonii* population should be avoided as far as possible. However, if avoidance is not possible, permits for the removal and translocation of this populations must be obtained. This population must be translocated within the same habitat type, on an adjacent property by a qualified botanist/horticulturalist.

Figure 3-1. Sample Site area N2

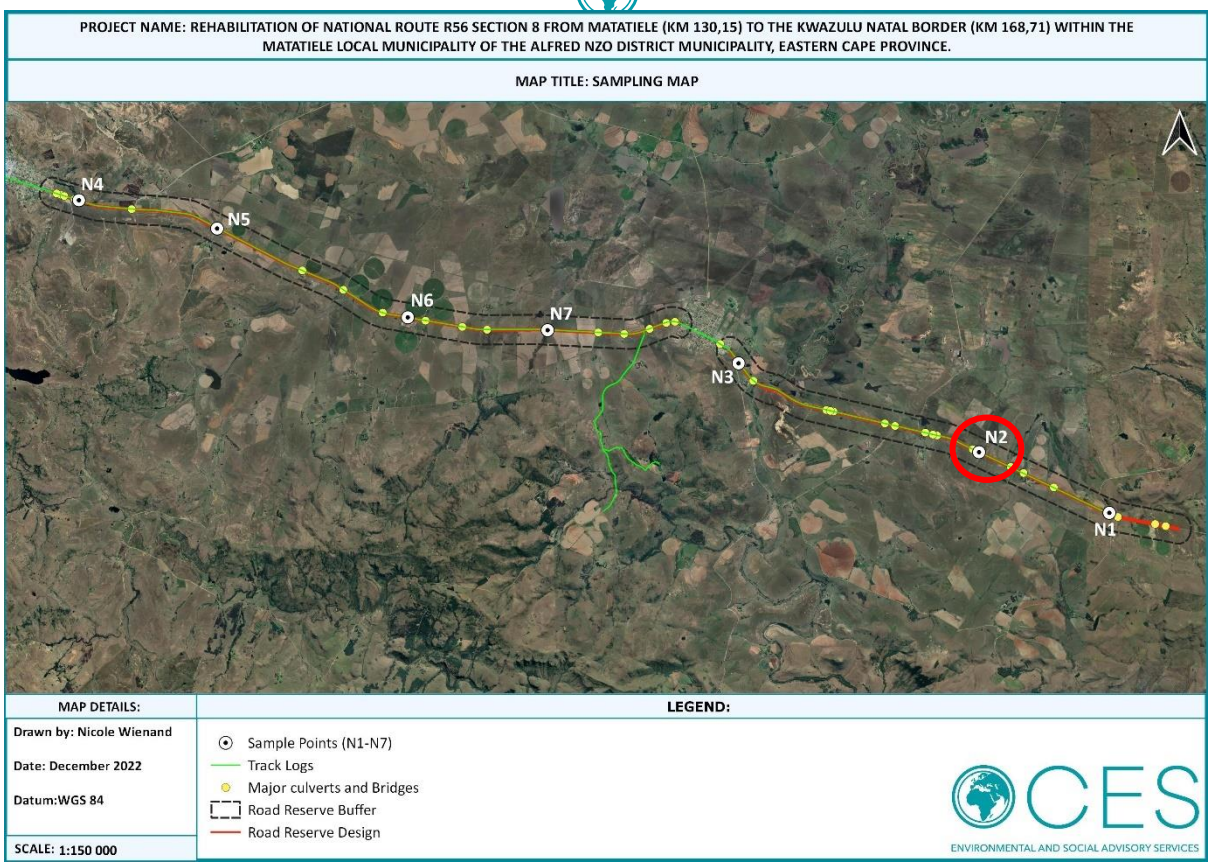

Figure 3-2. Sampling locations used by the Ecological Specialist within the proposed development footprint.

The circled N2 area in Figure 2-2 depicts the location of where the SCC species, *Dierama tysonii,* will need to be translocated from.

4 PLANT RELOCATION PLAN

The *Dierama tysonii* population should be avoided as far as possible. However, if avoidance is not possible, permits for the removal and translocation of this populations must be obtained. This population must be translocated within the same habitat type, on an adjacent property by a qualified botanist/horticulturalist.

This section provides the details of the Plant Relocation Plan. The Plant Relocation Plan must be implemented together with the approved Environmental Management Programme (EMPr).

- SCC will only be removed from the approved construction footprint;
- The entire site was walked and the SCC, which need to be removed, were identified and marked with construction tape during a ground-truthing exercise conducted prior to commencement of clearing;
- The following SCC were identified that will require Provincial Ordinance permits from DEDEAT:
    - *Dierama tysonii*

- The *D. tysonii* plant species will be removed individually with the use of picks, garden forks and small spades. The soil around the plants will be loosened and the plant extracted ***with the plants bulb intact***; it is imperative that the plant's roots and bulbs also need to be removed;
- Plants will be relocated to the adjacent property, outside the construction footprint, but still within the vegetation community. All relocated plants will be watered immediately after being replanted.
- The dry/dead *D. tysonii* that are seeding will be collected prior to clearing and stored in a dry area to preserve the seeds, afterwhich they will be used in rehabilitation of the area. The dry plants will be scattered over the rehabilitated site and on the adjacent property where the seeds will be dispersed and the plant will be able to proliferate.
- The establishment of an onsite nursery will not be required. None of the removed plants are required to be kept in a nursery either temporarily or permanently.
- After completion of the search and rescue, a Vegetation Search & Rescue Report will be submitted to DEDEAT.