ENVIRONMENTAL MANAGEMENT PROGRAM

FOR THE PROPOSED UPGRADE OF THE SCHOEMANSKLOOF ROUTE R539, MPUMALANGA, SOUTH AFRICA

March 2022

Proponent:

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	Name	Signature	Date
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DOCUMENT PROGRESS

Distribution List

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20/12/2021	TracN4-SMK-upgrades-EMPr-0	Internal	Internal Review
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Amendments on Document

Date	Report Reference Number		Description of Amendment
20/12/2021	TracN4-SMK-upgrades-EMPr-0	TracN4-SMK-upgrades-EMPr-00	Minor amendments
06/01/2022	TracN4-SMK-upgrades-EMPr-00	TracN4-SMK-upgrades-EMPr-d	Minor amendments
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10/03/2022	TracN4-SMK-upgrades-EMPr-d	TracN4-SMK-upgrades-EMPr-d1	Alternatives amendments; Finalise report

INDEMNITY AND CONDITIONS RELATING TO THIS REPORT

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1 INTRODUCTION

The South African National Roads Agency SoC Limited (SANRAL) is proposing road upgrades and improvements to the existing Schoemanskloof Route (R539) which is an alternative route to the N4 national toll route between eNtokozweni (Machadodorp) in the west and the T-junction between these two roads at Montrose, situated approximately 30 km east of Mbombela (Nelspruit).

As part of continual upgrading of this road corridor between Pretoria in the west and Maputo, Mozambique in the east; a need has arisen to bring about such improvements to this section of road to:
- Improve traffic flow speeds; and
- Drastically improve the safety of motorists by allowing for improved overtaking opportunities amidst the presence of slow-moving traffic, creating vastly improved climbing off- and onto the R539 with the introduction of appropriately designed, constructed and marked intersections.

This will be achieved by:

- lengthening existing overtaking lanes along certain sections in need of this improvement,
- introducing new overtaking lanes along certain sections in need of this improvement,
- re-aligning certain sections of road towards improved safety of traffic flow,
- introducing road safety upgrades and features to the existing treacherous bend at Poplar Creek (synonymous with high number of vehicular accidents resulting in high numbers of injuries and fatalities), and
- introducing formal and safer intersections to reduce the high number of informal accesses on- and off the R539.

Currently, a high number of road accidents – many resulting in fatalities, are experienced along the Schoemanskloof Route which can be attributed to a number of factors such as the higher number of trucks utilising the route and often contributing to frustration of passenger vehicle drivers who tend to take more risks in overtaking such slow-moving trucks; drivers having to climb-off the R539 route and often times around blind bends or sections where high traffic speed occurs with no dedicated turning lanes present; and drivers having to climb onto the R539 under similar circumstances.

SANRAL has appointed an implementing agent and concessionaire for the National N4 Toll Route existing between Pretoria and Maputo known as “Trans African Concessions” (known as “TRAC”) – a concessionaire established during the mid-90’s specifically for the management of the N4 corridor between South Africa and Mozambique. TRAC, as SANRAL’s Implementing Agent ultimately needs to ensure compliance with all conditions of environmental licenses, permits and similar authorisations as custodians of the N4 road on behalf of SANRAL. It therefore means that although SANRAL is the Proponent, TRAC remains the Implementing Agent.

Prism Environmental Management Services (Prism EMS) as independent Environmental Assessment Practitioners (EAP) has been appointed by TracN4 to undertake the required environmental authorisation processes required by a host of environmental legislation. Such a process is referred to as an ***Environmental Authorisation process*** and a prominent part of this authorisation includes authorisation of the **Environmental Management Program (EMPr)** which is to provide appropriate guidance and setting of environmental parameters to the road upgrades construction phase.

1.1 Location

The Schoemanskloof R539 road is situated between eNtokozweni (Machadodorp) and Mbombela (Nelspruit) in the Mpumalanga Province of South Africa. It serves as an alternative route of road travel between these regions – the other being the existing N4 national toll route that is situated along the Elands River valley in the south passing Ngodwana. The whole length of the existing Schoemanskloof R539 road comprises 61 km. The road's furthest western end joins with the N4 national toll route situated 5,5 km east of eNtokozweni, whilst its furthest eastern end is a T-junction with the same N4 national toll route at Montrose situated approximately 30 km east of Mbombela (**Figure 1-1**).

The route and therefore its proposed upgrades fall within the:

- Ehlanzeni District Municipality (eastern section)
- Ward 12 of the City of Mbombela Municipality (eastern section)
- Nkangala District Municipality (western section)
- Emakhazeni Local Municipality (western section)

The Schoemanskloof Route overarching co-ordinates are shown in **Table 1-1** below.

Table 1-1: Locality points of the authorisation application area

Schoemanskloof Route Co-ordinates	Co-ordinates (ddmmss)
Western end co-ordinate	25° 36' 30.30 S 30° 16' 49.90 E
Bambi turn-off	25° 30' 02.80 S 30° 21' 48.00 E
Northern position along Schoemanskloof Route	25° 23' 05.15 S 30° 31' 50.30 E
Eastern end co-ordinate	25° 27' 34.30 S 30° 41' 39.20 E

Refer to **Figure 1-1** below for a visual indication of the Schoemanskloof Route R539 location.

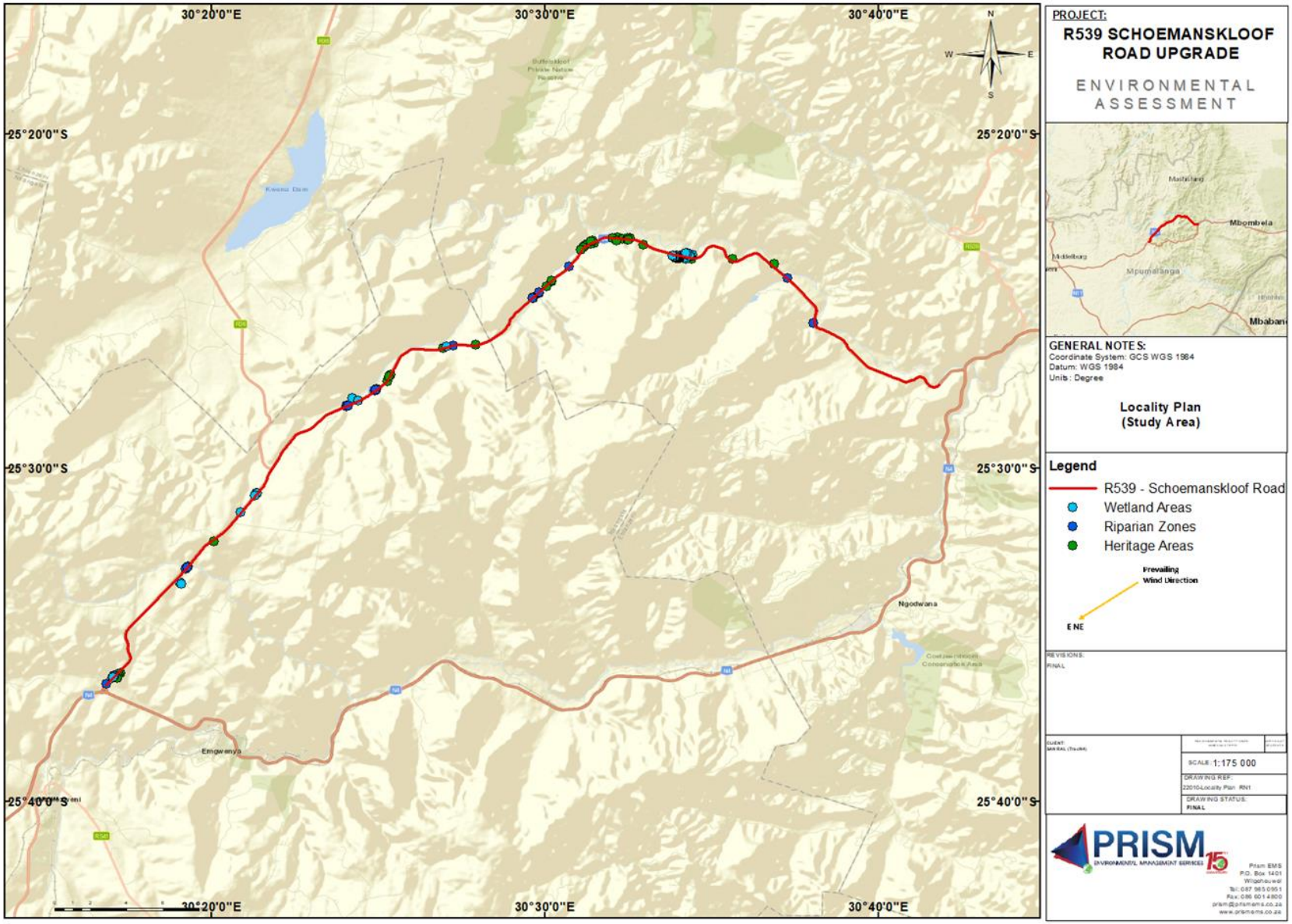

Figure 1-1: Locality Plan of the Schoemanskloof R539 road

2 PURPOSE OF THE DOCUMENT

The purpose of this document is to provide guidelines for environmental best practice to the Contractor commissioned to construct the proposed road upgrades and associated consolidated accesses with access roads. This document shall be seen as part of the contract. **The EMPr will thus be part of the enquiry document to make the recommendations and constraints, as set out in this document, enforceable under the general conditions of contract.**

The EMPr has a long-term objective to ensure that:

- Environmental Management considerations are implemented from the start of the project,
- Precautions against damage and claims arising from damage are taken timeously, and
- The completion date of the contract is not delayed due to problems with Landowners arising during the course of construction.

TracN4 requires a commitment from the Site and Project Managers as well as Contractor's team on the following issues:

1) Take into consideration the surrounding landowners and businesses as the upgrades will include roads traversing adjacent properties.
2) Always behave professionally on and off site.
3) Ensure quality in all work done, technical and environmental.
4) Resolve problems and claims arising from damage immediately to ensure a smooth flow of operations.
5) To underwrite SANRAL's Environmental Policy at all times.
6) To use this EMPr for the benefit of all involved.
7) *To preserve the natural environment by limiting destructive actions on site.*

3 SCOPE OF THE DOCUMENT

This EMPr encompasses the upgrades of the existing Schoemanskloof Road R539 and introduction of consolidated accesses with access roads and incorporates environmental management objectives and planning actions for the construction of these road upgrades. It has been compiled in terms of South Africa's Environmental Impact Assessment Regulations promulgated under the National Environmental Management Act (NEMA) (Act 107 of 1998), as amended and the Environmental Impact Regulations promulgated in December 2014. The EMPr also follows the rationale of the ISO 14001:2015 International Standard for Environmental Management Systems in that it addresses and differentiates between Activities, Aspects, Impacts, Objectives and Planning Actions.

4 EMPR REQUIREMENTS AND REPORT OUTLINE

The contents of this EMPr has been compiled according to the prescribed minimum legal requirements contained in Appendix 4 of the EIA Regulations, 2014 (as amended). Refer to **Table 4-1** below. Additional sections have been added to the report for purposes of best environmental practice.

Table 4-1: Contents of EMPr

Chapter Number	Chapter Name	Requirements included in Appendix 4 of 2014 EIA Regulations
1.	Introduction	-
2.	Purpose of the Document	-
3.	Scope of the Document	-
4.	EMPr Requirements and Report Outline	-
5.	Details of EAP	(a) details of (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;
6.	Regulatory Framework	-
7.	Project Description and Activities, Aspects, and Impacts	(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.
8.	General Roles and Responsibilities	(i) an indication of the persons who will be responsible for the implementation of the impact management actions
9.	Environmental Sensitivity	(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 any areas that should be avoided, including buffers;
10.	Environmental Awareness Plan	(m) an environmental awareness plan describing the manner in which- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and
11.	Waste Management Plan	-
12.	Emergency Preparedness Plan	-
13.	Monitoring Programme	(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);

Chapter Number	**Chapter Name**	**Requirements included in Appendix 4 of 2014 EIA Regulations**
		(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);
		(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;
14.	Environmental Objections and Planning Actions	(d) a description of the impact management objectives, 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- (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;
		(e) a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d)
		(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;
15.	Conclusion	-

5 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Prism EMS have been appointed to undertake the required Environmental Authorisation process in terms of the required Basic Assessment Process. Details and expertise of the Environmental Assessment Practitioner (EAP) who prepared the EMPr are provided in **Table 5-1**.

Table 5-1: Details of the EAP.

EAP:	Ryan Nawn	Vanessa Stippel
Company:	Prism Environmental Management Services	Prism Environmental Management Services
Highest Qualification:	M.Sc. Environmental Management	M.Sc. Ecology, Environment and Conservation
Experience:	21 years	12 years
Affiliation/ Registration	SAATCA Registered Lead Auditor Member of IAIAsa (2450)	Professional Member of Southern African Institute of Ecologists and Environmental Scientists Member of IAIAsa (6020) SACNASP: Pr.Sci.Nat. (116221) EAPASA: Registered EAP in terms of Section 24H of NEMA, 1998 (as amended) (2019/175)
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Designation	**Name**	**Qualification**	**Professional Registration**	**Specialist Assessment**
Prism EMS Team				
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Project Director	De Wet Botha	MA. Environmental Management PHED	SACNASP Registered Scientist – Pr.Sci.Nat. (119979) EAPASA: Registered EAP (2019/1209) Member of the International Association for Impact Assessors (IAIAsa) (1653) Member of the Gauteng Wetland Forum Member of the South African Wetland Society	Project Management and Quality Control and Review

6 REGULATORY FRAMEWORK

This section aims to provide an overview of key policy, legislation, plans, guidelines and municipal development planning frameworks triggered by the proposed project. The following Acts, Regulations, By-Laws and Guidelines are applicable to the proposed development.

6.1 Constitution of the Republic of South Africa

This is the supreme law of the country. It therefore means that all laws, including those pertaining to the proposed development, must conform to the Constitution. The Bill of Rights is also entrenched in the Constitution under Chapter 2. The Bill of Rights include an environmental right (Section 24) according to which:

"Everyone has the right to -

a) an environment that is not harmful to their health or well-being; and

b) 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

(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

Relevance to the proposed Schoemanskloof Road upgrades project

The proponent (SANRAL) has an obligation to ensure that the proposed development will:

- Not result in pollution and ecological degradation; and
- Be ecologically sustainable, while demonstrating economic and social development.

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

The NEMA is the umbrella framework for all environmental legislation primarily to assist with implementing the environmental rights of the Constitution (refer to Section 6.1). The NEMA provides fundamental principles required for environmental decision making and to achieve sustainable development. It also makes provision for duty of care to prevent, control and rehabilitate the effects of significant pollution and environmental degradation, and prosecute environmental crimes. These principles must be adhered to and taken into consideration during the impact assessment phase.

NEMA defines "environment" as –

"the surroundings within which humans exist and that are made up of –

(i) the land, water and atmosphere of the earth;

(ii) micro-organisms, plants and animal life;

(iii) any part or combination of (i) or (ii) and the interrelationship among and between them; and

(iv) the physical, chemical, aesthetic and cultural, properties and conditions of the foregoing that influence human health and well-being."

NEMA introduces the 'duty of care' concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution and may lead to the prosecution of managers or directors of companies for the conduct of the persons.

In addition, NEMA introduced a framework for environmental impact assessments, which aims to avoid detrimental environmental impacts through the regulation of specific activities that cannot commence without prior environmental authorisation. Authorisation in terms of the EIA Regulations GN R 326, 2014 (as amended), either requires a Basic Assessment (Listing Notices 1 and 3) or a Full Scoping and Environmental Impact Assessment report (Listing Notice 2), depending on the type of activity. These assessments specify mitigation and management guidelines to minimise negative environmental impacts and optimise positive impacts.

Relevance to the proposed Schoemanskloof Road upgrades project

An application for Environmental Authorisation (as triggered by the EIA Regulations 2014 (as amended) will be required. In terms of Section 28, every person who causes, has caused, or may cause significant pollution or degradation of the environment, must take reasonable measures to prevent pollution or rectify the damage caused. The undertaking of various specialist studies, in order to identify potential impacts on the environment and to recommend mitigation measures to minimise these impacts, complies with Section 28 of NEMA. The developer must apply the NEMA principles, the fair decision-making and conflict management procedures that are provided for in NEMA. The developer must apply the principles of Integrated Environmental Management and consider, investigate and assess the potential impact of existing and planned activities on the environment, socio-economic conditions and the cultural heritage.

In terms of the EIA regulations, the construction of the Schoemanskloof Road upgrades triggers the need for a **Basic Assessment process & Report (BAR)** under the NEMA EIA Regulations of 2014 (as amended) in Listing Notice 1 and Listing Notice 3 respectively.

6.2.1 Environmental Impact Assessment Regulations, 2014 (GN R 982 of 4 December 2014, as amended)

The EIA regulations were promulgated in terms of Section 24 of the NEMA, for the purpose of providing methodologies and specific requirements for the undertaking of an EIA. The Regulations stipulate that any proposed activity listed in the associated notices must undertake either a Basic Assessment (BA) or Scoping & Environmental Impact Report (S&EIR) in order to obtain an environmental authorisation (if granted) by the competent authority before the commencement of the specified listed activity.

The EIA Regulations provide the minimum requirements for appointing an Environmental Assessment Practitioner (EAP) and for undertaking the relevant Public Participation Process (PPP) as required. They also detail the contents of the impact assessment reports and all other aspects associated with BA and/or EIAs.

Table 6-1 below illustrates the proposed Schoemanskloof Road upgrades relevant activities that apply to those described in **Listing Notice 1 of GN 327 of 7 April 2017** promulgated under the National Environmental Management Act (No. 107 of 1998). Listing Notice 1 require that a Basic Assessment Process be followed in order for the competent authority (in this case the National Department of Forestry, Fisheries and the Environment) to make an informed decision on either authorising or not authorising the proposed development.

Table 6-1: Activities triggering a BAR process in terms of Listing Notice 1

Activity No(s):	Relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended:	Describe the aspect of the proposed project to which the applicable listed activity relates:
9 (i)	*The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—* *(i) with an internal diameter of 0,36 metres or more; or* *(ii) with a peak throughput of 120 litres per second or more;* *excluding where—* *(a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or* *(b) where such development will occur within an urban area.*	As part of the road upgrades, some sections of the existing Schoemanskloof Road will be re-aligned. As part of this, new stormwater drainage will be put in place and will include: • Cut-off berms or drains on top of deep cuts; • Type F concrete side drains and grid inlets to intercept road surface runoff; • Type A concrete side drains in high fills; where run-off will be discharged by downpipes/ chutes; • A minimum of 900 mm diameter cross drainage culverts (In accordance with SANRAL standards for culverts longer than 30 m).
12 (ii)(a)(c)	*The development of—*	The proposed road upgrades involve re-aligning some sections of the existing Schoemanskloof Road. Part of these

	(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; — excluding—* *(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;* *(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;* *(dd) where such development occurs within an urban area;* *(ee) where such development occurs within existing roads, road reserves or railway line reserves; or* *(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.*	changes oftentimes traverses minor drainage lines and larger watercourses and as such will result in infrastructure of more than 100m^2 within a watercourse as well as within 32m of a watercourse.
19.	*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving –* *-will occur behind a development setback;* *-is for maintenance purposes undertaken in accordance with a maintenance management plan;* *-falls within the ambit of activity 21 in this Notice, in which case that activity applies;*	The proposed road upgrades involve re-aligning some sections of the existing Schoemanskloof Road. Part of these changes oftentimes traverses minor drainage lines and larger watercourses and as such will result in bridges and culverts infrastructure introduced or widened at some crossings. In addition, depositing of material (concrete etc.) will be undertaken as part of the road and bridge construction.

	-occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or *-where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.*	These activities could result in more than 10 cubic metres of material from the Crocodile River as well as other drainage lines.
24.	*The development of a road –* *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters;* *But excluding a road –* *(c) which is 1 kilometer or shorter*	The proposed road upgrades involve reducing the number of direct access points along Schoemanskloof Road from approximately 130 accesses to 24 intersections. New gravel access roads will need to be constructed between these intersections and surrounding properties and there are some which will exceed 1 kilometer in length. The gravel access roads will be 6,6 meters wide and within a 16 meter servitude which must still be established through formal land expropriation processes.
48.(i)(a)(c)	*The expansion of –* *(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or* *(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;* *where such expansion occurs –* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;* *excluding –* *(aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;* *(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;* *(dd) where such expansion occurs within an urban area; or* *(ee) where such expansion occurs within existing roads, road reserves or railway line* *reserves.*	The proposed road upgrades involve re-aligning some sections of the existing Schoemanskloof Road. Part of these changes oftentimes traverses minor drainage lines and larger watercourses and as such will result in bridges and culverts infrastructure introduced or widened at some crossings. This will result in the expansion of infrastructure by more than 100m^2 within a watercourse. This will result in an expansion of infrastructure within the watercourse and within 32m of the watercourse.

56.	*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre –* *(i) where the existing reserve is wider than 13,5 meters; or* *(ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.*	The proposed road upgrades involve re-aligning some sections of the existing Schoemanskloof Road. Part of these changes oftentimes involve widening of the existing SANRAL servitude and road.

Table 6-2 below illustrates the proposed Schoemanskloof Road upgrades relevant activities that apply to those described in **Listing Notice 3 of GN 324 of 7 April 2017** promulgated under the National Environmental Management Act (No. 107 of 1998). Listing Notice 3 highlight specific geographic areas and also requires that a Basic Assessment Process be followed if the listing activities apply to the specific geographic areas.

Table 6-2: Activities triggering a BAR process in terms of Listing Notice 3

Activity No(s):	Relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
4 (f)(i)(ff)	*The development of a road wider than 4 metres with* *a reserve less than 13,5 metres.* ***(f) Mpumalanga*** *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves; or* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation.*	The proposed road upgrades involve re-aligning some sections of the existing Schoemanskloof Road. Part of these changes oftentimes involve widening of the existing SANRAL servitude and road and introduction of new 6,6m wide gravel access roads within 16m wide servitudes to be expropriated from land adjacent to the existing SANRAL servitude. These activities will take place outside an urban area in areas identified as a Critical Biodiversity Areas (CBA)
12 (f)	*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* ***f. Mpumalanga***	The proposed road upgrades involve re-aligning some sections of the existing Schoemanskloof Road. Part of these changes oftentimes involve widening of the existing SANRAL servitude and road and introduction of new 6,6m wide gravel access roads within 16m wide servitudes to

	i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; *ii. Within critical biodiversity areas identified in bioregional plans; or* *iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA.*	be expropriated from land adjacent to the existing SANRAL servitude. The clearance of indigenous vegetation exceeding 300m^2 applies in some sections. These activities will take place in areas identified as a Critical Biodiversity Areas (CBA).
14 (f)	*The development of* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *where such Development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.* ***f. Mpumalanga*** *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) World Heritage Sites;* *(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(ee) Sites or areas identified in terms of an international convention;* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(gg) Core areas in biosphere reserves; or* *(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA*	The proposed road upgrades involve re-aligning some sections of the existing Schoemanskloof Road. Part of these changes oftentimes traverses minor drainage lines and larger watercourses and as such will result in bridges and culverts infrastructure introduced or widened at some crossings. This will result in development of more than 10m^2 of infrastructure within some watercourses or within 32m of a watercourse in a Critical Biodiversity Area (CBA).

	or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation.	
18 (f)	*The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* ***f. Mpumalanga*** *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves; or* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation.*	The proposed road upgrades involve re-aligning some sections of the existing Schoemanskloof Road. Part of these changes oftentimes result in widening roads by more than 4 metres and/or creation of gravel access exceeding 1 km. This widening will take place in areas identified as a Critical Biodiversity Area (CBA).
23 (f)(i)(ee)	*The expansion of –* *(i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or* *(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs –* *(a) within a watercourse;* *(b) in front of a development setback adopted in the prescribed manner; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.* ***f. Mpumalanga*** *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;*	The proposed road upgrades involve re-aligning some sections of the existing Schoemanskloof Road. Part of these changes oftentimes traverses minor drainage lines and larger watercourses and as such will result in bridges and culverts infrastructure introduced or widened at some crossings and. This will result in expansion of more than 10m^2 of infrastructure within some watercourses or within 32m of a watercourse in a Critical Biodiversity Area (CBA).

	(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation.*	

Note that the activities that apply to those described in Listing Notice 2 of GN 325 of 7 April 2017 promulgated under the National Environmental Management Act (No. 107 of 1998) do not apply to the Schoemanskloof Road upgrades. Listing Notice 2 require that a full Scoping and EIA process be followed.

6.2.2 GN 960 of 5 July 2019 | Notice of the requirements to submit a report generated by the National Web Based Environmental Screening Tool in terms of Section 24(5)(h) of the National Environmental Management Act, 1998 and Regulation 18(1)(b)(v) of the EIA Regulations, 2014 (as amended)

As per the requirements of GN 960 of 5 July 2019, a report was generated on the National Screening tool and is submitted as part of the draft BAR.

6.2.3 Directions Regarding Measures to Address, Prevent and Combat the Spread Of COVID-19 Relating to National Environmental Management Permits And Licenses (GN 650 Of 5 June 2020)

The purpose of the Directions is to curtail the threat posed by the COVID-19 pandemic and to alleviate, contain and minimise the effects of the national state of disaster, and in particular to provide directions to ensure fair licensing processes and public participation processes. In line with the requirements, a Public Participation Plan has been compiled and subsequently as part of the draft BAR.

6.2.4 Directions Regarding Measures to Address, Prevent and Combat the Spread Of COVID-19 Relating To National Environmental Management Permits And Licenses (GN 970 Of 9 September 2020)

The purpose of the Directions is to curtail the threat posed by the COVID-19 pandemic and to alleviate, contain and minimise the effects of the national state of disaster, and in particular to provide directions to ensure fair licensing processes and public participation processes. These Directions apply to Alert Level 2 and lower. As part of this, the Directions require that any activity that was affected by timeframes in terms of the repealed timeframes and have not yet resumed must do so in order to avoid lapsing of the decision

within 30 days of the Gazette or where this cannot be undertaken, an extension must be obtained in writing within 30 days.

6.3 National Water Act (NWA), 1998 (Act No. 36 of 1998)

The NWA is the primary regulatory legislation; controlling and managing the use of water resources as well as the pollution thereof and is implemented and enforced by the Department of Human Settlements, Water and Sanitation (DHSWS[1]). Section 21 of the NWA lists water uses that must be licensed unless it is listed in the schedule (existing lawful use) and/or is permissible under a general authorisation, or if a responsible authority waives the need for a Water Use Licence. Section 21 water uses include:

- Section 21(a): taking water from a water resource
- Section 21(b): storing water
- Section 21(c): impeding or diverting the flow of water in a watercourse
- Section 21(d): engaging in a stream flow reduction activity contemplated in section 36
- Section 21(e): engaging in a controlled activity as identified in Section 37 (1) or declared under Section 38 (1).
- Section 21(f): discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall, or other conduit.
- Section 21(g): disposal of waste (i.e. effluent from sewage works) in a manner which may detrimentally impact on a water resource;
- Section 21 (h): disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process.
- Section 21 (i): altering the bed, banks, course or characteristics of a watercourse.
- Section 21 (j): removing, discharging, or disposing of water found underground if it necessary for the efficient continuation of an activity or for the safety of people.
- Section 21(k): using water for recreational purposes.

Applicable definitions included in the NWA include watercourse which is defined as "*(a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse (and a reference to a watercourse includes, where relevant, its bed and banks).* The Act also defines a wetland as "*land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil".*

[1] Previously referred to as the Department of Water and Sanitation or DWS

Due to the expansion of some existing bridges and culverts over the tributaries of the Crocodile River, altering two existing low water drifts to low water bridges over the Crocodile River itself, and water needing to be abstracted from the Crocodile River for construction uses; Section 21 uses are triggered and required licencing:

- Section 21 (a): taking water from a water resource
- Section 21(c): impeding or diverting the flow of water in a watercourse
- Section 21 (i): altering the bed, banks, course or characteristics of a watercourse.

6.3.1 General Authorisations in terms of Notice 509 of 2016

The DWS more recently published a new General Authorisation (GA) in terms of Section 39 of the NWA for water uses as defined in Section 21(c) or Section 21(i) (GN 509 of 26 August 2016).

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

In terms of this GA, any persons who owns or lawfully occupies property or has access to land in which the use of water takes place, can do as follows:

(i) exercise the water use activities in terms of Section 21(c) or (i) of the Act as set out in Appendix D1 subject to the conditions of this authorisation

(ii) use water in terms of Section 21(c) or (i) of the Act if it has a low risk class as determined through low risk class as determined through the Risk Matrix

(iii) do maintenance work associated with their existing lawful water use in terms of Section 21(c) or (i) of the Act that has a LOW risk class as determined through the Risk Matrix

(iv) conduct river and storm water management activities as contained in a river management plan

(v) conduct rehabilitation of wetlands (read together with Notice 1198 published in Government Gazette 32805 dated 18 December 2009) or rivers where such rehabilitation activities have a LOW risk class as determined through the Risk Matrix

(vi) conduct emergency work arising from an emergency situation or incident associated with the persons' existing lawful water use, provided that all work is executed and reported in the manner prescribed in the Emergency Protocol

In addition, the GA allows State Owned Companies (SOC's), and other institutions specified to use water in terms of Section 21(c) or (i) of the Act as specified. This is applicable in this case and a General Authorisation is therefore applicable.

6.4 National Heritage Resource Act (NHRA), 1999 (Act No. 25 of 1999)

The NHRA provides for the protection and management of South Africa's heritage resources. The South African National Heritage Resources Agency (SAHRA) is the administering authority in regard to all matters relating to heritage resources. A heritage resource refers to any historically important feature such as graves, trees, archaeology, culturally significant symbols, spaces, landscapes and fossil beds as protected heritage resources. In terms of Section 38 of the NHRA, SAHRA can call for a Heritage Impact Assessment (HIA) for certain categories of development. The NHRA also makes provision for the assessment of heritage impacts as part of an EIA/BAR process and indicates that if such an assessment is deemed adequate, a separate HIA is not required.

Section 38 (1) of the NHRA notes that the relevant heritage authority should be notified provided with details such as location, nature and extent of the following developments:

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
(b) the construction of a bridge or similar structure exceeding 50 m in length;
(c) any development or other activity which will change the character of a site—
    (i) exceeding 5 000 m2 in extent; or
    (ii) involving three or more existing erven or subdivisions thereof; or
    (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
(d) the re-zoning of a site exceeding 10 000 m2 in extent; or
(e) any other category of development provided for in regulations by SAHRA or
a provincial heritage resources authority,

Apart from the above, the proposed development triggers the NEMA - Section 23 (2) (b) and therefore a Heritage Impact Assessment (HIA) is required under section 38(8) of the NHRA. A HIA has been undertaken as part of the BA process. The study noted Late Iron Age stone walled features, ephemeral low packed stone wall terraces, older sites dating to the Early Iron Age occupation, several burial sites as well as some older farmsteads and ruins.

6.5 National Environmental Management: Biodiversity Act (NEM:BA), 2004 (Act No. 10 of 2004)

The NEM:BA aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. The purpose of the NEM:BA is to protect ecosystems and the species within as well as the promoting of sustainable use of indigenous biodiversity. During any environmental authorisation process the following regulations are considered and researched if at any stage the following regulations are applicable:

- Alien and Invasive Species Regulations;
- Alien and Invasive Species List;
- Lists of Critically Endangered, Endangered, Vulnerable and Protected Species; and
- Threatened or Protected Species Regulations.

An Ecological Assessment was undertaken and includes a number of mitigation measures included in this EMPr. It was determined that the sections to be upgraded transects two threatened regional vegetation units, namely Lydenburg Montane Grassland within the Grassland Biome and Legogote Sour Bushveld within the Savanna Biome of South Africa – vulnerable and endangered respectively.

The remaining natural vegetation contain national and provincial protected plants, for which permits are required for their destruction. Due to the presence of existing road infrastructure versus the small footprint of the total upgrade sections, it is not expected that the development will have a significant impact on fauna in the area. The upgrade does however provide an opportunity to improve the permeability of the road infrastructure to allow the movement of small to medium animals and herpetofauna to and from the Crocodile River, a source of water in the area.

The proposed upgrade of the two existing river crossings will contribute significantly to improve the permeability of the landscape, especially for ground dwelling organisms during the time of flooding.

It was found that the proposed upgrade will contribute less than 1% to transformation of the remaining natural vegetation and therefore habitat in the broader landscape.

6.6 National Environmental Management: Protected Areas Act (NEMPA) (Act 57 of 2003)

The aim of NEMPA is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscape. It also provides for the establishment of a national register of national, provincial and local protected areas and for the management of those areas in accordance with national norms and standards.

In line with this, the Minister has established a Register of Protected Areas which was utilized to determine whether the proposed development was affected by Protected areas. On a provincial scale, the Mpumalanga Biodiversity Sector Plan of 2014 indicates that 48% or 6.4 ha of the existing road upgrade sections transect Critical Biodiversity Areas (CBA) with only 17% or 2.3 ha are associated with heavily or moderately modified areas. With regards the access roads, the same principal applies, with the highest percentage cover being the CBA's at 44%, but of significance is that the actual extent (hectares) is more than double.

6.7 National Environmental Management: Waste Management Act (NEM: WA), 2008 (Act No. 59 of 2008)

The National Environmental Management: Waste Management Act (NEMWA) gives legal effect to the Government's policies and principles relating to waste management in South Africa, as reflected in the National Waste Management Strategy (NWMS). It aims to regulate waste management in order to protect health and the environment through the provision of reasonable measures for the prevent pollution and ecological degradation.

The Act includes regulations which provide a list of waste management activities that require a waste management licence terms of NEM: WA (GN 921 of 29 November 2013). The proposed development has been assessed as no waste management licence is required for the proposed development. Waste will be collected by municipal waste collectors and disposed of at the municipal landfill.

Storage Facilities in excess of 100m^3 (general waste) or 80m^3 (hazardous) (if required) will comply with the Norms and Standards for the Storage of Waste.

6.8 National Environmental Management: Air Quality Act (NEM: AQA), 2004 (Act No. 39 of 2004)

The aim of NEM: AQA is to regulate air quality in order to protect the environment from pollution and ecological degradation.

The proposed development does not trigger any activities that require an Air Emissions Licence. Dust produced during the construction phase will be managed through the implementation of mitigation measures as described in Section13.2.

6.8.1 National Dust Control Regulations (GN 827 of 1 November 2013)

The purpose of the National Dust Control Regulations, 2013, is to prescribe general measures for the control of dust in all areas.

The proposed development will generate dust which will require proper management. The prescribed dust fallout rate ("D") for non-urban areas is:

- 600 < D <1200 mg/m^2/day – 30-day average.

The Regulations allow for two instances of exceeding the Dust fallout rates. In non-urban settings, this is limited to two instances within a year (not sequential months).

6.9 National Veld and Forest Fire Act (Act No. 101 of 1998)

The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic. The Act provides for a variety of institutions, methods and practices for achieving this purpose.

- Chapter 4 places a duty on owners to prepare and maintain firebreaks; and
- Chapter 5 places a duty on all owners to acquire equipment and have available personnel to fight fires.

Requirements for prevention of fires during the construction of the road upgrades is included in Section xxx of the EMPr.

6.10 National Forests Act, 1998 (Act No. 84 of 1998)

The purposes of this Act are to-

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

In terms of section 15(1) of the National Forests Act, 1998, 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. Protected trees are listed in the: List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998) as published in Government Notice Number 690, September 2017.

Due to the very nature of this linear development through the escarpment of this region of Mpumalanga, the development transects three regional vegetation units, representing three biomes, namely:

1. Lydenburg Montane Grassland – Grassland Biome
2. Legogote Sour Bushveld – Savanna Biome
3. Northern Misbelt Forest – Forest Biome

Most of the upgrades along the existing road infrastructure occur within the Legogote Sour Bushveld unit at 6.6 ha or 54%. The second area in which 45% or 5.5 ha of upgrade will occur is the Lydenburg Montane Grassland, with less than a hectare or 1% of the upgrade occurring in the Northern Mistbelt Forest.

No nationally protected trees were identified or are expected to occur within the Lydenburg Montane Grassland.

Two nationally protected trees in terms of the National Forest Act (1998) occurs within the Legogote Sour Bushveld regional unit namely *Pterocarpus angolensis* (African teak, kiaatboom) and *Sclerocarya birrea* (Marula).

6.11 Conservation of Agricultural Resources Act (No. 43 of 1983)

The Conservation of Agricultural Resources Act (CARA) aims to control over-utilisation of the natural agricultural resources to promote the conservation of soil, water sources and vegetation through the combat of weeds and invader plants. Regulations 15 and 16 under this Act, which relate to problem plants, were amended in March 2001.

The Act provides a list of declared weeds and invader plants as well as indicators of bush encroachment. In terms of weeds and invader plants:

- A land user shall control any category 1 plants that occur on any land or inland water surface;
- No person shall, except for the purposes of a biological control reserve:
  - Establish, plant, maintain, multiply or propagate weeds and invader plants;
  - Import or sell propagating material of category weeds and invader plants; and
  - Acquire propagating material of weeds and invader plants.

These lists include:

- Combating of category 1 plants (Section 15A) according to CARA (Act No 43 of 1983); and
- Combating of category 2 plants (Section 15B) according to CARA (Act No 43 of 1983)

In addition, section 6 of the Act makes provisions for control measures to be applied to achieve the objectives of the Act. These measures relate to *inter alia*:

- Cultivation of virgin soil;
- Protection of wetlands, marshes, water courses and water sources;
- The regulation of the flow pattern and run-off;
- The protection of natural vegetation in the area; and
- The restoration or reclamation of land which is eroded or disturbed.

Invasives species monitoring, control and eradication measures for activities and land under the proponent's control are included in Section 13.3 .

6.12 Mineral and Petroleum Resources Development Act

The purpose of the Act is to regulate the prospecting for and the optimal exploitation, processing and utilization of minerals; to regulate the orderly utilization and the rehabilitation of the surface of land during and after prospecting and mining operations; and to provide for matters connected therewith.

The objectives of this Act are to-

- recognise the internationally accepted right of the State to exercise sovereignty over all the mineral and petroleum resources within the Republic;
- give effect to the principle of the State's custodianship of the nation's mineral and petroleum resources;
- promote equitable access to the nation's mineral and petroleum resources to all the people of South Africa;
- substantially and meaningfully expand opportunities for historically disadvantaged persons, including women and communities, to enter into and actively participate in the mineral and petroleum industries and to benefit from the exploitation of the nation's mineral and petroleum resources; (Section 2(d) substituted by section 2 of Act 49 of 2008 with effect from 7 June 2013);
- promote economic growth and mineral and petroleum resources development in the Republic, particularly development of downstream industries through provision of feedstock, and development of mining and petroleum inputs industries; (Section 2(e) substituted by section 2 of Act 49 of 2008 with effect from 7 June 2013);
- promote employment and advance the social and economic welfare of all South Africans;
- provide for security of tenure in respect of prospecting, exploration, mining and production operations;
- give effect to section 24 of the Constitution by ensuring that the nation's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development; and
- ensure that holders of mining and production rights contribute towards the socio-economic development of the areas in which they are operating.

It should be noted that:

- SANRAL is exempted from the application for a Mining Permit/Right but is not exempted from an application for Environmental Authorisation.
- Any activities requiring extraction of sand or hard rock for construction purposes will require the submission of an application to Department of Mineral Resources (DMR) for Environmental Authorisation.

An Application for a Mining Permit is necessary as five (5) sites have been shortlisted after extensive preliminary geological and high-level environmental screening was undertaken for 33 possible sites to

borrow material for the upgrade of the Schoemanskloof Road. This application under the Act will be undertaken separately.

6.13 National Guidelines and Plans

6.13.1 National Biodiversity Assessment (NBA)

The National Biodiversity Assessment (NBA) was completed as a collaboration between the South African National Biodiversity Institute (SANBI), the Department of Environmental Affairs (DEA) and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period (Driver *et al*., 2012).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Driver *et al*., 2012).

6.13.2 The National Development Plan

The National Development Plan (NDP) identifies five principles for spatial development: spatial justice, spatial sustainability, spatial resilience, spatial quality and special efficiency. It confirms that South African cities are highly fragmented, as little has been achieved in reversing apartheid geography. The Plan proposes that the situation be addressed by establishing new norms and standards: among others by densifying cities, improving transport and locating jobs where people live. The containment of urban sprawl is particularly highlighted in the Plan, confirming that sprawl be contained and reversed (if possible), *"…as denser forms of development are more efficient in terms of land usage, infrastructure cost and environmental protection"*.

The proposed development aligns with the vision of the National Development Plan, as it will promote improved road transport infrastructure to allow for safer travel amongst inhabitants of Mbombela travelling to- and from the western regions of the province and beyond.

6.13.3 Maputo Development Corridor Spatial Development Initiative (SDI)

The "Spatial Development Initiatives (SDI) programme is an interdepartmental investment strategy led by the National Department of Trade and Industry (DTI) and Department of Transport (DoT) and involves strategic initiatives by government. There are a number of these initiatives being pursued by national, provincial and local government in South Africa. The **Maputo Development Corridor (MDC)** is the most advanced and the best known of the SDI's. The Maputo Development Corridor focuses on the N4 route stretching from Witbank to Recano Garcia in Mozambique. The Corridor programme is more than just the construction of the road and includes rail, telecommunications, port facilities and gas pipelines. The proposed Schoemanskloof Road upgrades will take place on the MDC. The efficient and safe functioning of the route which is at the heart of the MDC is of paramount importance.

6.13.4 DEA, 2014 – IEMS Guideline series

The following guidelines have been adopted by the applicant in the pursuit of best practice and sustainable development and are considered in the management measures and mitigation of impacts identified.

- Integrated Environmental Management Guideline: Guideline on Need and Desirability;
- Integrated Environmental Management Guideline Series (Guideline 7);
- Public Participation in the Environmental Impact Assessment Process; and
- Guidelines on Alternatives.

6.14 Provincial Legislation and Guidelines

In addition to national legislation, South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996). A short summary of applicable provincial legislation and guidelines is provided below.

6.14.1 Mpumalanga Conservation Act, 1998 (Act 10 of 1998)

The aim of this Act is to consolidate and amend the laws relating to nature conservation within the Province and to provide for matters connected therewith. As described, the development transects three regional vegetation units, representing three biomes. This Act was taken into account by the Ecological Specialist who found that the following provincially protected species, genera and families were recorded in the plots surveyed:

- Twenty-four provincially protected species in terms of the Mpumalanga Nature Conservation Act (1998) had been recorded within the Lydenburg Montane Grassland, twelve species associated with the protected families Orchidaceae and Proteaceae, and twelve species with the protected genera *Aloe*, *Eucomis*, *Gladiolus*, *Kniphofia*, *Scilla* and *Watsonia*.

The following species which are protected in terms of the Act, occur in the Legogote Sour Bushveld regional vegetation unit, namely: *Pterocarpus angolensis*, all of the species within the following genera Aloe, Gladiolus, Olea, Huernia, Stapelia and Orbea and all of the species in the family Proteaceae (*Faurea rochetiana*, *Faurea saligna*).

6.14.2 Mpumalanga Tourism and Parks Agency Act, 2005 (Act of 2005)

This Act provides for the establishment of the Mpumalanga Tourism and Parks Agency (MTPA) and for the management thereof by a Board; to provide for the sustainable development and improvement of the tourism industry in Mpumalanga; to provide for conservation management of the natural resources of Mpumalanga; to confer powers and functions upon the Agency; to provide for the registration of certain persons and entities directly involved in tourism; to provide for transitional arrangements; and to provide for matters incidental thereto.

6.14.3 MTPA Guidelines for Biodiversity Assessment

To promote national uniform standards in EMPrs, the Mpumalanga Tourism and Parks Agency (MTPA) have set minimum standards that need to be conformed to in terms of Biodiversity Assessments for development applications. These guidelines cover flora, fauna, aquatic and wetland systems. The guidelines were taken into account in the necessary specialist studies.

6.14.4 Mpumalanga Conservation Plan

Mpumalanga's Conservation Plan Version 2 (C-Plan 2) database (MPSB, 2006), is intended to guide conservation and land-use decisions in support of sustainable development at a strategic level, have been identified. The C-Plan 2 maps the distribution of the Province's known biodiversity into categories according to ecological and biodiversity importance and their contribution to meeting the quantitative targets set for each biodiversity feature.

The Mpumalanga Conservation Plan has been used to better understand potential sensitivities which required further assessment. It has also been taken into account by the Ecological Specialist.

6.14.5 Mpumalanga Biodiversity Sector Plan (MBSP)

In 2006 the MTPA and the Department of Agriculture and Land Administration (DALA) initiated the development of the Mpumalanga Biodiversity Conservation Plan (MBCP). As the first such plan produced for the Province, it was intended to guide conservation and land-use decisions in support of sustainable development. The MBCP provided a spatial framework that supported land-use planning and helped to streamline and monitor environmental decision-making (Ferrar & Lotter, 2007).

Since 2007 several technical advances and land use changes necessitated the need for an update of the MBCP. The updated product is called the Mpumalanga Biodiversity Sector Plan (MBSP) and builds on the successes of the MBCP but incorporates improvements in science, technology and data, to provide a more comprehensive assessment of the biodiversity of the terrestrial and freshwater environment in Mpumalanga (MTPA, 2014).

The MBSP has been used to better understand potential sensitivities which required further assessment. It has also been taken into account by the Ecological Specialist in the Ecological Assessment.

6.14.6 Mpumalanga Vision 2030 Strategic Implementation Framework

The Mpumalanga Vision 2030 Strategic Implementation Framework (2013-2030) is established as a direct implementation response to the National Development Plan Vision 2030. It seeks to present and affirm the province's approach towards realising the adopted and articulated national vision and development plan. It includes a number of key drivers for spatial development including corridor and nodal development. As the

proposed development will improve road infrastructure and assist transportation in the area, it is in line with this driver.

6.14.7 Mpumalanga Spatial Development Framework

The Mpumalanga Spatial Development Framework (MSDF) is an indicative framework that promotes, clarifies and refines the spatial development principles and development priorities supported by the relevant policies and legislations such as the National Development Plan and the Mpumalanga Vision 2030 and define the desired spatial form of Mpumalanga.

The MSDFs aim is to guide specific decision regarding the spatial development and arrangement, within and between settlements, and to guide investment and development spending. A set of interrelated strategic development objectives provide the foundation for the spatial development strategies for Mpumalanga supporting the Spatial Indicative Framework. Ten strategic objectives were identified providing Strategic Focus Areas (Areas of Intervention on provincial, district and local level). This includes focus development on development corridors and nodes as well as infrastructure investment. The proposed development aims to improve road safety and efficiency along one of the main routes in the province and is thus in line with this.

6.14.8 Mpumalanga Tourism Growth Strategy

The aim of the strategy is to elaborate a framework to guide tourism initiatives and development. The ultimate objective is to attain sustainable benefits for the people of Mpumalanga by creating additional economic activity. Having a safe and efficient road network is key to the tourism strategy and therefore the development is in line with this.

6.15 Local Legislation and Guidelines

A summary of the other legislation and guidelines are provided in the subsections below.

6.15.1 City of Mbombela Integrated Development Plan

Section 25 of the Municipal Systems Act, 32 of 2000 requires that each municipal council must within a prescribed period after the start of its elected term adopt a single, inclusive and strategic plan, commonly known as Integrated Development Plan (IDP). The IDP must guide and inform all planning, development, budgeting decisions of the municipality. The City of Mbombela's 2017-2022 IDP is crafted under the following mission statement:

"Together in partnership spatially transforming the city, providing effective local governance and rendering competitive municipal services and sustainable development for living, working, investing and leisure"

The Mbombela IDP has identified a number of objectives to be implemented over the 5-year period. These include the provision of infrastructure and sustainable basic services as well as initiating strong and sustainable economic development. The N4 Toll Route via Ngodwana and N4 Schoemanskloof (R539) Route are both important routes within the Municipality (although not managed or operated by the municipality). Improving the road safety and efficiency is aligned to the concepts entrenched in the IDP.

6.15.2 Mbombela Spatial Development Framework (SDF), 2011-2030

The purpose of a municipal SDF is to guide all decisions of a municipality relating to the use, development and planning of land and should have the following key objectives:

- To provide a strategic and indicative forward planning tool to guide decisions on land development;
- To provide a set of policies, principles and directives for spatial development
- To provide a clear and logical framework for private and public sector investment;
- To promote sustainable development in terms of the natural and built environment;
- To provide a framework for dealing with key issues such as natural resource management, land reform and land use management;
- To guide and inform directions of growth and major movement routes

The City of Mbombela SPF includes a focus on development corridors, which are broadly defined as urban areas of high-intensity (i.e. dense and diverse) nodal or 'strip' development focused around (a combination of) rail, high-capacity road and trunk bus routes. They are characterised by a dynamic, mutually supporting relationship between land use and the movement system.

The Plan notes that Development corridors are generally supported by a hierarchy of transport services that function as an integrated system to facilitate ease of movement for private and public transport users. Corridors within the municipality have been categorized into primary and secondary corridors.

The SDF classifies the N4 as a primary transportation corridor. The improvement of the safety and efficiency of the road upgrades is therefore in line with the SDF.

6.15.3 Nkangala District Municipality commitment to the NDP

Nkangala District Municipality takes heed of the National Development Plan (NDP) developed by the National Planning Commission and unveiled on 11 November 2011. The District plans to *inter alia* prioritise the following initiatives:

• Improving infrastructure such as roads (the Schoemanskloof Road forming a significant part of this)
• An economy that will create more jobs
• An inclusive and integrated rural economy
• Building safer communities

7 PROJECT DESCRIPTION AND ACTIVITIES, ASPECTS, AND IMPACTS

A detailed description of the proposed Schoemanskloof Road upgrades can be found in Section 3 of the EIR. In summary, the proposed road upgrades project involves:

7.1 Proposed upgrades

For the upgrades, two different painted median scenarios are proposed for implementation on the road:

- 300 mm wide painted three-line system in cases where a two-lane facility or three-lane facility are applicable.
- 600 mm wide painted median with milled-out rumble strips in cases where a three-lane facility in both directions ("four-lane undivided carriageway") is applicable.

In cases where passing/climbing lanes are proposed, i.e., the road is widened; the following gravel shoulder widths will be implemented where the road is in fill:

- 2,4 m wide gravel shoulders where the road is in fill of up to 3 m.
- 2,7 m wide gravel shoulders where the road is in fill of higher than 3 m. A guardrail will be implemented in this case, which will result in an effective functional gravel shoulder width of 1,9 m.

The existing gravel shoulders for the remainder of the road will be rehabilitated where feasible. The length of existing gravel shoulders to be rehabilitated amounts to ± 30% of the length of the road, or ± 38 km in total length.

There are four main intersections situated along Schoemanskloof Road and these will be upgraded with protected turning lanes as well as acceleration and deceleration tapers:

- Road 796 (Goedewil at km 7,105)
- Road 792 (Elandshoogte at km 14,570)
- P8/1 (R36 to Mashishing known as "Bambi" at km 18,094)
- Weltevreden Road at km 44,076

Added to these upgrades; an *access management plan* has been developed. It reduces the number of direct access points along Schoemanskloof Road from approximately 130 accesses to 24 intersections. The proposed intersections will have protected turning lanes as well as acceleration and deceleration tapers. This will significantly improve the safety concerns and create a much safer road for travellers and landowners along the route. Access management along the route will, however, have a phased implementation. Only prioritized intersections will be constructed as part of the road upgrade construction.

The proposed access consolidation and intersection upgrades will improve road safety by providing protected right-turning lanes at each intersection as well as acceleration and deceleration tapers. These intersections as proposed are also positioned at locations with sufficient horizontal and vertical sight distances to safely turn. The proposed *access management plan* also improves sight distances along the route where feasible by creating wider cuttings to improve the line of sight along bends.

All the proposed intersection positions meet the highest achievable design and safety standards and are an improvement from the status quo in most cases.

Due to numerous farms situated along Schoemanskloof Road, farming activities are ongoing and inevitable. Numerous complaints were received from landowners regarding the movement of farming equipment and livestock on Schoemanskloof Road, which is adding to the safety concerns of the road. The proposed formal and informal access roads and consolidated accesses will significantly reduce the presence of these vehicles and equipment on the road since properties will be better connected without the need to use Schoemanskloof Road as a connecting route. By formalising the access points to Schoemanskloof Road, a more controlled system can be established for these vehicles and equipment entering onto the road. This improvement is, however, not possible everywhere due to segregated land ownership, and topographical and other constraints.

As part of the original upgrade works, agricultural underpasses were constructed to accommodate farming equipment as well as livestock crossing the N4.

7.1.1 Poplar Creek bend

The farm known and signposted as Poplar Creek is situated on the northern side of the Schoemanskloof Road around km 61,000 i.e. the furthest eastern section of the proposed upgrades. It is here that a sharp bend in the road has seen numerous vehicular accidents resulting in injuries and fatalities. The farm's access point poses a dangerous scenario given the access locality in relation to the curve of the Schoemanskloof Road bend, the speed at the which traffic passes this section of road, situations unfolding when vehicles wait for oncoming traffic from the east or west to tun into or out from the access point, the sharp bend and slippery conditions when the surface is wet. Poplar Creek is an export avocado farm and it also grows maize, oats, eragrostis and it has cattle. The farm operates its own packhouse and has a significant number of truck deliveries, in and out of the farm, particularly during the packing season, which ranges from April to September. During this period there are at least 500 movements of large interlink cold trucks and other delivery vehicles and with the expansion at Poplar Creek this will increase over the next few years to about 700 movements i.e. about 6 trucks per day. In addition, there are at least 20 other vehicle movements per day in and out of the farm.

The following additional safety measures for Poplar Creek's bends were proposed to be incorporated as part of the Schoemanskloof Road's overall design:

- Along the eastbound direction, the additional lane will be extended through the Poplar Creek bend and only close after the bend, where there is sufficient sight distance. In the existing scenario, the additional lane closes before a vertical crest curve, limiting sight distance for drivers and creating an unsafe S-movement for driver.
- Along the westbound direction, the opening of the passing lane will be moved so that the additional lane opens before a driver reaches the start of the uphill vertical grade, allowing heavy vehicles to move out of the fast lane before they start to lose speed. The closing position of the additional lane is also shifted to create a longer passing opportunity for drivers.
- Wide gravel shoulders (2,7m wide with guardrails) will be implemented along the new lane in the eastbound direction through the entire Poplar Creek bend. This creates an area for vehicles to safely pull off the road and out of the way of traffic.
- Warning signs will be implemented in areas where the design speed of the road is lower than the posted speed and where practical, i.e. along sharp bends.
- Road markings to be repainted according to standard, the design speed and to conform to the geometry of the road, i.e. no overtaking in locations where there are perceived passing opportunities.
- A 600 mm wide painted median with a yellow solid line centreline will be implemented on the undivided four-lane sections to discourage drivers to overtake.

The access point to the Poplar Creek property will be repositioned to a safer location as part of the access management plan.

7.1.2 Other proposed improvements

The Level of Service (LOS) of the road will be significantly improved.

Passing/climbing lanes are extended along the eastbound and westbound carriageways through Patatanek (km 32,400). After the upgrade, this section of road will be a four-lane section (i.e. two lanes per directions), compared to the existing three-lane facility.

Existing passing/climbing lane tapers often opens and closes inside horizontal curves or on the crest of vertical curves. In order to provide sufficient sight distances and to improve safety, the positions where auxiliary lane tapers open and close were improved in the design.

The radius through the Weltevreden Road intersection (km 44,076) will be increased to allow for improved intersection sight distance and overall safety. Furthermore, this access will also be widened to include a protected right turn slot, which has been requested previously by the Farmers' Association.

Wide gravel shoulders are implemented along sections where the road is widened and in fill. This creates an area for vehicles to safely pull off the road and out of the way of traffic. Existing gravel shoulders will be rehabilitated to eliminate the level difference between the existing road surfacing (tar) and gravel shoulders.

Warning signs will be implemented in areas where the design speed of the road is lower than the posted speed and where practical, i.e. along sharp bends and areas such as De Beersnek (km 18,300) and Patatanek (km 32,400).

Upon completion of the upgrading works, road markings will be reinstated in according to standards and road design speed and to conform to the geometry of the road, i.e. no overtaking in locations where there are perceived passing opportunities.

Accident data between January 2016 and March 2019 were plotted along the centreline of the road and grouped into clusters. The proposed new passing/climbing lanes coincide with most of these accident clusters, which will improve safety along these sections.

A 300 mm wide painted median will be implemented on the two-lane and three-lane sections. A 600 mm wide painted median with a yellow solid line centreline will be implemented on the undivided four-lane sections to discourage drivers to overtake.

From site observations, it was observed that guardrails often stop too short. In these cases, where fills are higher than 3 m, the guardrails will be extended.
Overtaking opportunities by means of a passing or climbing lanes along Schoemanskloof Road will be increased from 17% to 50% of the route length.

There are numerous attraction points/destinations obtaining direct access from the Schoemanskloof Road as well as numerous farm and private property accesses. Access to existing properties at approved locations will be reinstated by providing a 300 mm wide, 6,6 m long edge beam adjacent to the road surfacing. The access to Geluk No. 299-JT Portion 14 (owned by Joubert & Sons at km 48,73) will be upgraded to the SANRAL approved access road intersection layout, allowing a 30 m long dedicated right-turning lane as well as acceleration and deceleration tapers.

The current road reserve width is approximately 40 m wide, but varying. Localised widening of the road reserve will be required where the upgraded road prism extends up to or beyond the existing road reserve as a result of the proposed road widening.

7.1.3 Stormwater management

The existing minor stormwater drainage infrastructure along the route consists of surface drainage and cross drainage culverts. The existing minor cross drainage culverts will be extended where road widenings occur. Affected culverts underneath accesses will be replaced with new concrete culverts and several farm accesses with concrete drifts will be reinstated. New inlet- or outlet structures will also be provided to accommodate culvert extensions or replacements.

There are 11 major culverts and 4 bridges affected by the road upgrade. Only structures which are affected by the widening of the road will have rehabilitation works carried out.

All culverts were found to have adequate hydraulic capacity for the requirements of a road one class below the road's actual classification (i.e. for a Class 3 road). In terms of SANRAL's Drainage Manual, all structures are considered acceptable and do not require replacement or upgrading.

7.1.4 Road surfaces

A detailed visual assessment of the road was carried out in October 2019. Visible defects were recorded along the road by the appointed road engineers (SMEC). The road was found to be in a generally good to very good visual condition. Longitudinal cracks occurred frequently along almost the whole length of the road. Isolated areas of patching were found along the route as well as crocodile cracks. Rutting, bleeding and transverse cracks were found to be minimal and of limited occurrence. The surfacing along the route is a UTFC overlay that is generally in good to very good visual condition, no stripping or stone loss were observed.

7.1.5 Borrow Pits & Quarries

Borrow pit investigations were conducted adjacent to the future Montrose Interchange (± km 63) relevant to both the *Montrose Interchange* and *Schoemanskloof upgrades* projects. From the test results received, G1, G4/G5 and G7-G9 quality material were found at the source, however, the quantity of available material is insufficient for both projects' proposed scope of works. Engineering, geological and high-level environmental screening investigations were also completed to identify possible borrow pit/quarry sites along Schoemanskloof to supplement the available material and reduce the hauling distance from *Montrose*. Five (5) borrow pit/ quarry sites have been shortlisted from an initial 33 sites. These borrow pit sites are subject to a similar environmental authorisation process under the Minerals and Petroleum Resources Development Act (No. 28 of 2002) and its process is soon to commence. It is foreseen that the establishment of a multi-stage crusher to produce the material will be required. Surplus material from the widened cuttings can be utilised for pavement layers and fill.

Aggregate for bituminous surfacing and concrete will be obtained from commercial sources. However, if the quality of the material in the rock quarry is suitable, these aggregates could be produced on site.

7.2 Project activities, aspects and impacts

In order to understand the environmental aspects and associated impacts related to the project and to ensure necessary mitigation is provided, it is necessary to unpack the activities associated with the project life cycle. Related to the project life cycle is a number of project activities and secondary environmental activities. These are tabulated in **Table 7-1.**

Table 7-1: Project Activities

Pre-Construction	**Project Activities**
	Detailed layouts and services designs
	Procurement process for Contractors
	Land acquisition
	Procurement of other necessary materials
	Environmental Activities
	Appointment of Environmental Control Officer (ECO)
	Approval of site camp/construction layout to minimise impact to the environment
	Obtaining necessary permits for Protected Trees and other sensitive features as required
	Barricading of sensitive environmental features
Construction	**Project Activities**
	Appointments and site camp set up: • Set up site camp with temporary offices and administrative facilities; • Set up ablutions • Set up access control, security; signage and lighting • General materials storage and laydown areas • Construction employment • Change-houses, chemical toilets and showering facilities (linked to conservancy tanks – removal of contents by exhauster vehicle and disposal at permitted facility) • Temporary waste storage areas; these shall be established and managed in accordance with EMPr requirements
	Sourcing of construction materials and equipment: • All bulk materials (aggregate, cement, steel etc.) will be sourced from existing lawful commercial sources; or should it be necessary separate applications for mining permits to allow for borrow pits will be undertaken prior to use.
	• Excavation and earthworks • Removal of existing surfacing material where necessary (concrete, asphalt etc.) which could involve excavation below ground level; • Levelling and compaction using heavy machinery / earthmoving equipment. • Cut and fill activities • Material will be sourced from borrow pits and quarries (to be authorised under another environmental application with the Department of Mineral Resources). • A multistage crusher will be established on site.

	• Potential for excavations and trenching in order to lay of below ground level equipment (cables, pipes, sumps, drainage etc.); • Relocation or protection of existing services • Potential for excavation dewatering in the event of water-table interception; • Use of general mechanical equipment within construction areas (generators, cutting and welding equipment, compressors etc.).
	• Storage • Storage of aggregate and materials required for road construction (bitumen etc.) • Storage of topsoil and sub soil • Storage of hazardous material • Storage of waste
	• Expansion of existing bridges and upgrading of two low water crossings/drifts • To achieve the required roadway widenings in some sections, existing bridges will be widened and two low water drifts across the Crocodile River reconstructed to low water bridges. • Conventional ground supported staging will be used to construct the new bridge deck
	• Upgrading Schoemanskloof Road through drainage lines • The widening of the Schoemanskloof Road and introduction of new access roads will cross a number of small drainage lines. The same drainage paths were crossed by the existing Schoemanskloof Road and so the stormwater will be handled in much the same way, whilst the drainage paths under the proposed access roads will be accommodated for by the installation of culverts and associated supporting structures. It must be noted that all upgrades and new access roads have to be designed and constructed in accordance with the SANRAL Drainage Manual. The following also applies: – Earth embankments/ berms will be constructed at the top of the cuttings to channel stormwater runoff for a short distance to inlet structures at the top of the cuttings. – The water will then be conveyed beneath the Schoemanskloof Road via existing stormwater infrastructure. – The stormwater will then discharge from these culverts into existing open, unlined channels or into newly constructed open earth channels. – The aim is to reinstate the existing flow paths and to not increase the discharge flows at any of the existing culverts where possible.
	Environmental Activities
	Diligent compliance monitoring of the EMPr, environmental authorisation and other relevant environmental legislation.
	Monitoring of water quality as per the requirements of the GA.

	Continued consultation with I&APS (as required).
	Environmental awareness creation and training.
Operation	**Project Activities**
	Maintenance of infrastructure.
	Environmental Activities
	Monitoring as and when required by the EMPr by different environmental roles.

8 ROLES, RESPONSIBILITY AND AUTHORITY

8.1 Project Proponent

SANRAL will be the Project Proponent for all components of the work related to the development of the Schoemanskloof Road upgrades, consolidated accesses and associated access roads, whilst TracN4 will act as the Implementing Agent or Concessionaire for the project. Ultimately, the liability associated with environmental non-compliance rests with the Project Proponent.

8.2 Concessionaire/Implementer

The TracN4 is Concessionaire or Implementer for maintenance and improvement of the N4 national toll route between Pretoria in South Africa and Maputo in Mozambique. This role requires that part of TracN4's responsibilities are to oversee the overall implementation of the construction of the Schoemanskloof Road R539 upgrades, consolidated accesses and associated access roads against the compliance to the applicable legislation, the Environmental Authorisation (EA) and approved EMPr.

8.3 Engineer

SMEC South Africa (Pty) Ltd is the appointed Engineer responsible for the design of the road upgrades and associated infrastructure. It will be the responsibility of the Engineer and Concessionaire to ensure that the Contractor adheres to construction specifications, the EA and EMPr. The Engineer and Concessionaire have the authority to stop any construction activity which is in contravention of any of the specifications within the documents mentioned above after consultation with the Environmental Control Officer (ECO). All major decisions which may affect the programme or costs of the project with regards to the environmental procedure or protocols must be approved by the Concessionaire.

8.4 Concessionaire Environmental Coordinator

The Environmental Coordinator (EC) is employed by the Concessionaire and is responsible for overseeing the overall implementation of the EMPr and relevant specifications for the duration of the project on a monthly frequency. The EC should have a clear understanding of the project as well as all the environmental matters pertaining to the project and should have good knowledge on the applicable environmental legislation and processes. Responsibilities of the EC include:

- To advise and provide recommendations to the Site Environmental Control Officer (SECO) on all environmental and related issues based on the requirements of the EMPr.
- To record and forward complaints received from the public to the Engineer and Concessionaire.
- Resolve conflicts.
- Keep detailed and accurate records of the EMPr related activities on site.
- Report to the external Environmental Control Officer (ECO) on the monitoring of environmental issues by means of monthly monitoring reports verifying compliance to the EA and EMPr conditions.

8.5 Contractor

In order to carry out the requirements of this EMPr, the Contractor must make sure that he has a clear understanding of all environmental matters relating to the project. The responsibilities of the Contractor will include:

- The implementation of and adherence to the applicable environmental contract specifications in accordance with the requirements of the EMPr.
- To ensure all Sub-contractors under his supervision adhere to the applicable environmental contract specifications in accordance with the requirements of the EMPr.
- Report any non-compliance within 3 hours of the event occurring to the Concessionaire.
- To ensure that all employees and sub-contractors attend Environmental Awareness Training provided by the EO.
- To undertake any remedial work required in terms of this EMPr as a result of environmental negligence, mismanagement and/or non-compliance.

8.6 Site Environmental Control Officer

A suitably qualified Site Environmental Control Officer (SECO) with adequate experience of large construction projects will be employed by the Contractor and is responsible for overseeing the daily implementation of the EA, the EMPr and contract specifications for the duration of the project. The SECO must be appointed and present on site with the contractor team from site establishment. The SECO must have a bachelor's degree in environmental science or environmental management from a recognised tertiary institution and at least 3 years' experience as SECO on construction projects. Should the Contractor wish to create a 'SHE Officer' role (or similar) for the project, the individual responsible in this role must still have the minimum environmental qualifications and experience as described above. The SECO must have a clear understanding of all the environmental matters pertaining to the project and should have good knowledge on the applicable environmental legal requirements pertaining to the project. Other responsibilities of the SECO include:

- The compilation and completion of daily and weekly checklists, whilst conducting monthly audits and preparation of monthly reports.
- Compiles and submits environmental method statements for approval by the Trac EC and independent ECO.
- Ensure record keeping and environmental administrative tasks are undertaken.
- Ensure implementation and adherence to all environmentally related authorisations, permits and licenses, such as the EA, EMPr, contractor specifications, the GA and approved Method Statements.
- Manages and closes-out non-compliances and responds to incidents.
- Ensures environmental best practice implementation of the project and adheres to sound environmental principles.
- To record and forward all complaints received from external parties to the Trac EC.

- Environmental Awareness Training in the form of an on-site talk and demonstration. The following is also to be noted in terms of training:

Prior to construction, all contractor teams involved in work on the project are to be briefed on their obligations towards environmental controls and methodologies in terms of this EMPr. It is recommended that the briefings take the form of an on-site talk and demonstration by the SECO. The awareness programme should be aimed at all levels of management and construction workers within the contractor and their sub-contractor teams. All new employees arriving on site shall undergo this training and the training shall be repeated after construction beaks (such as the December construction break) as well as to individuals who were absent from site for 3 weeks or longer. Environmental induction must include all main aspects of the EMPr.

'Toolbox talks' are to be used as a tool for continuous training of employees and must be conducted on a weekly basis. Toolbox talks must be conducted in an interactive way as to ensure the employees understand the content and purpose of the specific EMPr requirements.

As construction continues, an effort must be made by the Contractor and SECO to assess the training needs of workers on site. Cognisance must be given to the specific work to be undertaken at the time and, if necessary, additional training on environmental requirements must be conducted to ensure all workers understand the risks involved as well as how to adequately implement mitigation measures.

Records of awareness training conducted must be kept comprising of signed attendance registers.
The SECO is responsible for maintaining all records in relation to the EMPr requirements on site. Such records must be made available to the external ECO on request during his/her quarterly audits, as well as at any time as requested by the ECO or authorities.

8.7 External Environmental Control Officer

TracN4 must appoint a suitably qualified and experienced external and independent Environmental Control Officer (ECO) who will be responsible for conducting quarterly auditing and reporting of the project compliance to the EA and EMPr. The ECO shall have a bachelor's degree in environmental science, conservation or environmental management and at least 5 years' working experience in an environmental monitoring role on construction projects. The contract for the ECO will extend from the commencement of the Construction Phase to the handover of the site by the TracN4 to SANRAL for operation. During this time, the ECO's quarterly reports will be submitted to DEFF, SANRAL and TracN4. The responsibilities of the ECO include but are not limited to:

- Being well-versed and familiar with the contents of the EA and the site-specific EMPr;
- Conduct compliance monitoring with the requirements contained in the EA and EMPr;
- Notify the Proponent (SANRAL) and Concessionaire (TracN4) in the event of any infringements of the EA and EMPr so that appropriate remedial action can be taken;

- Notify the Proponent and Concessionaire timeously in advance of any actions believed of having a significant negative impact, so that mitigatory measures can be discussed and implemented before negative impacts arise.

Furthermore, the ECO's role would also entail:

- Undertake site inspections (in this case on a quarterly basis) to monitor and audit compliance of all parties with the requirements of the EA and EMPr. The external ECO will inform the client of the visit and will commence the visit with an opening meeting on site to gather information regarding the level of operations and a closing meeting to provide feedback to the Resident Engineer and the Concessionaire's EC and Contractor's SECO. A report will be compiled to summarise the findings i.e. reporting on the compliance of all the requirements as detailed in Section 13 of the EMPr;
- Advise on actions or issues impacting on the environment to the Concessionaire's EC, who shall issue any required Site Instructions to the Contractor;
- Undertake photographic monitoring of the construction works;
- Verify awareness on site; and
- Submit the quarterly audit reports to the Department of Environment, Forestry and Fisheries (DEFF), the Proponent and the Concessionaire.

9 ENVIRONMENTAL AWARENESS PLAN

Training aims to create an understanding of environmental management obligations and prescriptive measures governing the execution of the project. It is generally geared towards project team members that require a higher-level of appreciation of the environmental management context and implementation framework for the project. In contrast, **Environmental Awareness Creation** strives to foster a general attentiveness amongst the construction workforce to sensitive environmental features and an understanding of implementing environmental best practices. The Environmental Awareness Plan for the Development incorporates both training and environmental awareness to ensure that the proposed development is implemented in line with the requirements of the EMPr and that environmental sensitivities on site are managed correctly. The below sections should form part of the final Environmental Awareness Plan or Method Statement the Contractor needs to develop upon appointment and before site establishment.

As part of this, **SANRAL** and **TRAC N4** are committed to remaining responsible and accountable for environmental practices on site. Being accountable for environmental practices undertaken during working tasks and activities remain the responsibility of both employer and employee awareness of the potential environmental impacts that could result from these activities.

All potential incidents to the environment may be effectively minimised through effective training and awareness of the employees using any of the following methods:

- Supervisory meetings (weekly);
- Induction training (annually);
- EMP Training (annually); and
- External environmental and/or health and safety courses (when applicable).

These methods are discussed below in more detail.

9.1 Meetings/Toolbox Talks

Weekly supervisory meetings are ideal to facilitate awareness of specific environmental dangers pertaining to each week. Various topics may be discussed during these meetings and must be recorded or logged. All attendees at each meeting must sign an attendance register, these records must be kept on file at the administration office. Topics for discussion may include:

- Topics applicable to the entire operation;
- Area specific topics (e.g. heritage); and
- General environmental awareness:
    - Sensitive species/threatened vegetation
    - Fauna
    - Waste management
    - Spillages
    - Saving water

- Electricity consumption
- Dust control
- Noise generation
- Housekeeping
- Indigenous Vegetation
- Alien vegetation
- Fire-making

'Toolbox talks' are to be used as a tool for continuous training of employees and must be conducted on a weekly basis. Toolbox talks must be conducted in an interactive way as to ensure the employees understand the content and purpose of the specific EMPr requirements. Toolbox talks are most often used to communicate safety issues amongst workers, but it must be ensured that topics of an environmental nature be communicated on the weekly basis.

As construction continues, an effort must be made by the Contractor and SECO to assess the training needs of workers on site. Cognisance must be given to the specific work to be undertaken at the time and, if necessary, additional training on environmental requirements must be conducted to ensure all workers understand the risks involved as well as how to adequately implement mitigation measures.

Records of awareness training conducted must be kept comprising of signed register attendance registers. The SECO is responsible for maintaining all records in relation to the EMPr requirements on site. Such records must be made available to the ECO on request during the quarterly inspections, as well as at any time as requested by the ECO or authorities.

Should issues be identified by the ECO, these can also be addressed during monthly site meetings between the Concessionaire, Engineer and Contractor.

9.2 EMPr/Induction Training

Prior to construction, all contractor teams involved in work on the project are to be briefed on their obligations towards environmental controls and methodologies in terms of this EMPr. It is recommended that the briefings take the form of an on-site talk and demonstration by the SECO. The awareness programme should be aimed at all levels of management and construction workers within the contractor and their sub-contractor teams.

All new employees arriving on site shall undergo this training and the training shall be repeated after construction beaks (such as the December construction break) as well as to individuals who were absent from site for 3 weeks or longer. Environmental induction must include all aspects of the EMPr.

Workers should be informed that they may refuse work that is harmful to human health and/or the environment.

10 WASTE MANAGEMENT PLAN

In order to ensure waste is properly dealt with, waste management is included in the EMPr. In addition, a **Waste Management Plan** is discussed below.

10.1 Legal Requirements

Section 16 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), as amended states 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, reuse, 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;*
- *Prevent the waste from being used for any unauthorised purpose.*

Only temporary storage of waste is allowed (once-off storage of waste for a period less than 90 days). The volume of material should be limited to less than 100m^3 of general waste and less than 80m^3 of hazardous waste. Should this be exceeded the Norms and Standards for the Storage of Waste will need to be complied with.

10.2 Waste Hierarchy

Management objectives provided in this EMPr are aligned to the waste management hierarchy indicated in Error! Reference source not found..

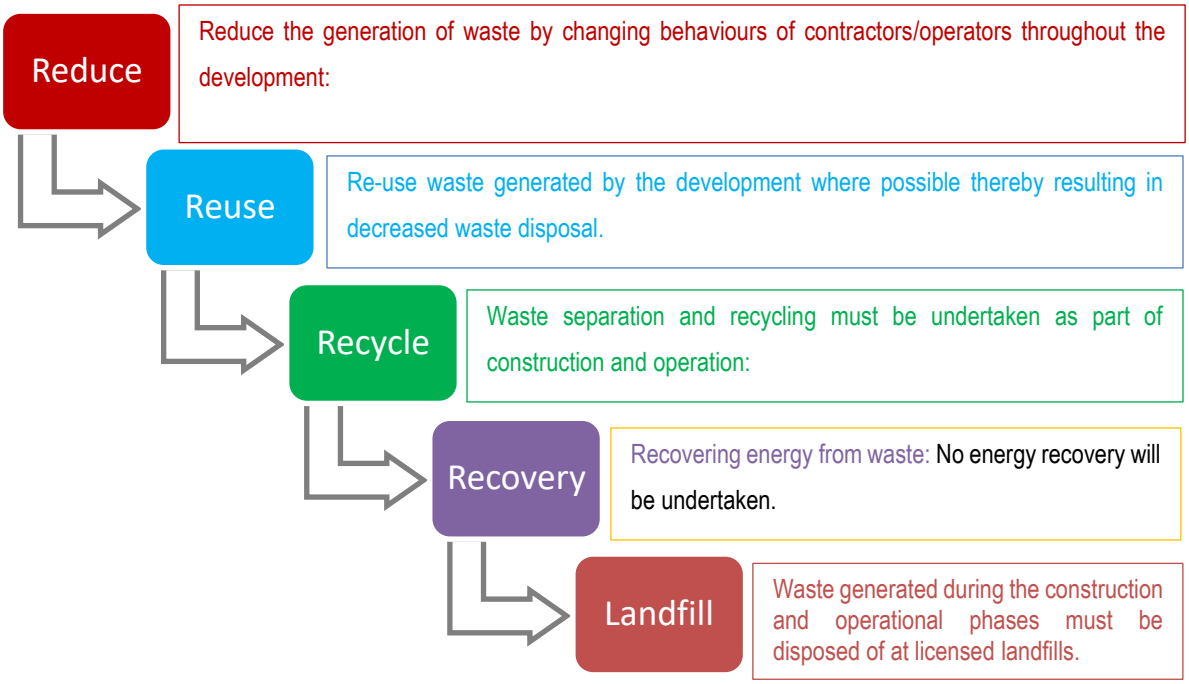

Figure 10-1: Waste Hierarchy

10.3 Waste Management Actions

The following waste management actions must be implemented in order to ensure the objectives included in the waste hierarchy above are met.

10.3.1 Waste Avoidance and Reduction

Avoidance and reduction should be practiced wherever possible. Recommended actions include: but are not limited to:

- Bulk buying of materials to reduce the volume of packaging required.
- Avoidance of materials/items/brands that are heavily packaged, have a short lifespan or are low quality.
- Buying items that last longer and can be repaired.
- Buying items in refillable containers.
- Environmental awareness training should focus on management of waste and all construction workers should be aware of the importance of waste minimisation and avoidance.

10.3.2 Recycling

Recycling should be practiced whenever waste prevention or reuse is not possible, provided that any such recycling is cost effective, taking into consideration environmental benefits, financial costs and community interests.

Potential priority recyclable waste streams include:

- Used Oil;
- Paper;
- Glass;
- Tyres;
- Plastics;
- Building rubble; and
- Electronic waste.

The following actions must be implemented:

- To reduce or avoid the need for sorting after collection, the categories of distinctively marked waste receptacles must be provided in order to receive waste as it is generated.
- These receptacles shall be fitted with a tight cover.
- All types of waste collection receptacles shall be clearly marked with the type of waste they are receiving.
- Obtain and label recycling containers for office waste, aluminium, steel, glass, ferrous metals, nonferrous metals, waste timber.
- Locate these containers within office buildings and trailers.
- Establish a recycled material collection schedule.
- Arrange full bins to be hauled away.

10.3.3 Waste Disposal

The contractor is responsible for removal of all waste from the site, generated through the contractor's activities. The contractor shall ensure that all waste is removed to an appropriately licensed waste management facilities (the following source may be utilised – www.sawic.org.za). During operation, waste that is not collected for recycling must be collected by the municipality or by a municipality approved 3rd party collector.

In addition, it should be noted that the classification of waste determines the handling methods and the ultimate disposal of the material. All **hazardous waste** that may be generated by construction and operation must be managed as follows:

- Characterise the waste to determine if it is general or hazardous (Use the Appendix 1 of the Norms and Standards for the Classification of Waste for landfill to determine whether additional classification is required).
- Obtain and provide an acceptable container with a label.
- Place hazardous waste material in the container.
- Inspect the container on a regular basis.

- Haul the full container to the licenced and correct disposal site.
- Provide documentary evidence of proper disposal of the waste.

In addition, the following actions must also be undertaken:

- Provide waste skips on site. These skips should be sufficient in number, the skip storage area should be kept clean, skips should be emptied and replaced before overflowing or spillage occurs.
- Skips should be covered to prevent waste blowing away.
- Vermin / weatherproof bins (waste bins must be able to prevent baboons and monkeys from gaining access to the contents) will be provided in sufficient numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.
- Ensure that solid waste is transported so as to avoid waste spills en-route.
- No waste shall be buried or burned anywhere on the site.
- Permits to transport/dispose of waste must be in place.

11 EMERGENCY PREPAREDNESS PLAN

11.1 Potential Emergencies

The following potential emergencies that may occur on site include:

- Environmental Incidents:
  - Fuel and hydrocarbon spillages; and
  - Fire Hazards.
- Safety Incidents:
  - Injuries related to operation of heavy machinery such as Front-End Loaders, Excavators, Mobile Crushers etc. during construction;
  - Driving related accidents and incidents from Trucks on site during construction;
  - Accidents during earth moving, levelling and rehabilitation activities; and
  - Criminal incidents such as theft or potential violent crime during construction and operation.

11.2 Emergency Plan

11.2.1 Emergency Assemblage Area

A central area on site must be demarcated with appropriate signage for the gathering of all employees and visitors on site in the event of an emergency. Should more than one site camp be established, the same applies to each.

11.2.2 Emergency Procedures

The following procedures must be compiled in order for the identified potential emergencies to be managed effectively:

- Drill and evacuation procedure for any emergency related incidents containing information on the following:
  - Reporting structure for all incidents
  - Emergency contact information (e.g. telephone numbers)
  - Procedure to be followed for the specific emergency
  - First Aid information
- Spillages of fuel and hydrocarbons:
  - Immediate action plan (e.g. use of spill kits) to prevent spill for spreading
  - Reporting of incident to manager and supervisor to advise on next steps
- Procedure for Theft and Crime:
  - Details on security system on site
  - Emergency response units

- Panic alarms
- Details of community response units

11.2.3 Emergency Contact Information

A list of potential emergency contact centres specific to the area must be drawn up and displayed on common notice boards for all employees to access. The following emergency centres must be sourced:

- Nationwide emergency response;
- Cell phone Emergency;
- Ambulance;
- Hospitals;
- Fire Response; and
- Police.

This list must be checked and updated at least quarterly to ensure that the information remains up to date.

12 MONITORING PROGRAMME

The purpose of the monitoring program is to ensure that mitigation measures identified and described in the EMPr are implemented.

The method of monitoring the implementation of the management and mitigation measures stipulated within the EMPr are indicated in **Table 12-1**.

Table 12-1: Method of monitoring implementation of EMPr

Method	Frequency	Responsibility	Main Topics	Outcome
Internal Inspections	Daily – Weekly	SECO	• Observe housekeeping practices • Check for spillages, leaks or any other sources of pollution • Observe waste management • Observe stormwater control	• Based on observations identify need for protocols / procedures and compile where needed in order to comply with EMPr and EA • Verbally inform employees on any identified issues
Internal Audits	Monthly	Enviro Coordinator	• EA conditions • EMPr conditions	• Monthly Concessionaire EC Audit Reports
External Audits	Quarterly auditing and reporting	External ECO	• Check compliance with management measures in EMPr • Specific attention to sensitive areas (Sensitive areas (Crocodile River, drainage lines, heritage etc. Storage and laydown areas (waste, building materials, etc.)	• Based on observations identify need for protocols / procedures and compile where needed in order to comply with EMPr and EA • Verbally inform employees on any identified issues. • Information from inspections will be used to compile quarterly report. • Photos from inspections to be utilised in quarterly reporting.
Management Meetings	Quarterly – Bi-annually	Management	• Discuss (problem solve) recurring issues or actions that require management intervention	• Record minutes of main points of discussion • Implement outcome actions of meeting

Method	Frequency	Responsibility	Main Topics	Outcome
In situ water quality	Weekly during construction Once off - Post Construction	SECO	• Dissolved Oxygen (DO), pH, Electrical Conductivity (EC), water temperature, water velocity, and clarity.	• Monthly report • Close out report (Post construction)
Biomonitoring (SASS-5 invertebrates monitoring)	Wet and Dry Seasons i.e. bi-annual frequency) Once off – Post construction	Aquatic Specialist (accredited in SASS-5 monitoring)	• Biomonitoring	• Biomonitoring report per wet and dry season • Close out report (Post construction)
Rehabilitation Audit	Preconstruction Phase – Once Construction Phase – Once Post construction - Once	External ECO/ or Rehabilitation Specialist	• Site condition of sensitive and rehabilitated areas. Effect of the Rehabilitation effort before, during and after rehabilitation comparisons.	• Rehabilitation Audit Report

Heritage Monitoring				
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Method**
Clearing activities and construction	Entire project area	SECO and CECO	SECO to inspect proposed corridors of construction in advance of clearing. CECO to confirm the same when on site.	• Apart from keeping the four burial sites identified in mind prior to clearing activities, the SECO is to inspect all proposed corridors of construction in advance of clearing. Should any finds be noted, the CECO must be informed. • If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: 1. Cease all works immediately; 2. Report incident to the Sustainability Manager; 3. Contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities.

Heritage Monitoring				
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Method**
				• Only recommence operations once impacts have been mitigated.
SCH009 SCH026 SCH027	Access Roads	SECO and CECO	SECO to monitor and record sites pre- and during construction. CECO to confirm the same when on site.	• Measure levels of subsidence and compare with recorded baseline conditions; • Status quo will be recorded through photographs; • Results will be maintained; and • Results will be reported in the progress reporting.
SCH021 SCH022 SCH028 SCH032	Access Roads and road widening	SECO and CECO	SECO to monitor and record sites pre- and during construction on a bi-weekly basis. CECO to confirm the same when on site.	• Measure levels of subsidence and compare with recorded baseline conditions; • Status quo will be recorded through photographs; • Results will be maintained; and • Results will be reported in the progress reporting.

12.1 Compliance Monitoring and Auditing

As described, construction activities of the Schoemanskloof Road upgrades will be monitored and reported by the ECO on a quarterly basis.

The quarterly ECO audit reports must also be made available to the Contractor by the Concessionaire EM. Should non-compliances be raised, the Contractor must then prioritise these findings of the audit and compile an action plan on how to adequately rectify these. This action plan must be sent to the Concessionaire EC for approval. The ECO will follow up on these findings during the following audit to ensure that the action plan has been implemented. Once the ECO is satisfied that the findings have been adequately addressed, the findings will be closed out. Detail of such findings, follow-ups and close-outs should be captured in the audit report.

12.1.1 Penalties

The Contractor will comply with the environmental management requirements of this EMPr on an on-going basis, any failure on their part to do so will entitle the Concessionaire, in consultation with the ECO to certify the imposition of a fine. The value of the fine will be agreed between the Concessionaire and SANRAL and it will also be based on the nature, extent and duration of the offence and subsequent environmental damage. Such penalties shall be payable in addition to any remediation costs for correction of environmental damage as a result of the non-compliance(s) to this EMPr, that will also be for the Contractor's account. Time penalties may also be awarded by the Concessionaire where the Contractor does not comply. These details are to be included into the contracts.

Note that the following is applicable:

- In terms of the Conventional Penalties Act (1962) a creditor is not entitled to recover both the penalty and damages,
- Accordingly, where a Contractor causes damage, the project manager can either enforce a penalty or make the Contractor make good the damage, but not both.

The Contractor is deemed NOT to have complied with this specification if:

- Within the boundaries of the site, site extensions and access gates there is evidence of contravention of the requirements of the EMPr,
- Environmental damage ensues due to negligence,
- The Contractor fails to comply with corrective or other instructions issued by the Concessionaire within a specific time,
- The Contractor fails to comply with a contract instruction given by the Concessionaire or Engineer,
- The Contractor fails to respond adequately to reasonable complaints from the public and surrounding businesses or landowners,
- Legal action is instituted against the developer in terms of environmental laws as a result of Contractor misconduct.

Payment of any fines in terms of the contract will not absolve the offender from being liable from prosecution in terms of any law.

13 ENVIRONMENTAL OBJECTIVES AND PLANNING ACTIONS

13.1 Overview

This section deals with the Schoemanskloof Road upgrades' construction activities and associated environmental aspects (mostly temporary in nature) that may occur in order to improve the overall level of service of the existing route and improve accesses on and off the route.

Environmental impacts borne from the identified aspects are described in the tables below as well as the proposed mitigation measures and environmental management procedures required to manage the expected impacts. The following sections are dealt with in the table:

Section13.2 : Air Quality

Section 13.3 : Terrestrial Ecosystems

Section 13.4 : Water Management

Section 13.5 : Waste Management

Section 13.6 : Hazardous Substances Management

Section 13.7 : Noise & Vibration Management

Section 13.8 : Heritage & Archaeological Management

Section 13.9 : Traffic Management

Section 13.10 : Fire Risk Management

Section 13.11 : Social Management

Section 13.12 : Safety Management

Section 13.13 : Visual Impact Management

Section 13.14 : Environmental and Social Issues

Section 13.15 : Rehabilitation

13.2 Air Quality

Existing potential sources of air pollution on and around the proposed Schoemanskloof Road upgrades include:

- Emissions from vehicles and equipment as well as materials required for the upgrade (CO_2, NOx, SOx, VOC's etc.) of the Schoemanskloof (R539) route at and around the proposed upgrade sites; and
- Dust emitted associated with road construction activities (large construction sites involving heavy earthworks, concrete works and large machinery generally are sources of dust emissions).

Existing impacts as described above may be reduced because vehicles and large trucks would not need to decelerate and accelerate as much as the current scenario and therefore it is expected that on average less fuel will be burned resulting in less exhaust emissions. Dust however may be more since consolidated graves accesses and access roads will be introduced along the route's neighbouring properties.

The proposed road upgrades does not require any licence in terms of legislation that governs air quality. Dust suppression measures during the construction phase will need to be implemented and will be dealt with in the construction phase method statements that will need to be complied to by the Contractor and approved by the Concessionaire's EC and independent ECO. The following shall be implemented:

Air Quality environmental objectives and planning actions

No	Aspect	Potential Impacts	Objectives	Targets	Management and Mitigation Measures
1	Dust Generation	• Negative effects on floral photosynthetic functioning. • Potential increase in breathing aliments of site staff, surrounding landowners and fauna. • Decreased visibility. • Nuisance factor to existing conferencing, accommodation	To maintain levels of fallout dust emissions below 1200 mg/m^3.	• Dust levels at active working sites do not exceed 1200 mg/m^3/day. • Zero number of complaints from site staff, surrounding landowners and communities.	• Dust must be controlled through the regular watering of active work areas. The Contractor is to take appropriate measures to minimise the generation of dust such as, the frequent water spraying of exposed cleared surfaces, road footprints, open areas and access routes during low rainfall periods or by using a chemical dust binding agent approved by the Engineer. • A maximum speed of 30km/h for passenger and light commercial vehicles and 20km/h for heavy vehicles and equipment must be enforced on the construction sites. • Disturbed areas no longer used for construction purposes shall be re-vegetated immediately when no longer required. • Areas having to be stripped of topsoil for construction purposes must be kept to a minimum and only stripped when work is about to take place.

No	Aspect	Potential Impacts	Objectives	Targets	Management and Mitigation Measures
		and farming properties adjacent to existing route.			• Dust suppression by means of either water with dust suppressant is required, if necessary. • Adherance to the prescribed dust fallout rates for non-urban areas from the National Dust Control Regulations, 2013 (600 < D <1200 mg/m2/day – 30 day average). • Dust monitoring spot checks (with hand held devices) should be undertaken by the ECO to ensure dust does not exceed allowable levels. • Activities such as crushing of aggregate should be halted in high wind speeds (i.e. during storms). • Where possible, fine aggregate material should be covered to reduce potential for dust. • Any soil excavated, and not utilised for rehabilitation, must be removed from site or covered and no large mounds of soil may be left behind after construction.
2	Unpleasant / offensive odours	• Nuisance factor to existing conferencing, accommodation and farming properties adjacent to existing route.	No unpleasant or offensive odours are experienced on site.	• All portable toilets are serviced on a frequency determined in agreement between the SECO and CEC. • All putrescible waste removed and disposed off-site within one day.	• Putrescible waste must be handled, stored and disposed of before the probability of it generating odours. • Chemical or portable toilets must be emptied / serviced at a frequency as agreed between the SECO and the CEC. Records of the services shall be provided to the Concessionaire. • Sewage conservancy tanks (if installed on site additional to portable toilets) must be emptied at a frequency as agreed between the SECO and the CEC. Records of collection of sewage and volumes of this must be provided to the Concessionaire.
3	Greenhouse gas emissions	• Decrease in air quality. • Contributing influence on climate change.	The level of greenhouse gas emissions emanating from plant and vehicles on site is kept to a minimum.	• All vehicles, plant and equipment serviced as per manufacturer's maintenance schedules • Evidence available of service records kept for all vehicles, plant and equipment.	• Plant and equipment to function at an optimal level. • Where possible low sulphur containing diesel is to be used (10 ppm or 50 ppm) • All vehicles and equipment must be maintained and serviced according to manufacturer's specifications. • In terms of transportation of workers and materials, collective transportation arrangements should be made to reduce individual car journeys where possible. • Road closures and staging of construction to be planned as far as possible to reduce traffic disruptions (as traffic disruptions are a large source of emissions in road construction projects). • The proposed road upgrades has incorporated as much of the existing road and alignment as possible thereby reducing the need for materials.

No	Aspect	Potential Impacts	Objectives	Targets	Management and Mitigation Measures
				• No evidence of plant, equipment or vehicles in poor condition.	• Material required for the road upgrades will be sourced from approved borrow pits and quarries at three positions along the route to reduce transportation of materials (and related emissions). • Design to minimize use of materials where possible. • Construction planning should take into account weather patterns as well potential changes to these due to climate change (for example, extreme events, flooding etc.) • Design to take into account relevant floodlines to ensure infrastructure will not be impacted by potential for increased extreme events. • Detailed designs to consider impact of heat on materials.
4	Emission of noxious fumes from welding	• Development of Respiratory problems. • Irritation to eyes.	Damage caused to lungs and eyes is prevented.	• Use of appropriate/required PPE including, welding mask, gloves and overall. • Medical test results prior to construction not to be exceeded.	• Required PPE must be worn at all times.

13.3 Terrestrial Ecosystems

The Project's construction activities may have an effect to certain terrestrial ecosystems or features. Loss of floral or faunal species must be prevented as far as practicable possible and all areas disturbed as a consequence of the construction activities must be fully rehabilitated to the satisfaction of the ECO, the CEC, the Concessionaire and servitude owner.

Impacts to flora relate to loss of vegetation. The upgrade of the road will result in the removal of natural vegetation, associated with a threatened vegetation unit on a regional scale and Critical Biodiversity Area on a provincial scale, however taking in consideration the extent of the area involved, of approximately 1 % of the larger landscape of primary persistent vegetation; it cannot be considered that it would contribute significantly to habitat loss, whether for plants or animals within the immediate landscape.

Most of the upgrades along the existing *road infrastructure* occur within the **Legogote Sour Bushveld** unit at 6.6 ha or 54%. The second area in which 45% or 5.5 ha of upgrade will occur is the **Lydenburg Montane Grassland**, with less than a hectare or 1% of the upgrade occurring in the **Northern Mistbelt Forest**. The potential influence of the upgrades on the Northern Misbelt Forest was therefore considered insignificant. The same applied to the *proposed access roads*, with the majority of additional access roads proposed to be developed, falling inside the **Legogote Sour Bushveld of the Savanna Biome** at 15.4 ha (57%).

In terms of known recorded species, 165 species are listed for the **Lydenburg Montane Grassland**, of which 24 species (15%) is endemic and 24 species (15%) is biogeographically important taxa. Fourteen of the known 165 species recorded within the Lydenburg Montane Grassland are classified as threatened Red Data plants, of which one species is Critically Endangered (*Protea roupelliae subsp hamiltoni*), four species are Endangered, and nine species are Vulnerable.

From the habitat description, it is evident that the species are associated with terrestrial ecosystems, mainly in high-lying, rocky areas. It should be noted that *Protea roupelliae subsp hamiltoni* is also a critical endangered species in terms of the National Environmental Management Biodiversity Act.

Twenty-four provincially protected species in terms of the Mpumalanga Nature Conservation Act (No 10 of 1998) had been recorded within the Lydenburg Montane Grassland. Twelve species associated with the protected families *Orchidaceae* and *Proteaceae*, and twelve species with the protected genera *Aloe*, *Eucomis*, *Gladiolus*, *Kniphofia*, *Scilla* and *Watsonia*.

No nationally protected trees are expected to occur within the Lydenburg Montane Grassland.

Within the regional vegetation 68 plant species are listed. Of these, one species is nationally protected and threatened in terms of the National Environmental Management Biodiversity Act, namely *Aloe simii. This* succulent is classified as Critically Endangered and associated with wetland habitat.

Two nationally protected trees in terms of the National Forest Act (1998) occurs within the regional unit namely: *Pterocarpus angolensis* and *Sclerocarya birrea*.

The following species which are protected in terms of the Mpumalanga Nature Conservation Act (No 10 of 1998) occur in the regional vegetation unit, namely: *Pterocarpus angolensis*, all of the species within the following genera Aloe, Gladiolus, Olea, Huernia, Stapelia and Orbea and all of the species in the family Proteaceae (*Faurea rochetiana*, *Faurea saligna*).

Permits are required for the removal or destruction of nationally protected plants, while permits are only required for provincially protected plant's destruction if developer is not the owner of the land or if the plants would be sold or moved into other areas of the provinces.

In terms of fauna, limited signs of fauna activity were noted. The ecological specialist listed 135 mammal species which had been recorded within the 1-degree grid 25307. The surrounding landscape represents a potential source for these species, especially the conservation areas present, while the drainage lines and ridges providing corridors for their movement. Some of the larger animals (antelope, jackal, baboons, leopard and hippopotamus) could collide with vehicles on the road, while the smaller animals' habitat (burrows) could be destroyed by the construction activities, however very few of these species are threatened. A hippopotamus was noted in a small dam between the Schoemanskloof Farmers Hall and the Viva Fuel Station. Interviews with landowners revealed that crocodiles have been spotted along the eastern sections of the Crocodile River which will also be the eastern section of the Schoemanskloof Route.

The specialist lists 41 reptile species which had been recorded in the quarter degree grid 2530BC8. None of these species are threatened. It is obvious, that it is unlikely that the road sections upgrades will affect flying animals such as the birds, bats and most of the invertebrate species. No nests of birds of prey were observed during the site visit, and it is most probably due to human activity already present in the area. The bridges to be constructed at the river crossings will improve connectivity for ground dwelling species, especially during times of flooding, as these animals will be able to cross the river, this is especially relevant for medium to large size mammals.

Management and mitigation measures for terrestrial ecosystems will need to be implemented and will be dealt with in the construction phase method statements that will need to be complied to by the Contractor and approved by the Concessionaire's EC and independent ECO. The following shall be implemented:

Terrestrial Ecosystems environmental objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Loss of Vegetation, Habitat and Soil Fertility	• Decrease in faunal diversity and density. • Decrease in floral diversity. • Increased potential for erosion and soil loss. • Increase in dust emissions. • Potential decrease in soil organisms.	The extent of the contactor's construction footprint and spoil storage footprint, as well as remainder inside sensitive areas is kept to a minimum.	• Contractor's site offices and construction works kept within confines of demarcated footprint. • No accommodation on site.	• The planning and design for the contractor's site offices and construction sites must ensure that there is a minimum impact on the environment. These areas must be kept to a minimum footprint in size. • A method statement inclusive of site plan is required from the Contractor at tender stage or prior to any construction activities that includes the layout of the contractor's camp, management of the ablution facilities and wastewater management. The method statement must be approved by the Concessionaire's EM. • As far as possible the construction camps must be placed on already disturbed land, such as the sites that have previously been utilised for road construction. • The width of the construction footprint may not exceed the existing and new acquired servitudes owned by SANRAL and as far as possible must be kept to a minimum for the construction of the associated road widenings. • A vegetation scientist specialising in vegetation ecology should do a walkthrough prior construction commencing during the summer season, optimally January/ February to identify and mark protected plants for which permits are required. Those plants small enough to translocate could be temporarily stored in a nursery for re-introduction post construction. • It is strongly recommended that the topsoil from the natural areas be stored and used in the subsequent rehabilitation of the road reserve once construction had ended. The topsoil should be stored in low (1 m high), levelled stockpiles which would reduce the establishment of alien invasive species, as well as facilitate the control alien invasive species which could establish. • The upgrade of the road sections allows for an opportunity to increase the permeability of the road infrastructure to facilitate animal movement in the landscape. Therefore, culverts should be designed to allow movement for small to medium size mammals to and from a water source such as the Crocodile River. The proposed upgrade of the two existing low water river crossings will contribute significantly to the facilitation of animal movement, during time of flooding, especially for ground dwelling species Permits must be approved prior to the removal of any protected species. • Should *Aloe simii* plants be found on site these must be conserved *in situ* as far as possible. Permits to disturb and relocate the plants should be sought from the relevant Authorities where this is not possible. If the *A simii* plants will be disturbed or relocated, plants smaller than 15 cm in diameter must be kept in bags for a minimum of 12 months before transplanted into the field

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					(experimental trials indicate high mortality rates among this size class of they are directly planted into the field). • An MTPA Botanist must be involved with the re-establishment and monitoring of *A simii*. Every individual must be marked and monitored to determine survival rates. Botanist details: Mr Willem van Staden; Willem.VanStaden@mtpa.co.za • Fences must be constructed so as to avoid significant vegetation, natural features, and sites of cultural and historical significance. • No personnel or construction materials will be allowed outside the designated / demarcated site under normal circumstances. There may be certain instances where associated construction activities need to be temporarily undertaken outside of the servitude. During such instances, prior consent between the SECO and Trac EC need to be established with associated specific guidelines in place. • Limit clearing for fencing to the removal of trees and shrubs within 1 m of the fence line. No removal of the grass cover or topsoil is to occur within this width. • Site demarcations must remain in position until the completion of construction. • Once the site has been cleared of vegetation (i.e. trees and shrubs), the topsoil including the existing grass cover is to be shallowly ripped before removal. • Topsoil must only be handled twice, once to strip and stockpile and once to replace and level. • Topsoil must be stripped in as dry condition as possible in order to prevent compaction. • The depth of topsoil to be stripped will vary between 200 – 300 mm (depending on each specific soil strata characteristics). The depth of the topsoil shall be determined by the EC before soil stripping commences. • Topsoil must be stored in a demarcated area which is protected from wind and rain. • Topsoil stockpiles must be above the 1:50 year flood lines of the Crocodile River and its tributaries. • Stockpile topsoil in windrows parallel to the road servitude and associated works. • All grass and other vegetation should be left on the topsoil stockpiles so that they colonise the area after construction. • No storage of vehicles or equipment will be allowed outside of the designated area. • Plants outside of the construction area are not to be disturbed, destroyed or removed. • The Contractor will be held liable for the replacement of any plant or feature under the protection of local by-laws, provincial ordinances or national legislation that is removed or damaged by the Contractors negligence or mismanagement. The Concessionaire's EC is to indicate the plants or features to be avoided.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• Protected or endangered species of plants shall not be removed unless they are interfering with the construction. Where such species have to be removed due to interference the construction, the necessary permission and permits shall be obtained from Provincial Nature Conservation or Department of Forestry, Fisheries and the Environment. • All protected species not removed must be clearly marked and such areas fenced off for the duration of the construction works. • The removal of harvesting of plant species for medicinal or cultural use by an employee is strictly prohibited. • Planning of access routes must be done in conjunction between the Contractor, Engineer, CEC, TracN4 and the relevant landowners (where relevant). • Slight deviations of the access road alignments are permitted, so as to avoid significant vegetation specimens and communities, natural features and sites of cultural and historical significance. • Any additional routes and turning areas required by the Contractor must be approved by the Concessionaire. • Make use of existing roads and tracks where feasible, rather than creating new routes. • No vegetation clearing in the form of de-stumping, scalping or uprooting shall be allowed outside the approved working servitude on river- and stream banks, unless authorised by the CEC and ECO. • Do not disturb, deface, destroy or remove plants or natural features outside of the construction area, whether fenced or not, for the duration of the Contractors presence on site, unless otherwise specified. • Do not establish any Site Works besides those specified and allowed for in the successful tender. • Do not paint or mark any natural feature. Marking for surveying and other purposes must be done using pegs, beacons, rope or droppers.
2	Soil contamination	• Decline in soil organisms. • Potential sterilisation in the carrying capacity of the soil.	Adequate protection of soil and soil remediation measures in case of spills is ensured.	• No evidence of hydrocarbon and hazardous spills. • No release of contaminated water into the natural environment.	• Topsoil stockpiles may not become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation. The Contractor will be held liable for the replacement of any topsoil rendered unsuitable for use during rehabilitation. This topsoil will be sourced from commercial sources. • Do not mix topsoil obtained from different sites. • Do not mix sub-soil and topsoil stockpiles. • Fuel must be stored in above ground storage tanks or sealed containers – both such vessels being contained within a bunded area with controlled sump drainage (such as valves).

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
				• Immediate removal and remediation of all spills.	• All bunds must be designed to contain at least 110 % of the largest vessel it contains or 25 % of the total volume of multiple vessels it contains – whichever is greatest (this shall include fuels for, welding equipment and oxy-acetylene cutting equipment). • No free drainage from fuel storage areas shall be permitted. • Appropriate response plans must be prepared by Contractors to ensure the fastest possible reaction to spills or accidents. These plans must include rehabilitation procedures. • All spills (minor and major) must be cleaned and remediated to the satisfaction of the CEC within 24 hours of occurrence. • Any spillage on site will be excavated to the visible depth of impact and collected in bags or waste skip(s) for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable material. Alternative *in-situ* remediation techniques could be used if approved by the Engineer and CEC. • The contractor must ensure that there is a supply of absorbent material (e.g. Drizit) and clean-up materials readily available to absorb, breakdown and, where possible, encapsulate minor material spillages. • All maintenance of vehicles and equipment shall take place off-site. Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the containment of spilled or leaked oil. The area for emergency repairs should be identified between the Contractor and CEC. • Vehicles and equipment must be checked on a daily basis. Checklists for all vehicles and plant must be kept as a record. • Drip trays or any form of oil absorbent material must be placed underneath vehicles, plant and equipment **prone to leaking** when not in use i.e. it is not necessary to place drip trays underneath vehicles, plant and equipment where it is obvious that no hydrocarbon leaks are occurring. • Drip trays must be used where dispensing mechanisms or stored receptacles may leak. Such drip trays may be made of plastic or sheet metals. Drip trays must not leak and not be allowed to overflow. Leaked oils or other hydrocarbons in drip trays must be soaked up with spill kit materials on a regular basis – especially in advance of rain events being expected which will fill such trays with water and cause hydrocarbon spills on surrounding ground. • All vehicles and equipment must be well maintained to ensure that there are no oil and fuel leakages. • Leaking equipment shall be immediately removed from site to a facility for repair. • No permanent structures will be permitted at the contractor's camps.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• Vehicles, plant and equipment may not be washed on the construction sites or the site office area. This is especially applicable to concrete mixer trucks. • Cement must be delivered in sound and properly secured bags or in approved bulk containers. • Cement products in bags must be stored in storage containers to be provided at the construction camp and should only be opened when needed. • Limit cement and concrete mixing to single sites where possible. • No concrete batching on bare soil. • Dispose of all visible remains of excess cement and concrete after the completion of tasks. • Any spilled concrete shall be cleaned up immediately. • Avoid stripping borrow pit areas to bedrock as it limits the rehabilitation potential for these areas.
3	Increased potential for soil erosion	• Loss of valuable topsoil. • Loss of vegetation habitat. • Formation of rills and gullies. • Decrease in surface quality of access roads. • Increased sedimentation of the Crocodile River and its tributaries.	To prevent any erosion and to provide adequate erosion control measures where required.	• No visible evidence of erosion activity. • Sedimentation loads of streams and rivers do not exceed predetermined levels by more than 10 %. • Erosion control measures present in all higher risk areas.	• The contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This could include the use of erosion control fabric or grass seeding. • Identify all areas susceptible to erosion so that these can be protected from undue soil erosion resultant from activities within and adjacent to the construction areas. • Retain natural trees, shrubbery and grass species wherever possible. • Institute sedimentation control measures along the works at the Crocodile River low water bridges to be constructed and tributaries feeding it, and when excavation or disturbance within riverbanks, or the riverbed takes place. • Do not let erosion develop beyond the formation of rills. • Repair all erosion damage as soon as possible and not later than a target specified by the Engineer and EM. • Slopes steeper than 1(V):3(H) or slopes where the soils are by nature dispersive or erodible must be stabilised. • Dust and erosion of topsoil from runoff must be minimised through watering or similar dust control measures. Placing of topsoil in areas exposed to high wind or excessively rainy conditions must be avoided. • The contractor shall devise a soil conservation and stockpiling plan, to be approved by the Concessionaire's CEC. • Where berms are installed on severe slopes the outflow shall be suitably stone pitched to prevent erosion from starting on berms. • Alterations to drainage lines should not be altered and these areas should be level with the surrounding land once subsidence has occurred.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• Runoff from roads must be managed to avoid erosion and pollution problems.
4	Encroachment and establishment of alien vegetation	• Decrease in indigenous floral habitat availability. • Decrease in floral populations and diversity. • Spread of alien vegetation to other environments.	Alien plants / seeds are prevented from being introduced on site and spreading to surrounding areas. Alien plants are eradicated and removed from site.	• No visible presence of alien vegetation on site.	• Alien vegetation growing on topsoil stockpiles must be removed. • All sites disturbed by construction activities must be monitored for exotic or invasive plant species and weeds. • Herbicides and pesticides may only be used during vegetation clearance and the eradication of alien plant species with the prior approval of the EM. If necessary, a method statement shall be submitted for approval. • Chemical removal shall be used in accordance with manufacturer's specification for weeds where mechanical eradication / control are no longer effective. • Those exotic / invasive plant or weed which cannot be eradicated by means of herbicides, need to be manually removed from site. • The herbicide consultant must have a Pest Control Operators license. • Control the type of material imported to site to ensure that soil contamination, in terms of weed and alien invasive plants, does not occur.
5	Impede faunal movement and disrupt livelihood	• Decrease in faunal diversity. • Obstruction to faunal migratory patterns. • Potential decrease in faunal populations. • Potential injury and death to fauna.	All possible impacts on faunal movement are kept to a minimum. Consideration is given to faunal movements before demarcation of areas and habitat clearing.	• No visible impediment of faunal corridors. • All fences removed at completion of construction work. • No hunting or poaching of fauna.	• The upgrade of the Schoemanskloof Road and introduction of access roads allows for an opportunity to increase the permeability of the road infrastructure to facilitate animal movement in the landscape. Therefore, culverts should be designed to allow movement for small to medium size mammals to and from a water source such as the Crocodile River, this is especially relevant for the section towards the east. • All excavations must be demarcated using danger tape with steel droppers or other methods approved by the CEC. • The contractor must ensure that domesticated animals belonging to the adjacent landowners are kept away from the construction sites. • The footprint of disturbance must be kept to a minimum. • Access roads should be planned so that only minimum linear distances are developed. • **No wild animal may under any circumstance be handled, removed or interfered with (unless no other means present itself to assist the animal)**. • **No wild animal may under any circumstance be hunted, snared, captured, injured or killed. This includes animals perceived to be vermin**. • **Snakes encountered may not be killed.** Snakes are to be captured and removed from the working sites by a person qualified and experienced in the identification and handling of snakes. The Contractor shall identify such a person – whether forming part of the construction team, or a

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					herpetologist or snake handler nearby; and ensure that his/her contact number is made available to all site teams. • The Contractor's SECO and the Concessionaire EC must regularly undertake checks of the surrounding natural vegetation, in fences and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. • Ensure that the Work site is kept clean, tidy and free of rubbish that would attract animal pests. • Ensure that bins and waste storage facilities are scavenger proof. Baboons and monkeys should not be able to open bins. • The Contractor must report problem animals and vermin to the CEC who will facilitate any removal by the relevant organization or authority.
6	Illegal wood harvesting for creation of fires	• Loss of indigenous woody vegetation. • Decrease in habitat for fauna and avifauna. • Increased potential for erosion. • Possible loss of protected species.	The unnecessary harvesting of wood from the surrounding area is prevented.	• No visual evidence of wood harvesting. • No change to vegetation baseline (except within approved construction footprints).	• Woody material removed during construction may be placed in a designated area for collection by the local communities in an orderly manner and pre-arranged between the SECO, CEC and community leaders. • No vegetative matter, besides the woody material mentioned above, may be removed for firewood.

13.4 Water Resources Management

The proposed Schoemanskloof Road upgrades are located along the existing R539 Route between eMgwenya (Waterval Boven) and Mbombela (Nelspruit) measures just over 60 km in length, and is located in quaternary catchments X21E, X21D and X21G in the Inkomati-Usuthu Management Area (WMA 3) (sub-quaternary catchments SQR X21D-00957 Buffelskloofspruit, X21E-00943 Crocodile and X21G-01037 Elands).

The Crocodile River flows in an easterly direction along the northern side of the R539 Schoemanskloof road. It is then crossed by the N4 toll route approximately 250 m north of the existing N4 / R536 T-junction. Its 10,446 km^2 catchment area originates north of Dullstroom, Mpumalanga, in the Steenkampsberg Mountains. Downstream of Kwena Dam, the Crocodile River winds through the Schoemanskloof and down the Montrose Falls. It then flows eastwards past Nelspruit where it forms the southern boundary of the Kruger National Park and joins the Komati River at Komatipoort before continuing through Mozambique to the Indian Ocean.

At approximately 990 m downstream of the Montrose Falls that the Elands River confluences with the Crocodile River. The Elands River upper catchment is near the town of Machadodorp in the Highveld zone of Mpumalanga Province.

Management and mitigation measures for surface water management will need to be implemented and will be dealt with in the construction phase method statements that will need to be complied to by the Contractor and approved by the Concessionaire's EC and independent ECO. The following shall be implemented:

Water Resource Management environmental objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Water contamination	• Impact on the wellbeing and reproduction potential of the aquatic biota. • Potential decrease in ground water quality. • Potential decline in the use of water for existing water users. • An increase in turbidity, due to suspended	No pollutants released to the aquatic environments. Wastewater is appropriately managed. Erosion is prevented. Turbidity is appropriately managed during instream works.	• The quality of the water from upstream of construction and downstream of construction will not differ with more than 10%. No evidence of pollutants released into	• Measures shall be taken to ensure that the water quality of the Present Ecological Status of the Crocodile River is maintained during the construction phase as well as its tributaries across which existing bridges/culverts are widened. • The Contractor must identify sources of process water and quantify quantities for approval and monitoring by the Concessionaire.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
		sediment/materials during construction activities may result in reduced photosynthetic capacity of primary producers, increased bacterial activity and a decrease in oxygen saturation. The suspended matter could interfere with the reproduction, growth and survival of aquatic organisms and can ultimately compromise biotic integrity.		Crocodile River or its tributaries. • No erosion caused by construction activities.	• The Contractor shall develop a Water Management Method Statement describing all forms of potential water contamination and how it plans to prevent and mitigate such impacts. This Method Statement shall be approved by the Engineer and Concessionaire EM. • Fuel storage areas and other equipment or vessels with the potential of leaking pollutants may not be located within the 1:100 year flood line or horizontal distance of 100 m (whichever is greater) of a watercourse or drainage line. • Fuels, other flammables and hydrocarbons shall be stored bunded. • No rubble may be temporarily stored or dumped within 100 m of the rivers. • No detergents may be used. • Water from repair areas and fuel storage areas must be discharged into oil separators or sumps. Pollutants collected in this manner should be retained in a safe holding tank and removed from site by a specialist oil recycling company for further use. • No free drainage from fuel storage areas shall be permitted. • Never hose oil or fuel spills into the surrounding natural environment. Any contaminated storm water and other run-off from the site shall be contained. • Contain oil or fuel spills in water using an approved oil absorbent fibre. • Grey water not deemed suitable for dust suppression by the CEC and ECO must be stored in sealable marked containers and disposed of with other wastewater. Wastewater as well as spilled fuel collected within bunded areas and refuelling areas shall be disposed of as hazardous waste. • Waste storage should be located outside the aquatic resource buffer zones. • The ECO and staff should monitor and report any introduction of hazardous, human and/or general waste into/in proximity of the aquatic resource. • Contaminated water needs to be isolated. Water with a chemical signature different to that of the receiving aquatic environment should be considered contaminated and should be collected with site sewage for appropriate treatment at a local sewage treatment works. • Appropriate measures such as the implementation of silt and litter traps, or areas to contain silt before entering the watercourse, such as sedimentation basins.The Contractor shall inform all site staff of the use of supplied ablution facilities and under no circumstances shall indiscriminate

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					excretion and urinating be allowed other than in supplied facilities. The design of culverts should incorporate existing drainage lines. • Concrete trucks shall not be washed on site. • Do not locate any site toilet, sanitary convenience, septic tank or French drain within the 1:100 year flood line, or within a horizontal distance of 100 m (whichever is greater) of stream or rivers. • Do not allow the use of any surface water resource for swimming, bathing, or the cleaning of clothing, tools and equipment. • Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. • Stockpiling areas should be bermed to reduce soil and sand movement. • Soil and spoil must be stored outside the sensitivity buffer area. • In order to prevent excessive sedimentation from occurring, it is critical that for any construction activities, for example, trench excavations; that topsoil stockpiles are located at least 100m away from, out of the 1:50 year floodlines, or riparian habitat of the Crocodile River and its tributaries, whichever is the greatest. • Excavated material is recommended to be placed on the upstream side of the trench so that should any excavated material be displaced during rainfall, it will flow back into the trench rather than towards the watercourse. • Stormwater and flood attenuation ponds should be constructed to reduce the flow of entrance into the river should the CEC and ECO deem this as necessary. • Where not feasible to incorporate attenuation ponds, breakers should be used to reduce the flow should the CEC and ECO deem this as necessary. • Discharge points of stormwater channels and pathways must be oriented parallel to the flow of the watercourse, with breakers before the entry point to the watercourse. • Appropriate measures such as the implementation of silt traps, or areas to contain silt before entering the watercourse, should be devised such as sedimentation basins. • The SECO, CEC, ECO and staff should monitor and report any benthic disturbances on account of stormwater inputs and surface run-off.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• The contractor is to ensure that should there be any excessive quantities of sand, silt and silt-laden water, it does not enter the storm water system. Deflect any unpolluted water/runoff away from any dirty area. • Where necessary, turbid water pumped from excavations within the Crocodile River or its tributaries must be passed through a sand filter or settling pond before being releases back into the river. Ensure that no storm water is allowed to enter any drainage installation for the reception, conveyance, storage and or treatment of sewage. • Before any water is permitted to enter natural drainage lines, the quality of the water must comply with the water quality constituent values as described in the General Limits for the discharge of water to the environment (National Water Act). • Riparian zones along the Crocodile River and its tributaries must be viewed as conservation corridors of concern. The impacts at these riparian zones should be kept to a minimum while the functionality of the riparian vegetation (as described in the EIA's Aquatic Resources Report) not be compromised. • No roads shall cut through the rivers banks as this may lead to erosion causing siltation of the watercourses. • A General Authorisation for water uses must be acquired from the IUCMA before construction starts. • Erosion from the construction activities must be prevented. Measures to control erosion include: • Minimising removal of vegetation, • Clearly demarcate boundaries in order to limit construction activities, • Permanent or temporary fences shall be erected and maintained to ensure that activities are conducted within the demarcated area, • Erosion sensitive zones shall be clearly marked. No persons, machines, equipment or materials shall enter these areas, • Vehicles and plant to utilise dedicated routes only.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• Stabilisation of the banks should be implemented at sections of the rivers with a high probability of being affected by the construction activities. The stabilisation methods should ensure that adequate marginal vegetation is available for aquatic biota. • Dredging activities should be kept to the minimum practicable timescales. • It is recommended that a silt curtain be used where possible to contain increased turbidity and limit the extent of the construction activities. Silt curtains can be used to contain re-suspended sediment to a smaller area. • Excavated sediment should not be placed on the shoreline prior to disposal. Same must be removed from site and/or stockpiled 32m wayward from the delineated riparian zone. Berms around the stockpiling area should be placed to facilitate the prevention of soils entering the river. • The implementation of an appropriate method to maximize the capture of sediment and minimize the re-suspension of silt/sediment to be achieved. • Access roads need to be inspected on a regular basis for signs of erosion and sedimentation as it is anticipated that large vehicles and heavy machinery will be utilised for the activity. Preferential flow paths (usually on the side of the roads) should have anti-erosion measures in place to limit surface runoff of road soils. • Frequent monitoring should consider possible sources of sediment input and whether these are controlled and managed appropriately. Special attention should be given to the presence of any new erosion features and unstable slopes. • The banks of the riparian area and riverbed would need to be stabilised and prevented from becoming broader in areas that may be susceptible to erosion. • An aquatic biomonitoring (SASS-5) assessment shall be conducted once every wet season and once every dry season during the duration of the construction phase by an aquatic specialist with accreditation in SASS-5 biomonitoring, and further to assess the effectiveness of the post-construction rehabilitation, as well as mitigation measures. It will be required at all watercourses flowing at localities where construction is present i.e. under expansion of bridges and new crossings. This will ensure the establishment of biotic trends regarding the water courses. Trend data will illustrate what impact construction activities had, or are having, on affected reaches of the Crocodile River.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• *In situ* water quality will be conducted weekly at the upstream and downstream points of the construction activities along the Crocodile River and its tributaries i.e. upstream before any construction impact and downstream after all works. This shall be conducted by the SECO.
2	Impacts to aquatic biota	• Loss of aquatic habitat for aquatic biota • Water quality changes impacting aquatic biota	Management of activities within the watercourse to ensure impacts to aquatic biota are minimized.	• Aquatic biota diversity identified during Aquatic Impact Assessment is maintained. • No erosion caused by construction activities.	• Stabilisation of the riverbank should be implemented at sections of the river with a high probability of being affected by the construction activities. The stabilisation methods should ensure that adequate marginal vegetation is available for aquatic biota. • Re-vegetation with functional indigenous species on accessible margins of the river should be actioned during the rehabilitation process and will ensure adequate habitat availability for fish and macroinvertebrates. This will also ensure succession of indigenous species over alien species, when coupled with alien vegetation removal. • De-silting the benthic area of sand and soils from construction activities may aid increasing the surface area of the stones biotope (in which many macroinvertebrates thrive) by reducing and limiting the distribution of the GSM biotope to its natural zonation. • No clearing of vegetation or construction activities to take place other than on the footprint of the activity. Impacted area(s) will be rehabilitated with indigenous vegetation. Stock piling outside the riparian area, minimal ingress and egress. • Stabilisation of banks should be implemented at sections of the river with a high probability of being affected by the construction activities. The stabilisation methods should ensure that adequate marginal vegetation is available for aquatic biota. • Hazardous, general and/or human waste may contribute to poor, and even toxic water quality with the potential to eradicate aquatic biota on a regional scale. It is therefore imperative that these types of waste do not enter the water courses and riparian areas. • Construction vehicles must be monitoring for oil and fuel leaks. Any spillage must be immediately mitigated with the appropriate methods. • Under no circumstances should hazardous materials and wastes be stored/placed in the delineated riparian/wetland and buffer zone. Same applies to the general and human wastes (including ablution facilities).

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• All types of wastes should be surround by appropriate berms and linings and be temporarily stored away from drainage lines. • Waste material and management must be monitored and any contamination or situation that may lead to contamination should be immediately reported and actioned against, thus protecting the river and riparian area.
3	Decline in water availability of water resource	• The decrease in the habitat for aquatic biota and riparian vegetation. • Negative effect on the wellbeing of terrestrial fauna. • Decrease in the effective functioning of the aquatic biota. • Decrease availability of water for downstream users of the water course.	Full compliance to the limits provided by the IUCMA for abstraction volumes from a watercourse.	• Volume of water abstracted from the watercourse on an annual basis not to exceed the IUCMA Water Use License.	• **Water may only be abstracted from an approved water user (or as per GA) for use during construction.** • Grey water produced on site should be utilised on site for dust suppression, should its quality be acceptable to the Concessionaire EC and independent ECO. • The volume of water abstracted from a water user may not exceed the limits stipulated by its GA. • Do not drain, fill or alter in any way, any drainage line, including the riverbanks unless this forms part of the construction Works, or upon specific instruction by the Concessionaire.
4	Misuse of available water on site	• Unsustainable utilisation of available wastewater resulting in increased abstracted volume of water from natural water courses. • The decrease in the habitat for aquatic biota and riparian vegetation. • Decrease availability of water for downstream users of the water course.	Wastewater generated from construction activities is as far as possible recycled for reuse.	• Abstraction from natural watercourses is kept to a minimum and does not exceed the IUCMA GA provisions.	• Monitor water use and ensure that instances of wastage are identified and minimised. • Repair identified leaks and address issues of water wastage as soon as these are identified. • Where possible, reuse water on the construction site for dust suppression on roads. • Create awareness of water conservation in toolbox talks.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
5	Modification of flow during construction	Flow is modified in such a way that it negatively impacts river system.	▪ The design of the storm water system should ensure that no adverse impacts on the natural systems in terms of increased velocity of storm water. ▪ Construction and operational activities should not impact negatively on the flow of the aquatic resource.	No increase in velocity of stormwater. No impacts on the flow of the aquatic resource.	▪ No impeding flow other than approved erosion control measures. ▪ Stock piling should be done outside the buffer areas associated with the aquatic resource(s). ▪ Effective and sustainable stormwater management. ▪ Construction across watercourses to be initiated during the dry season to limit impacts to aquatic resource. ▪ Litter traps should be implemented at strategic points. ▪ Energy dissipating structures to be used to attenuate stormwater velocity. ▪ After rainstorms culverts should be inspected for any obstruction.

13.5 Waste Management

Waste generated during construction activities will need to be managed in compliance with waste management principles. This means that if waste cannot be prevented, attempts should be made to re-use the waste or else the waste would have to be recycled or disposed of. Waste generated during the construction phase needs to be effectively handled, separated, stored, transported and ultimately safely disposed of while trying to reduce the amounts of waste generated.

Management and mitigation measures for waste generated during construction of the Schoemanskloof Road upgrades and consolidated access roads will need to be implemented and will be dealt with in a Waste Management Plan or method statement(s) that will need to be complied to by the Contractor and approved by the Concessionaire's EC and independent ECO. The following shall be implemented:

Waste Management environmental objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Increase in waste generation	• Decrease in the aesthetic quality of the environment. • Unpleasant odours. • Potential injury and death to local fauna. • Shortening the lifespan of the local waste disposal sites. • Potential disease and injury to site staff and local inhabitants. • Land surface pollution.	Re-use and recycling of waste is promoted where prevention thereof is not possible. The disposal of waste to local waste disposal sites is limited.	• No visible waste from construction activities observed on site (apart from temporary storage areas). • No unpleasant odours. • Marked and sealable bins utilised. • Evidence of waste disposal certificates.	• Characterise and quantify all waste streams across the project in terms of quantity, hazard, generation frequency and recyclability and define and implement disposal options approved by the Engineer. • As part of the characterisation define opportunities for source reduction, as well as reuse and recycling as opposed to simply disposing of waste. • Ensure segregation of hazardous wastes from non-hazardous. • Sealable bins and containers must be made available by the contractor for the storage of construction and domestic waste. Contents of such bins must not be accessible by baboons or monkeys. • Temporary storage of construction waste will take place within areas designated by the Contractor's SECO and the CEC. • Construction waste will not be stored on site for longer than the time determined by the EM. • The Contractor will be responsible for the removal and transportation of all construction waste material off site to a registered waste disposal facility. Proof of this must be provided by the Contractor to the Concessionaire. Maintain a waste register for materials removed from the site, indicating type, quantity, date, haulage contractor, delivery point and safe disposal certificate. • Clearly marked waste bins are to be provided for the separation of waste. • Recyclable waste, including glass, paper and plastic must be separated at the construction site office, stored and recycled where possible, for example waste oil should be recycled.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• All empty cement bags may not be left on site uncontrolled overnight. • Personnel must be informed about the necessity of using waste drums. • The Contractor must do site clean-ups on a daily basis and dispose in the designated refuse bins provided. • The Contractor must dispose of all domestic refuse generated by the staff and sub-contractors on a weekly basis at a registered waste disposal facility (or more frequently in instances where wastes are filling storage bins and facilities). Proof of this must be provided by the Contractor's SECO to the CEC. • Ensure that solid waste is transported in a manner that will avoid waste spills *en route*. • The Contractor must ensure that the site is kept clean and free of rubbish that could potentially attract animal pests. • Do not dump waste of any nature, or any foreign material into any drainage lines or the Crocodile River. • Storage of waste must be done in accordance with the National Waste Norms & Standards. • During transportation of waste, the Contractor must comply with the codes of practice and guidelines for licensing of waste transport vehicles and the regulation and monitoring of transport operations. • Should temporary "stop & go" road interruptions be implemented during stages of construction, it is imperative that waste bins are strategically placed at such locations so that staff manning such localities have facilities to discard general wastes as well as motorists who are stationery at such locations (motorists tend to discard wastes out their vehicles when waiting at stop & go's). Bins provided must be clearly visible and have sealable lids to prevent wind-blown litter or disturbance by monkeys and baboons. Such bins shall be emptied after each day at the site offices' temporary waste storage facilities.
2	Mis-management of sewage	• Unpleasant odours • Potential outbreak of disease • Infringement on human rights • Spillages which could result in increase in microbiological pollutants to soil, the Crocodile River or its tributaries.	The required number of portable toilets are provided and serviced on a regular basis.	• The required number of chemical toilets are present and utilised on site. • Record of sewage waste disposal certificates. • Water quality of the Crocodile River and	• A minimum of one toilet must be provided per 15 persons at each active working area and within a distance of 500 m from all worker activities. • Portable chemical toilets must be emptied / serviced on a frequency as determined between the Contractor SECO and the Concessionaire EC to prevent them overflowing. Proof of services must be kept on record. • The Contractor shall inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
				its tributaries is maintained within baseline levels in terms of faecal coliforms and *E-coli*.	• Should temporary "stop & go" road interruptions be implemented during stages of construction, it is imperative that a portable toilet is strategically placed at such locations so that staff manning such localities as well as motorists waiting at a stop & go have such facilities (motorists tend to use surrounding bush when waiting for long periods at stop & go's). Portable toilets provided must be anchored securely and shall be serviced as regularly as required i.e. overflow to be prevented at all cost and maintained clean and respectable.

13.6 Hazardous Substances Management

Hazardous substances pose risks to health & safety of site staff and surrounding landowners and the environment if incorrectly handled, stored, transported or disposed of. Hazardous substances on the Project typically include fuels, oils, bitumen and paints but may include other substances as well. It is necessary to ensure that hazardous substances are transported, stored, handled and used in a safe manner that poses minimal risk to human health and the environment.

Management and mitigation measures for hazardous substances present and generated during construction of the Schoemanskloof Road upgrades and consolidated access roads will need to be implemented and will be dealt with in a Waste Management Plan or method statement(s) that will need to be complied to by the Contractor and approved by the Concessionaire's EC and independent ECO. The following shall be implemented:

Hazardous Substances Management environmental objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Potential spillages of hazardous waste	• Decrease in water quality of the Crocodile River and its tributaries. • Soil contamination. • Potential negative effects to the wellbeing of fauna and flora.	Hazardous spills are prevented, mitigated if occurred and no incidents to human health.	• The quality of the water from upstream of construction and downstream of construction will not differ with more than 10%. No evidence of pollutants released into Crocodile Rivers and its tributaries. • Immediate removal and remediation of all spills. • All staff trained. • All hazardous substances are documented.	<u>Training</u> • Ensure that all personnel that use or handle hazardous materials are trained in the use and potential dangers of the materials; • Employees must be trained on emergency response procedures or method statements that the Contractor is to develop required to counter the nature and hazards of an accidental release; and • Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact. <u>Control planning</u> • Document the types and amounts of hazardous materials present on the project site including the following information: – Name and description (e.g. composition of a mixture) of the hazardous material; – Classification of hazardous material with SAWIS code; – Quantity of hazardous material used or generated per month; – Characteristics that make the material hazardous (e.g. flammability, toxicity); – Analysis of potential consequences based on the physical geographical characteristics of the site, including aspects such as its distance to settlements, water resources, and other environmentally sensitive areas. – Identify locations of hazardous materials and associated activities on an emergency plan site map;

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					– Detail the availability of specific personal protective equipment and training needed to respond to an emergency; and – Detail availability of spill response equipment sufficient to handle at least initial stages of a spill and a list of external resources for equipment and personnel, if necessary, to supplement internal resources. <u>Uncontrolled Releases and Spillages</u> • Implement all measures detailed in the spill prevention method statement; • Prevent uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard; • Implement management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures; • Store all hazardous (reactive, flammable, corrosive and toxic) materials in clearly identified, fit-for-purpose containers or vessels; • Describe response activities in the event of a spill, release, or other chemical emergency including: – Internal and external notification procedures; – Specific responsibilities of individuals or groups; – Decision process for assessing severity of the release, and determining appropriate actions; – Facility evacuation routes, and – Post-event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. <u>Reaction, fire and explosion prevention</u> • Reactive, flammable, and explosive materials must be managed to avoid uncontrolled reactions or conditions resulting in fire or explosion. Such prevention practices include: – Storage of incompatible materials (acids, bases, flammables, oxidizers, reactive chemicals) in separate areas, and with containment facilities separating material storage areas; – Provision of material-specific storage for extremely hazardous or reactive materials; – Use of flame arresting devices on vents from flammable storage containers; – Provision of grounding and lightning protection; and – Storage of hazardous materials in an area of the facility separated from the main construction activities. <u>Planning co-ordination</u> • A procedure or method statement should be prepared for:

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					– Informing the surrounding landowners, road users and emergency response agencies; – Documenting first aid and emergency medical treatment; – Taking emergency response actions; – Reviewing and updating the emergency response plan to reflect changes, and ensuring that employees are informed of such changes; and – Using, inspecting, testing, and maintaining the emergency response equipment. <u>Storage of hazardous materials</u> • Chemical products must be secured when not needed to prevent tampering and vandalism. • Provide warning notices, fire-fighting facilities and protection from weather damage. • Each shift supervisor or the SECO is to report on the integrity of the hazardous materials storage on a monthly basis in the SECO monthly report. • Keep products in their original container unless they are not re-sealable; with all stored products and containers being labelled, and original labels and MSDS retained. • Store acetylene, propane, and oxygen cylinders in dedicated areas where they will be protected from collision or ignition sources. • Label containers so that the hazard nature of the material is clear. <u>Handling of hazardous materials</u> • Obtain Material Safety Data Sheets (MSDS) for all chemicals before use and all materials must be handled according to the instructions. • In response to and in addition to the information contained on the MSDS, the following must also be determined: – Location, or where the material is to be moved; – The weight of the container so that proper personnel and/or equipment will be utilized during handling; – Access and egress routes; – What personal protective equipment (PPE) is required; – What emergency actions may be needed (i.e., abiding by the applicable emergency procedure(s), first aid, fire-fighting media, etc.); and – Containers holding flammable materials to be grounded during any transfers of contents. <u>Transport of hazardous materials</u> • Transporters of hazardous materials must ensure that: – The vehicle is suitable and registered for the purpose it is being used; and

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					– The vehicle displays clear markings in English indicating the nature of the materials being carried, what to do in the event of an emergency, and an emergency telephone number (24 hour) of a responsible person who can provide advice in the event of an emergency. <u>Flammable liquids</u> • No combustible material (e.g. wood, rags, carton boxes, etc.) are to be kept in the presence of flammable liquids. • 'No Open Flames' and 'No Smoking' symbolic signs are to be displayed in the vicinity of the flammable liquid storage areas. • Flammable liquids are to be issued only on a need-to-use-basis and strict control is to be exercised to ensure that persons do not draw more than what is needed for the specific job. • An adequate number (according to OHS regulations) and type of fire-fighting equipment is to be available in the close vicinity of a flammable liquid store/facility. • Flammable liquid stores are to be well ventilated and free of explosive vapours. • Flammable liquid containers in a flammable liquid store is to be clearly marked / labelled as to their contents. • Locations are to support MSDS information and handling/storage instructions. • Bund walls are to surround storage tanks containing flammable liquids and other hazardous liquids. These must be able to contain the volume of the largest container/vessel plus 10%, or 25 % of the total volume of the vessels – whichever is greater, in case of spillage.

<u>Specific site requirements:</u>

The effective management of hazardous materials on site should ensure that there are no uncontrolled releases of the same to the environment. That said it must be recognised that spillages can occur as a result of accidents or other anomalous circumstances. In the event of a spill, quick and effective remedial action can ensure little or no significant impact especially if there is effective rehabilitation as well.

Training:

- Train vehicle drivers to be aware of the loads they are carrying, spill prevention in respect of the loads and the possible spillages of materials that could arise in the event of a vehicle accident or collision with infrastructure such as a fence that could be ruptured by the collision;
- Only trained employees must be entitled to refuel equipment. The training of employees for refuelling must include spillage prevention, containment and clean-up and the necessary reporting of spills that do occur;
- Operators must be trained on release prevention, including drills specific to hazardous materials as part of emergency preparedness response training;
- Operators must also be trained in the safe transfer and filling of the hazardous material, and in spill prevention and response.

Spill prevention:

- Monitor containment areas, valves, tanks, and pipelines for potential ruptures, failures or overfilling;

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures

- Each shift supervisor/ foreman is to report on the status of spillage prevention infrastructure in the area of their jurisdiction confirming that it is in a serviceable state or requesting that maintenance be affected.

Refuelling:

- Fuel dispensing hoses shall be of approved non-electrically conductive types with automatic shut-off nozzles;
- Nozzles used for vehicle and equipment fuelling should be equipped with an automatic shut-off to control drips;
- All fuelling equipment is to be inspected regularly and all leaks must be repaired immediately;
- Absorbent spill clean-up materials should be available at fuelling areas and should be disposed of properly after use;
- Fuelling operations should not be left unattended; and
- Temporary fuelling facilities and trucks must be equipped with fire extinguishers.

Spill containment and countermeasures

- Spill response procedures must be prepared and suitable spill response equipment available when and where required – locate spill response equipment at various strategic locations across the project site;
- In the case of a spill, immediate action must be taken to stop and contain the spill;
- Any observed spills / leakage must be removed and the cause remedied;
- Spill reporting procedures to be posted at all storage facilities so that the appropriate emergency response can be mobilised;
- Spills into a containment area are to be removed/pumped out of the containment area. The water release valve is not be used to drain the spill; and
- The recovery of all spills to be treated as hazardous waste – this includes all contaminated materials such as sand, soil, gravel and stones - and appropriate temporary storage, transport and final disposal to meet the requirements for hazardous waste.

13.7 Noise and Vibration Management

The existing Schoemanskloof Road and intersections has vehicle generated noise emanated both during day and night-time. Apart from this and timber activities in the west and agricultural activities in the east, other significant sources of noise are not present along the route. Despite that fact that noise remains a feature of the road, actions need to be taken to control construction noise or to ensure that noisy activities occur at a time that will ensure no disturbance to surrounding landowners.

Potential vibration impacts from blasting activities and construction machinery and vehicles should be controlled and monitored to ensure damage to existing structures is avoided. The following shall be implemented:

Noise and Vibration Management environmental objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Increased level of noise generation during construction	• Nuisance factor to surrounding landowners (especially for conferencing, accommodation and leisure venues adjacent to the road) and fauna. • Potential negative effects to hearing of construction staff.	Level of noise generation kept to a minimum.	• No complaints from site staff and surrounding landowners. • Noise levels do not exceed existing road noise levels by more than 10 % at active construction sites.	• Construction may only occur during work hours as specified in the Contract Specification. • It is expected that construction will occur during daylight hours. Should any temporary construction activities need to be undertaken at night-time, this will be arranged and agreed with adjacent landowners on a formal basis. • No loud music is permitted on site. • All machinery and equipment must be maintained in good working order and fitted with approved and specified muffler systems must comply with the manufacturer's specifications on acceptable noise levels. • The Contractor shall take preventative measures (e.g. screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisance from sources. • Equipment shall be turned off when not in use.
2	Vibration	• Decrease in habitats of subterranean fauna. • Decrease in the breeding potential of subterranean fauna. • Nuisance to surrounding landowners.	Identified subterranean habits prior to blasting and compaction activities are considered. The effects of blasting and compaction activities are limited.	• Evidence of consultation and record keeping with surrounding landowners. • Visible warning signs.	• The Contractor shall take preventative measures (e.g. timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisance from sources. • Keep a record of the condition of all existing structures around the blasting area, before and after blasting. • The Contractor will be held responsible for the damage to structures as result of blasting. • Blasting Plan to be approved by the Engineer.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
		• Formation of cracks and deterioration of existing infrastructure.		• Measures in place for controlled blasting.	

13.8 Heritage and Archaeological Management

The Palaeontological (Fossil) Sensitivity Map developed by SAHRA has been reviewed and shows that the proposed site does not fall within an area with high fossil sensitivity. Instead, the site falls within an area of insignificant or zero sensitivity and therefore no palaeontological studies were required.

The heritage assessment revealed that the later phases of the Iron Age (AD 1600-1800's) are represented by various tribes including Ndebele, Swazi, BaKoni, and Pedi, marked by extensive stonewalled settlements found throughout the escarpment and particularly around Machadodorp, Lydenburg, Badfontein, Sekhukuneland, Roossenekal and Steelpoort. The BaKoni were the architects of a unique archaeological stone building complex who by the 19th century spoke seKoni which was similar to Sepedi. The core elements of this tradition are stone-walled enclosures, roads and terraces. These settlement complexes may be divided into three basic features: homesteads, terraces and cattle tracks.

Previous researchers identified three basic settlement layouts in this area. These sites can be divided into simple and complex ruins. Simple ruins are normally small in relation to more complex sites and have smaller central cattle byres and fewer huts. Complex ruins consist of a central cattle byre, which has two opposing entrances and several semi-circular enclosures surrounding it. The perimeter wall of these sites is sometimes poorly visible. Huts are built between the central enclosure and the perimeter wall. These are all connected by track-ways referred to as cattle tracks. These tracks are made by building stone walls, which forms a walkway for cattle to the centrally located cattle byres. A combination of these features occur at various locations along the Schoemanskloof Road.

Nineteen features were recorded with **stone packed walls and Iron Age Artefacts**. Due to dense vegetation accessibility and visibility was limited in many of these
areas.

Nine features related to the **built environment** were recorded. Features range from rectangular stone-built structures to bridges and modern ruins that are of no heritage significance.

Four burial sites were recorded during the study characterized by both stone packed informal graves as well as gravestones with inscriptions in formal cemeteries. Graves are always of high social significance and due to the dense vegetation and the fact that graves can occur anywhere across the landscape more graves can be expected in the area.

Potential impacts to heritage and archaeological features of the site shall be controlled and monitored to ensure damage to existing structures is avoided. Apart from the need for the Contractor to compile a Development Heritage Management Plan (DHMP) to ensure ongoing protection and management of recorded heritage resources, the following shall be implemented:

Heritage and Archaeological objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Destruction of sites of archaeological value	• Loss of archaeological valuable artefacts. • Loss of cultural and heritage value to society. • Social unrest.	Preserve sites and artefacts of archaeological interest, unearthed during construction as well as ensure that the correct protocols for such findings are adhered to.	• Sites demarcated prior and during construction. • Evidence of records should further discoveries be identified during construction. • Full compliance to all mitigation measures required. • Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA.	• The identified heritage features detailed below shall be documented with scaled drawings upon which a destruction permit must be applied for from South African Heritage Resources Agency (SAHRA). This is to be done by a heritage specialist. • Do not disturb deface, destroy or remove protected features and sites, whether fenced or not for the duration of the Contractor's presence on site unless it forms part of a destruction permit. • Construction must be immediately stopped, should any elements of cultural or heritage significance be found and the Concessionaire EC must be informed. As part of this, the following chance find procedure must be implemented: – If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager. – It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area. – The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA. • Do not resume Works in the area in question without permission from the Concessionaire and Engineer. • A qualified and registered archaeologist must be appointed and consulted at such a finding to appropriately excavate any artefacts in agreement with the Mpumalanga Heritage Resources Agency (MHRA) and the SAHRA.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
2	Subsurface items of archaeological value	• Loss of archaeological valuable artefacts. • Loss of cultural and heritage value to society.	Preserve artefacts of archaeological interest, unearthed during construction as well as ensure that the correct protocols for such findings are adhered to.	• Sites demarcated prior and during construction. • Evidence of records should further discoveries be identified during construction. • Full compliance to all mitigation measures required. • Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA.	• If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager. • It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area. • The senior on-site Manager will inform the Site Environmental Control Officer (SECO) and/ or Contractor Environmental Control Officer (CECO) of the chance find and its immediate impact on operations. The CECO/ SECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

Site-specific mitigation measures to be implemented:

Ref in HIA Report	Description report	Longitude	Latitude	Area	**Mitigation**
SCH001	SCH001-SCH004 marks a cluster of packed stone walled features running along the proposed line. These stone walled features seem to form part of a much larger series of stone walled ruins that extent across the landscape in an eastern direction over the various hills. These extensive ruins can be seen on the historical imagery on Google earth. This area has a substantial grass cover making ground visibility here fairly low.	30° 17' 15.6374" E	25° 36' 09.0567" S	Access Road	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.
SCH002		30° 17' 13.7004" E	25° 36' 11.5733" S	Access Road	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.
SCH003		30° 17' 12.3497" E	25° 36' 15.9383" S	Access Road	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.

SCH004		30° 17' 10.8661" E	25° 36' 18.6989" S	Access Road	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.
SCH005	Concrete bridge of unknown age and a section of the old tar road.	30° 17' 04.2132" E	25° 36' 13.6145" S	Access Road	No Mitigation.
SCH006	Cement slabs and concrete mix of recent origin	30° 20' 04.1348" E	25° 32' 12.2322" S	Access Road	No Mitigation.
SCH007	Ephemeral stone walling in an extensive thicket. The site is highly overgrown, and it is not possible to determine layout or time period.	30° 25' 16.1510" E	25° 27' 24.6823" S	Access Road and road widening	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.
SCH008	Remains of ephemeral walling. Probably robbed to build stone walls for garden landscaping/terraces at adjacent residential dwelling	30° 25' 19.2299" E	25° 27' 16.1554" S	Access Road	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.
SCH009	Low density undiagnostic ceramic scatter and grinding stone exposed by trenching next to fence. No other cultural deposit visible	30° 26' 55.9961" E	25° 26' 23.8724" S	Access Road	Monitor during construction.
SCH010	Possible Iron Age ephemeral stone walls. The site is highly overgrown, and it is not possible to determine site layout or time period.	30° 27' 55.7067" E	25° 26' 18.1566" S	Access Road	The area should be cleared to confirm the presence of features. **If features are found** mapping and **destruction permit**. The area should be monitored during construction.
SCH011	Iron Age stone wall settlement within inaccessible thickets next to existing Schoemanskloof road. The road impacted on a section of the site.	30° 30' 01.9365" E	25° 24' 33.7955" S	Access Road	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.
SCH012	Early Iron Age site decorated ceramics could indicate Klingbeil ceramic facies. Sorghum lower grinder on site. The site is exposed by agricultural activities.	30° 30' 11.5146" E	25° 24' 22.8682" S	Access Roads	Test Pits.
SCH013	Broken down lodge-Falcon glen (Modern Features)	30° 31' 25.8093" E	25° 23' 10.5456" S	Access Road	No Mitigation.
SCH014	Broken down and overgrown labourer housing	30° 31' 22.0719" E	25° 23' 12.4914" S	Access Road	No Mitigation.
SCH015	Late Iron Age site with multiple sections of packed stone walling. The walls are ephemeral and highly overgrown limiting visibility and site layout, or time period could not be determined.	30° 31' 16.3280" E	25° 23' 17.6289" S	Access Road	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.
SCH016	Ephemeral stone walls next to road leading to modern dwelling. The walls are highly overgrown, and it is not possible to determine site layout or time period.	30° 31' 12.2506" E	25° 23' 19.8473" S	Access Road	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.
SCH017	Ephemeral stone wall in overgrown thicket.	30° 31' 07.9942" E	25° 23' 22.8554" S	Access Road	The area should be cleared, the features should be mapped after which **a destruction permit should be applied for**. The area should be monitored during construction.

SCH018	Stone packed foundations of dwelling with small cemetery of at least 5 graves with stone packed grave dressings.	30° 31' 27.9866" E	25° 23' 15.1399" S	Access Road	Retain *in situ* based on approval from SAHRA and consent from next of kin. Monitor during construction and operation based on DHMP.
SCH019	Graves of the Bos family located next to road. Inscriptions date the cemetery to 2016 with possible older graves present as well	30° 31' 21.3984" E	25° 23' 17.5673" S	Access Road	Retain *in situ* based on approval from SAHRA and consent from next of kin. Monitor during construction and operation based on DHMP.
SCH020	Small cemetery located in a bamboo thicket. Graves are marked by stone packed grave dressings and large stones as headstones	30° 32' 09.6939" E	25° 23' 05.4660" S	Access Road	Retain *in situ* based on approval from SAHRA and consent from next of kin. Monitor during construction and operation based on DHMP.
SCH021	Ephemeral stone walling in an overgrown thicket. The walls are ephemeral and highly overgrown limiting visibility and site layout or time period could not be determined.	30° 32' 01.0940" E	25° 23' 07.1435" S	Access Road	Indicate on development plans and avoid.
SCH022	Cement slab.	30° 32' 19.6618" E	25° 23' 08.7181" S	Access Road	Indicate on development plans and avoid.
SCH023	Ephemeral walls possibly related to terracing at the farmstead. The area is very overgrown. The structures are not in use and dilapidated.	30° 32' 32.1350" E	25° 23' 06.5767" S	Access Road and road widening	Mapping and permitting.
SCH024	Small cemetery located within thicket with 4 visible graves of the Schoeman family. The graves are marked by cement borders and headstones. Visible inscriptions date the cemetery to 1934.	30° 32' 27.7752" E	25° 23' 06.7570" S	Access Road	Retain *in situ* based on approval from SAHRA and consent from next of kin. Monitor during construction and operation based on DHMP.
SCH025	Demolished remains of ruins with stone foundations with a possible more recent addition. The site is highly overgrown.	30° 32' 56.3479" E	25° 23' 18.0584" S	Access Road and road widening	Mapping and permitting.
SCH026	Upper grinding stone, no other cultural material is noted.	30° 34' 12.4236" E	25° 23' 41.6793" S	Access Road	Monitor during construction.
SCH027	Possible ephemeral walling forming terraces next to drainage line. The site is overgrown and difficult to determine if the linear looking stones are anthropogenic.	30° 34' 23.4627" E	25° 23' 43.5511" S	Access Road	Monitor during construction.
SCH028	Recent homestead with a bridge crossing the river dating to 1966.	30° 35' 36.4740" E	25° 23' 43.9105" S	Access Road	Map on development plans and avoid structures.
SCH029	Low density scatter of undiagnostic ceramics exposed in agricultural field.	30° 36' 51.6729" E	25° 23' 53.3624" S	Access Road	No Mitigation
SCH030	Remnants of a small historical homestead approx. 20m from the roadside in an inaccessible area. The structures are stone built with multiple foundations scattered close to the standing feature. The small homestead is situated close to a stream that also has small stone built features that seem to have been built to prevent erosion.	30 19 11.2800	25 33 03.3264	Road Widening Site	No Mitigation

SCH031	Large area of multiple stone-built enclosures. The stone features extend far into the surrounding environment. These features are highly disturbed and overgrown making it difficult to determine layout and could contain Iron Age and historical components.	30° 22' 47.0353" E	25° 28' 57.1871" S	Road Widening Site	Avoidance. If this is not possible Phase 2 mitigation and destruction permit.
SCH032	Remnants of a ruin approx. 10 m from the roadside within an inaccessible area on the other side of a large fence.	30° 23' 52.8431" E	25° 28' 13.7603" S	Road Widening Site	Indicate on development plans and avoid.
SCH033	Multiple areas of Circular stone walling on the edge of the road buffer. These features are highly disturbed with some areas having been cut through due to the construction of the road. The rest of these features continue into an inaccessible area on the other side of the road buffer fence line. Waypoints taken at multiple locations to indicate the closest existing features within the development area.	30° 25' 22.8432" E	25° 27' 11.7899" S	Road Widening Site and access road	Avoidance. If this is not possible Phase 2 mitigation and destruction permit.

13.9 Traffic Management

By the very nature of the project, the construction of the Schoemanskloof Road upgrades and consolidated access roads, may hinder traffic flow. The route carries a lot of traffic and a significant number of heavy trucks travelling between Mashishing in Mpumalanga and Maputo in Mozambique and all associated economic activities in between such as the SAPPI timber plantations in the west and agricultural activities in the east along the Schoemanskloof. Careful traffic management planning in advance of construction is crucial. Traffic generated as a result of the Project can result in additional congestion, noise, dust emissions and damage to roads which can result in turn in significant potential impacts on road users with resultant potential safety risks. Mitigation must be implemented to reduce the severity of these effects and ensure that they do not result in significant impacts. The following shall be implemented:

Traffic Management objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Increase in vehicle movement in the area	• Increase in noise levels. • Potential vehicle accidents. • Potential increase in pedestrian accidents. • Decrease in the surface quality of roads.	Accidents are prevented. The surface quality of the road is not negatively impacted by the construction activities.	• No incidents of reported vehicle, pedestrian and animal accidents. • Condition of existing road lanes surfaces maintained. • No complaints from surrounding landowners or road users.	• All incidents should be reported to the Concessionaire, investigated, documented, closed out and record kept in the safety file. • Deliveries should preferably be scheduled for off-peak hour traffic times. • Where construction will obstruct existing access, be sure to allow for alternative temporary access routes. • Allow for safe pedestrian crossings where necessary. • Traffic calming measures must be implemented in consultation with the provincial traffic department.
2	Lack of visibility of warning signage	• Increase in potential vehicle accidents. • Potential increase in pedestrian accidents.	The presence of construction activities and vehicles is continually clearly indicated thereby minimising the potential for accidents.	• No incidents of reported vehicle, pedestrian and livestock accidents. • Clear visibility of warning signage.	• Warning signs must be placed on and around the site as per the Occupational, Health and Safety Act and Road Traffic Act requirements. • Clearly indicate which activities are to take place within which areas of the site using demarcation and/or signage. • Traffic warning signage must be erected where applicable, along transport routes and access roads. • The Contractor shall properly mark all access roads. Markers shall show the direction of travel. Roads not being used shall be marked with a “No Entry” sign.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• Position security lighting (where applicable) such that it does not pose a nuisance to the local leisure, accommodation and business venues. • Access to adjacent properties and businesses such as Old Joe's Kaya, Joubert & Seuns, Fish Falls Farm, Joubert & Seuns, Viva Fuel Station, St Paul's Nature Reserve and Martin's Haven must at all times remain accessible. • Warning barricading should be placed around open excavations and should be suitable for varying weather conditions.
3	Impact on existing road conditions and neighbouring properties	• The development of potholes. • Damage to vehicles • Potential increase in vehicle accidents.	Sections of existing road surfaces which have been impacted on by the construction activities are remediated.	• Existing road surfaces are utilised and maintained within the baseline levels.	• Consolidated accesses and associated access roads need to be constructed within the preliminary design corridors as assessed during the BA process completed. • Access for affected landowners to their properties must always be available or special arrangements must be agreed upon. • Maintain storm water control mechanisms. • Clean and make good any damage to public or private roads caused by the Contractor during the construction phase.

13.10 Fire Risk Management

The largest risk of uncontrolled fire is that it can result in severe human injury and even death. Uncontrolled fire also poses a risk of impacts on neighbouring activities – the most notable being the SAPPI timber plantations in the west. As such it is necessary to ensure that there are multiple preventative measures in place to reduce the risk of fire. In the event that fire occurs it is crucial to be able to quickly and effectively to bring the fire under control before it causes damage to adjacent properties and possible injury people and animals. Of paramount importance is to work in compliance with the established Lowveld & Escarpment Fire Protection Association (LEFPA). The Association has developed a *"Rules and Minimum Requirements"* document (latest version known as *"Version 2020"*) and these requirements must be adhered to by the appointed Contractor and the Concessionaire. The following must be implemented:

Fire Risk Management objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Fire hazard	• Fire damage to surrounding properties, businesses, vegetation, plantations, crops, grazing and communal land. • Potential injury or death of fauna, avifauna species, and humans. • Fire damage to equipment, plant, vehicles and construction materials.	No uncontrolled fires are created.	• Adequate food warming facilities (no use of fires). • No evidence of open fires. • Adequate and serviced fire-fighting equipment and materials easily accessible on site.	• During site establishment, contact must be established with the LEFPA Manager, Mr Andre Scheepers via e-mail: manager@lefpa.co.za; or cellphone number: 083-310-7252 • Basic fire-fighting equipment must be available on site. Pages 17 and 18 of the *Rules and minimum requirements* document of LEFPA must be consulted regarding equipment required by Contractors in the region. This includes rubber beaters, gloves, fire extinguishers and masks. A water cart with a minimum capacity of 5000 litres, equipped with a pump and hose must be permanently on site(s) susceptible to the spread of uncontrolled fires. • Basic wildland fire fighting training is recommended. The LEFPA must be contacted in this regard. • The contractor must supply electrical or gas food warming facilities for the labourers at the contractor's yard. • Do not store any fuel or chemicals under trees but rather in properly bunded vessels and flammable stores. • Do not store gas and liquid fuel in the same storage area. • Staff must be adequately trained to operate all fire-fighting equipment on site and records of training must be kept for EMS and ECO auditing requirements. • All incidents should be reported to the Concessionaire's EC, the ECO and be investigated, documented and kept in the environmental file. • No decanted fuel to be left unattended in the sun to avoid fire. • No open fires permitted anywhere on site. No on-site burning of waste materials, vegetation, litter or refuse shall be permitted. • Smoking shall only be allowed in designated areas that include fire extinguishers.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
					• Appropriate facilities such as sand bins must also be provided at dedicated smoking areas. • Emphasis must be placed on the risk of cigarette butts during toolbox talks.
The LEFPA's Rules and Minimum Requirements document (Version 2020) must be complied to. A copy of the document must be kept on site and communicated to site staff – their fire risk training must include the relevant information from this document as well.					

13.11 Social Management

Due to the Schoemanskloof Road upgrades and introduction of the consolidated access roads, there are a number of ways in which the Project will interact with the social environment. Negative impacts that may manifest include safety risks and traffic flow issues. Potential benefits like procurement and general economic development effects that may stem from the Project also apply. The following requirements must be met during the construction of the Project to manage its social aspects. Instead of the Project possibly being perceived as being negative on the social dynamics of the surrounding areas, the social aspects, when well-managed, may depict the positive outcomes of the Project.

Social Management objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Decrease in the aesthetic quality of the environment	• Negative effect on sense of place of the surrounding area. • Negative effect on sense of being.	The disruption of the natural and existing landscape characteristics is limited.	• No decrease in the visible characteristics of the site's surrounding areas.	• Do not perform any activities or operations that are likely to adversely affect the aesthetic quality of the environment. • Inert building rubble and waste rock may not be dumped indiscriminately on site or surrounding areas but must be used for the rehabilitation of voids created on site or associated borrow pits or removed off site for disposal. • Spoil must be positioned in windrows parallel to the excavation. • Spoil must be stored in heaps not exceeding 2 m in height. • Do not store spoil in drainage lines. • No vegetation shall be pushed into heaps or left lying all over the veld. • Shape cut and fill slopes to emulate the natural surroundings. • Trim areas already shaped to within an acceptable tolerance, with all undulations following a smooth curve. Ensure that final trimmed levels make provision for the specified depth of the reapplied topsoil.
2	Disruption in the provision of services	• Disruption of the availability of water, electricity and telecommunications to surrounding landowners and businesses. • Negative effects on the well-being of the local inhabitants	Disruption of all major services to the affected area is prevented.	• No disruptions to daily activities of local communities and land users • No complaints received from local communities and land users	• Where pipelines are found along the route, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures. • Any damage to pipelines shall be repaired immediately. • All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties and businesses. • Care must be taken not to damage property, access roads, fences, etc.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
		as well as the potential outbreak of disease. • Decline in the micro-economic output of the surrounding area.			
3	Insufficient consultation with affected parties	• Social unrest. • Delay in progress of construction.	Surrounding landowners, business owners and communities have been consulted with prior to and during construction.	• Records are available of consultation with surrounding landowners and communities prior to and during construction. • No complaints from surrounding landowners and communities.	• Access to privately owned land must be arranged with the landowners by the Contractor via the Concessionaire. • All agreements reached should be documented and no verbal agreements should be made. • The success of the project depends a lot on the good relations with relevant affected parties. It is required that the Contractor will supply one person to be the Contractor's Liaison Officer (CLO) for the entire contract, and that this person shall be available to investigate all problems arising on the project. • The contact numbers of the CLO, the ECO and the CEC shall be made available to landowners. This will ensure open channels of communication and prompt response to queries and claims. • All contact with the landowners shall be courteous at all times. • The rights of the landowners shall be respected at all times and all staff shall be sensitised to this. • Response must be made to landowner and community complaints taking reasonable action to ameliorate the impact. • Where complaints concerning noise cannot be addressed to the satisfaction of all parties, the Contractor will upon instruction by the Concessionaire provide an independent and registered Noise Specialist to undertake a survey of the noise output levels. • The proposed consolidation of accesses may reduce visibility of existing businesses in specific instances. It is expected that this will have a medium effect as these businesses have an existing customer base. The significance can be further reduced by the implementation of necessary signage on the new alignment. For example, clear signage to accommodation venues must be erected at strategic positions for existing and potential customers as construction and re-alignment works will inevitably result in fewer number of people knowing about, and/or missing access routes to the venues.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
4	Insufficient employment of local labour	• Social unrest. • Potential delays in construction programme. • Limiting growth in local economy.	Local labour where applicable and as far as possible have been employed.	• Evidence of staff employment record. • No complaints received from local community.	• The Contractor must ensure that a percentage of the labour employed is from the local community.
			Development of unskilled, semi-skilled and skilled personnel recruited from the Project Area, and wider Mpumalanga Province respectively.	• Expenditure by Contractor on training equals 3 % of wage bill. • Training of females, expenditure on learnerships and expenditure on internships each equals 0.5% of wage bill.	• The Contractor must institute an approved training and skills development programme to meet targets and criteria. • The training shall be restricted to trade skills for the construction industry in categories: trade workers, machine operators, elementary workers, safety representatives, supervisors, etc. • Additional training must be provided for workers for the duration of construction, directed towards: (i) satisfying the immediate requirements of the Works, and (ii) introducing unskilled employees to the constraints and requirements of an organised working environment, and (iii) to the use of construction tools and equipment.
5	Trespassing on construction site and private properties	• Theft. • Vandalism. • Safety to site staff jeopardised. • Injury to trespassers resulting in possible lawsuits.	The construction site is demarcated.	• Secure and adequate fencing and access control. • 24-hour security evident on site.	• Labourers associated with the contractor must be easily recognizable (i.e. company issued overalls with company name/logo etc), and no non-labourer will be allowed within the construction camp at any time. • The Contractor shall take all necessary precautions against trespassing on private properties. • The Contractor will be responsible for his own security arrangements and shall comply with all site security instructions. • Protect and maintain existing private property, fences and gates. • Respect the open or closed status of gates for the duration of the construction period.
6	Influx of job-seekers	• Loitering at construction site. • Increase in crime and social pathologies. • Pressure on existing services/ infrastructure.	The influx of job-seekers is minimised and the risk of their presence leading to negative social impacts is reduced.	• Records of resident status of temporary workers. • Existence of labour desk.	• Employ people from local communities as far as possible, with adequate verification of applicants' local resident status. • Clear communication of preference for local labour to surrounding communities. • Strict control of access to construction site.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
		• Development of informal settlements.		• No complaints from local residents regarding population influx.	• Labourers associated with the contractor must be easily recognisable (i.e. the Contractor must issue overalls with company name/logo etc.), and no non-labourer will be allowed within the construction camp at any time.
7	Loss of farm labour to construction work	• Landowner resistance to the project. • Increased unemployment after construction ends.	Local people are encouraged not to leave current employment for temporary work on the project.	• No complaints from local landowners regarding loss of farm labour.	• During community engagement/ information dissemination, emphasis must be placed on the temporary nature of construction employment. • Strict adherence to Labour legislation (in terms of employment of minors, etc.) must at all times be made.

13.12 Safety Management

Construction projects and the associated construction activities pertaining to them hold numerous safety hazards to construction workers and the surrounding land owners and road users if safety is not treated as a first priority. Projects such as the construction of the Schoemanskloof Road upgrades and consolidated access roads, would require full compliance with the Occupational Health and Safety Act (No. 85 of 1993) and its associated Regulations as well as Provincial and local By-laws. The following requirements must as a minimum be met during the construction of the Project to manage its safety aspects.

Safety Management objectives and planning actions

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures
1	Construction activities	• Injury to site staff from construction, demolition and blasting activities. • Damage to vehicles and building as a result of blasting activities. • Injury or fatal accidents of construction workers during the upgrade of roads. • Burning and the development of "arc eyes" from welding. • Potential injury or death to fauna from falling into open excavations.	The safety of all personnel on site during the construction phase is ensured.	• Low incidents of injured on duty (IOD's) on site. • Low incidents of reported pedestrian accidents. • Records kept of health and safety training conducted for all staff on site. • Visible evidence and use of PPE. • Excavations are demarcated.	• PPE to be provided and well maintained at contractor's camps. • The Contractor will adhere to all requirements of the Occupational Health and Safety Act (Act 85 of 1993), including the drafting of suitable Health and Safety Plan which will be implemented during the construction phase. • All incidents should be reported to the Safety staff, investigated, documented and kept in the safety file. • All personnel are to undergo Environmental Awareness and Safety Training. A signed register of attendance must be kept for proof. • Open excavations must be checked on a daily basis for any wildlife that may have fallen into them. • The Contractor shall recognise that the sites are situated along a major route with a high number of motorists using this route and shall therefore take all reasonable measures to ensure the safety of people in the surrounding area. • Where the public could be exposed to danger by any of the Works or Site activities, the Contractor shall, as appropriate, provide suitable flagmen, barriers and/or warning signs all to the approval of the Concessionaire. • All unattended open excavations shall be adequately demarcated (fencing shall consist of a minimum of three strands or wire and made clearly visible). • Storage areas shall display the required safety signs depicting "No smoking", "No naked lights" and "Danger". Containers shall be clearly marked to indicate contents as well as safety requirements. • Adequate first aid services must be provided by the contractor at the contractor's camps.

13.13 Visual Impact Management

The Schoemanskloof Road upgrades will not only introduce additional road infrastructure such as access roads, but also additional road signage for safety improvement reasons. These aspects consequently have visual impacts on the surrounding area and its receptors like landowners and road users. During the BA Process, the visual impacts were assessed and found to be 'low-medium' in significance.

The most important mitigation measure is planning and design such that the structures are placed is such a manner that the visual intrusion is either avoided or limited as far as possible. Secondarily, it is important that during the construction phase the short-term visual disturbance is kept to a minimum that any such disturbance is adequately rehabilitated such that no long-term disturbance remains. General mitigation measures include the following:

- Existing linear features: Placing new linear structures alongside existing linear features will reduce the overall impact.
- Erosion: special attention to erosion control is important as erosion tends to develop long term scars in the landscape.
- Clearing of vegetation: Clearing of any vegetation that would provide a screening effect should be avoided.
- Access Roads: Use existing roads and tracks as far as possible
- Rehabilitation: Any temporary disturbance should be rehabilitated as soon as possible to reduce the effects of erosion.
- Suitable screening to be put in place during construction to minimise visual impacts.
- No littering to be allowed.
- Good housekeeping practices to be followed

13.14 Environment and Social Issues

Some activities may bring about issues both for the environment and society.

13.14.1 Pre-construction

Most Landowners will see the construction period as interference with their daily activities. There may be a negative attitude towards the construction process. Landowners are usually apprehensive toward changes they do not control. Landowners shall therefore be informed timeously of the construction program, duration and all interference with their daily activities.

13.14.2 During construction

Due to the current security situation of South Africa, Landowners are not comfortable when strangers come on to their properties. They may look for reasons to interfere with the construction process and may therefore cause delays in the process that can be very costly to the Concessionaire and the Contractor.

The Contractor is reminded that accesses shall not be continuous. No camping shall be allowed on any private property. If the contractor wants to leave guards on other's sites, it shall only be done with the written consent of the Landowners involved. Damage to fences, gates and other infrastructure may occur at any time. This will create problems with the Landowners and should be avoided as far as possible. All damage to be repaired as soon as practically possible and to the agreement reached between the Concessionaire and the landowner prior to the repair. The use of private access routes for construction purposes leads to damage due to heavy equipment and frequent use.

13.14.3 Post construction

If damaged infrastructure outside of the SANRAL servitude is not repaired to the expectations of the Landowners, they may refuse to sign the release forms and even engage in litigation. Outstanding claims may also result in release forms not being signed by the Landowners. Possible solutions to such problems are:

- Proper liaison between TracN4, the Contractor and surrounding Landowners.
- A physical access plan along the servitudes shall be compiled and the Contractor shall adhere to this plan at all times. Proper planning when the physical access plan is drawn up in conjunction with the Contractor shall be necessary to ensure access to all working sites.

- The affected Landowners around the earmarked upgrades shall be informed of the starting date of construction as well as the phases in which the construction shall take place.
- The Contractor must adhere to all conditions of contract including this EMPr.
- Proper planning of the construction process to allow for disruptions due to rain and very wet conditions.
- Where existing private roads are in a bad state of repair, such roads' condition shall be documented before they are used for construction purposes. If necessary some repairs should be done to prevent damage to equipment and plant.
- All manmade structures shall be protected against damage at all times and any damage shall be rectified immediately.
- Proper site management and regular monitoring of site works.
- Formal documentation and robust record keeping of all complaints and actions taken.
- Regular site inspections and good control over the construction process throughout the construction period.
- A positive attitude towards Environmental Management by all site personnel.
- Appointment of a Community Liaison Officer on behalf of the Contractor to implement this EMPr as well as deal with all Landowner related matters.
- Environmental Audits to be carried out on a monthly basis during and upon completion of construction. Such audits will be conducted by the Concessionaire EC and the independent ECO shall audit the project on a quarterly frequency. The Contractor SECO shall conduct daily inspections and compile weekly and monthly reports for review by the CEC and ECO.

13.15 Rehabilitation

Rehabilitation must be carried out as soon as possible after the construction is completed. All rehabilitation is to be done with approval of the Concessionaire's CEC.

13.15.1 Rehabilitation of site camps

The removal of all construction facilities and materials from the construction site yards / office areas will be required, and rehabilitation will have to be carried out, including the removal of the following:-

- Concrete and compacted earth platforms;
- Fuel storage tanks; and
- Chemical toilets.

Access roads will need to be rehabilitated according to the contract specifications. Any contaminated material or soil must be removed to a registered hazardous waste disposal facility and the prescribed re-vegetation process must then be followed thereafter.

13.15.2 Eradication of alien vegetation

All alien vegetation borne from construction activities spread over the entire construction footprint must be removed on a regular basis. Chemical removal shall be used in accordance with manufacturer's specification for weeds and only applied by a registered pest control applicator. Once the weeds have perished they shall be removed mechanically by use of an offset disk plough thereby digging up the vegetation including the root ball.

13.15.3 Control of alien vegetation

The remainder of the site including the revegetated areas shall be kept free of weeds and alien vegetation.

13.15.4 Rehabilitation in general

Overall, rehabilitation shall consider:

- Filling of the excavations with subsoil and topsoil to a minimum depth as required by Contract Specifications;
- Shaping of the disturbed areas to blend with the surrounding landscape;
- Placing of topsoil on all disturbed areas (minimum depth 150 mm);
- Organic fertilizers must be added to the topsoil prior to seeding (if required).
- Re-vegetation of all areas where topsoil is placed using a mixture of indigenous grasses and bushes;
- Maintenance of these areas until an acceptable cover has been established. Acceptable cover shall mean 75% ground cover with no gaps exceeding 500 mm. Maintenance may include watering, mowing and weeding as well as preventing the development of erosion channels or, backfilling where they have occurred.

13.15.5 Rehabilitation monitoring framework

A monitoring framework for the rehabilitated terrestrial and surface water areas must be designed and implemented to ensure that:

- The trees, shrubs and grasses that are planted for rehabilitation purposes are growing and repopulating the areas as they should;
- The *Aloe simii* (if found to be present) has re-established and is not further being impacted on by the operations of the road;
- Alien invasive species are identified and cleared before they infest the area; and
- The stormwater infrastructure is functioning accordingly.

14 CONCLUSION

Although all foreseeable actions and potential mitigations or management actions are contained in this document, the EMPr should be seen as a day-to-day management document. The EMPr thus sets out the environmental and social standards that would be required to minimise the negative impacts and maximise the positive benefits of the construction of the Schoemanskloof Road upgrades, consolidated accesses and associated access roads.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the Engineers and Contractor are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these. Numerous challenges and problems can be prevented if this is achieved. For example, in terms of heritage, there are destruction permits that will need to be attained for some identified impacted sites in advance of construction. Similarly, protected trees marking also needs to be done and permits for removals before construction commences.

The compliance to the EMPr will be verified by the Concessionaire EC and independent ECO on monthly and quarterly frequencies, respectively.