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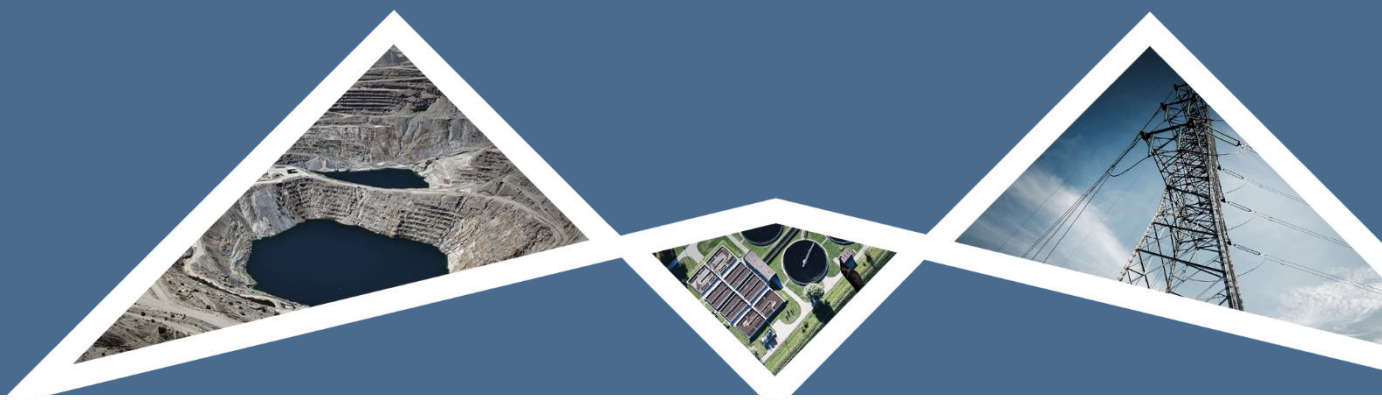
T 011 789 7170 E info@eims.co.za W www.eims.co.za

ENVIRONMENTAL MANAGEMENT PROGRAMME

EASTERN CAPE DEPARTMENT OF TRANSPORT: PROPOSED UPGRADE OF A PORTION OF DR08606, STERKSPRUIT



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COMPILED:	Andisiwe Stuurman		**2019/04/26**
CHECKED:	GP Kriel		**2019/04/26**
AUTHORIZED:	Liam Whitlow		**2019/04/26**

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Abbreviations

DEA	:	Department of Environmental Affairs
DWAF	:	Department of Water Affairs and Forestry (now DWS)
DWS	:	Department of Water and Sanitation
EA	:	Environmental Authorisation
EAP	:	Environmental Assessment Practitioner
ECO	:	Environmental Control Officer
EO	:	Environmental Officer
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Services (Pty) Ltd.
EMPr	:	Environmental Management Programme
EPRP	:	Emergency Preparedness and Response Plan
HSE	:	Health, Safety and Environment
I&AP	:	Interested and Affected Party
ISO	:	International Standards Organisation
NFA	:	National Forests Act (Act 84 of 1998)
NEMA	:	National Environmental Management Act (Act No. 107 of 1998)
NEMAQA	:	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEMBA	:	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEMWA	:	National Environmental Management: Waste Act (Act No. 59 of 2008)
NWA	:	National Water Act (Act No. 36 of 1998)
OHSA	:	Occupational Health and Safety Act (Act No. 85 of 1993)
SABS	:	South African Bureau of Standards
SANAS	:	South African National Accreditation System
SWMP	:	Storm Water Management Plan
TOPS	:	Threatened or Protected Species

1 INTRODUCTION

Environmental Impact Management services (Pty) Ltd (EIMS) has been appointed by Eastern Cape Department of Transport – hereafter referred to as ECDoT to assist in preparing and submitting, in support of an Environmental Authorisation application – a Basic Assessment process as per the NEMA EIA Regulations, 2014 (as amended) for the proposed upgrade of a portion of DR08606. The competent authority for this application will be the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (ECDEDEAT). A Water Use License Application will be submitted to the Department of Water and Sanitation (DWS) for the water crossings. Suitable borrow pit areas will be investigated along the route of the road for the supply of aggregate for the construction of the road, and where required, an application for a mining permit will be submitted to the Department of Mineral Resources (DMR).

An EMPr is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented, and that the positive benefits of the projects are enhanced. This EMPr has been compiled as a guideline for the mitigation and management measures to be implemented to avoid, reduce and minimise potential environmental impacts arising out of the construction phase of the project.

2 SCOPE OF THIS DOCUMENT

The purpose of the EMPr is to give effect to precautionary measures, which are to be put in place for controlling the activities that take place during the construction phase of the project. The EMPr also provides guidance to assist in ensuring compliance with relevant national legislative and regulatory requirements.

It should be borne in mind, however, that the EMPr is a working document that should be updated on a regular basis, as and when necessary. Formal risk identification forms an integral part of EMPr management and assists with prioritizing and focusing the control of risks. The EMPr thus supports this on-going proactive mitigation and the duty of care to the environment. The EMPr shall therefore allow for risk minimization, rather than just ensuring legal compliance. The purpose of this EMPr is thus also to allow the user to make minor amendments to ensure continual revision and improvement of risk mitigation through the continual re-assessment of risks associated with the activity.

3 DOCUMENT STRUCTURE

Table 1: EMPr Structure

Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(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;	Section 6
Appendix 4(1)(1)(b):	A detailed description of the aspects of the activity that are covered by the EMPR as identified by the project description.	Section 4
Appendix 4(1)(1)(c):	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 4
Appendix 4(1)(1)(d):	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified though 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;	Section 16
Appendix 4(1)(1)(f):	A description of proposed impact management actions, identifying the manner in which the impact management contemplated in paragraphs (d) 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;	Section 16

Appendix 4 Reference	Description	Section in EMPr
	(iii) Comply with any applicable provisions of the ac regarding closure, where applicable; and (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	
Appendix 4(1)(1)(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 16
Appendix 4(1)(1)(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 16
Appendix 4(1)(1)(i):	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 16
Appendix 4(1)(1)(j):	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 16
Appendix 4(1)(1)(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 16
Appendix 4(1)(1)(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 16
Appendix 4(1)(1)(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	Section 14
Appendix 4(1)(1)(n):	Any specific information that may be required by the competent authority.	N/A

4 PROJECT DESCRIPTION

Eastern Cape Department of Transport– hereafter referred to as ECDoT – is proposing to upgrade to a portion of DR08606, from Sterkspruit to Mlamli Hospital. The proposed activity area is located starting from Sterkspruit town leading 12km towards Mlamli Hospital. The site is in Senqu Local Municipality within the Joe Gqabi District Municipality in the Eastern Cape Province. Please refer to Figure 1 illustrating the locality of the proposed road upgrade as well as the bridges and proposed borrow areas. The type of surfacing that will be applied on the proposed road will be 19mm Cape Seal. The stone that will be used in the construction of the road will be sourced from a commercial quarry in Aliwal North and the bitumen will be sourced from a bitumen specialist, thus there will be no asphalt plant on site and no bitumen will be stored on site. Where blasting is required, a suitably qualified and approved specialist will be appointed to conduct the blasting activities. The construction will include the upgrading of a gravel road to surfacing that is ±12km in length and 9.8m wide.

In support of this, ECDoT is required to undertake a Basic Assessment process as per the NEMA EIA Regulations, 2014 (as amended) for the proposed construction of the road upgrade. The competent authority for this application will be the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (ECDEDEAT). A Water Use License Application will be submitted to the Department of Water and Sanitation (DWS) for the water crossings. Suitable borrow pit areas will be investigated along the route of the road for the supply of aggregate for the construction of the road, and where required, an application for a mining permit will be submitted to the Department of Mineral Resources (DMR).

The construction phase will include the following activities:

- The upgrade of a road from gravel to surface (the road is roughly 12km in length and 9.8m wide);
- Bulk cut and fill operations;
- Construction of layer-works (material to be obtained from borrow pits and hard rock quarry on site);
- Sealing of new layer-work surface;
- Construction of new concrete lined surface drains parallel to existing road;
- Construction of subsoil drainage;
- Construction of storm water drainage; and
- Demolition of existing storm water culverts and construction of new major storm water culverts.
- Construction of 4 major bridges.

Suitable borrow pit areas will be investigated along the route of the road for the supply of aggregate for the construction of the road, and where required, an application for a mining permit will be submitted to the Department of Mineral Resources (DMR). One borrow pit will be investigated. It is possible that one hard rock quarry to provide crushed aggregate for the project may be developed. The feasibility of the development of such a source still needs to be investigated in detail taking into account the lack of suitable materials in the area and the possibility of using existing quarries and/or commercial sources. The size of the borrow pits and quarry could exceed 1.5 hectares each. The construction phase of the project is anticipated to commence in 2019 and end during 2020.

Prior to commencement of any construction activities, that may disturb waterlines in the area, the Joe Gqabi District Municipality water services unit will be informed on planned activities. With regards to the old bridges and structures along the existing road, most of the bridges will be kept and used as a detour detour during construction. The existing bridges will also be used for pedestrian and for animal crossing during the operational phase. The only bridge that will be demolished is the bridge that has already collapsed and would not be safe for continued use.

It is noted that climate change is likely to affect the proposed road and river crossings both acutely through extreme weather events and chronically through gradual changes. The use of Cape seal surfacing in the design of the road will increase its resilience to effects of climate change such as increased temperatures, precipitation and flooding which may cause accelerated aging of binder, rutting of asphalt and reduced load carrying capacity of the road. A

Cape Seal is a chip seal covered with a slurry or micro-surface. The benefits of using a cape seal include a very smooth surface with an increased durability by sealing the subbase. The cape seal increases the life of a chip seal by enhancing binding of the chips and by protecting the surface. The cape-seal surface does not have any loose aggregate and creates a dense mat. The river crossings have been designed to cater for a 1:50 year flood to minimize the occurrence of wash-aways and overtopping of road. In addition, the road has been designed to have concrete lined surface drains parallel to the existing road which is expected to be able to accommodate the increased volume and intensity of discharge should there be greater rainfall.

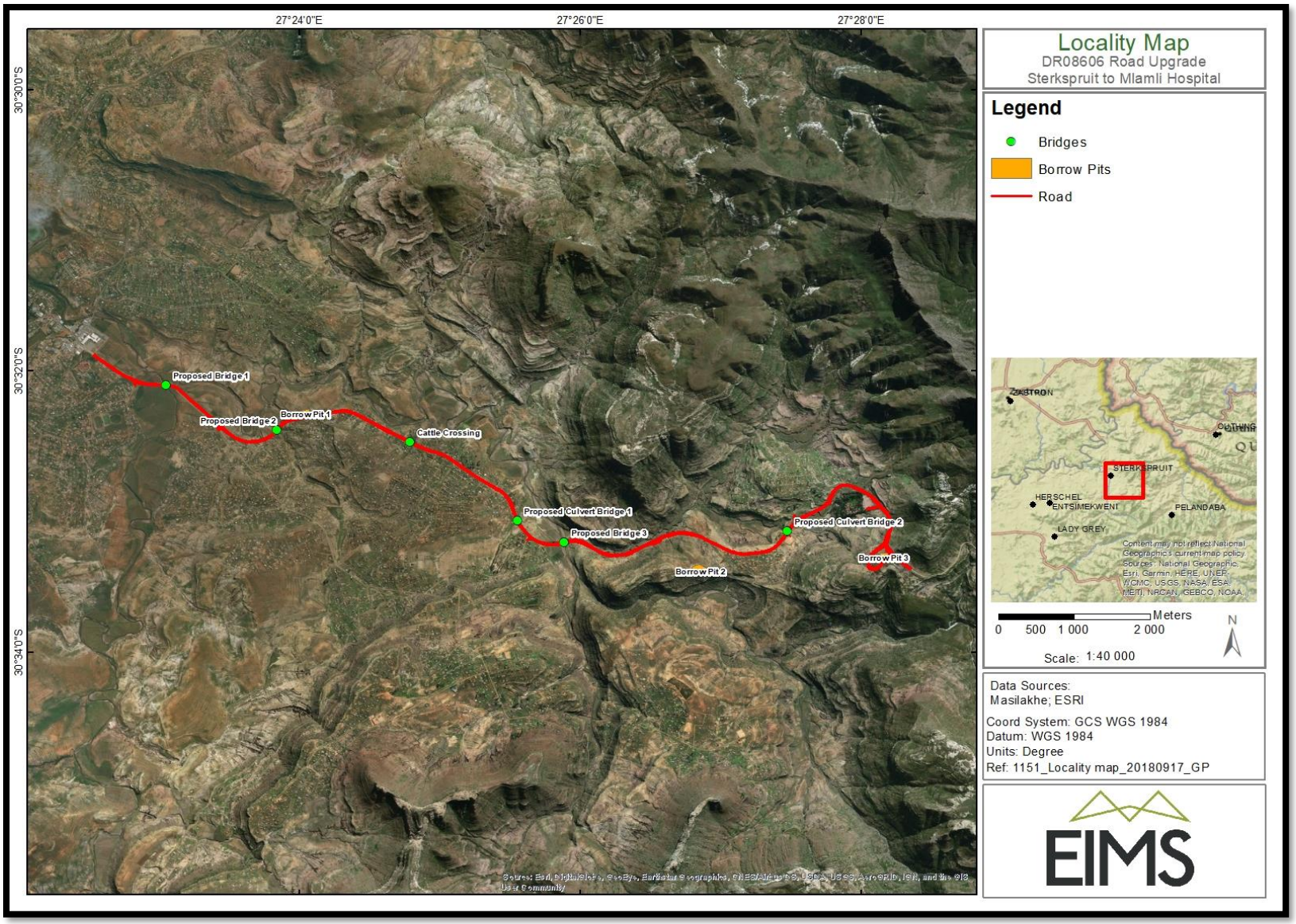

Figure 1: Locality Map

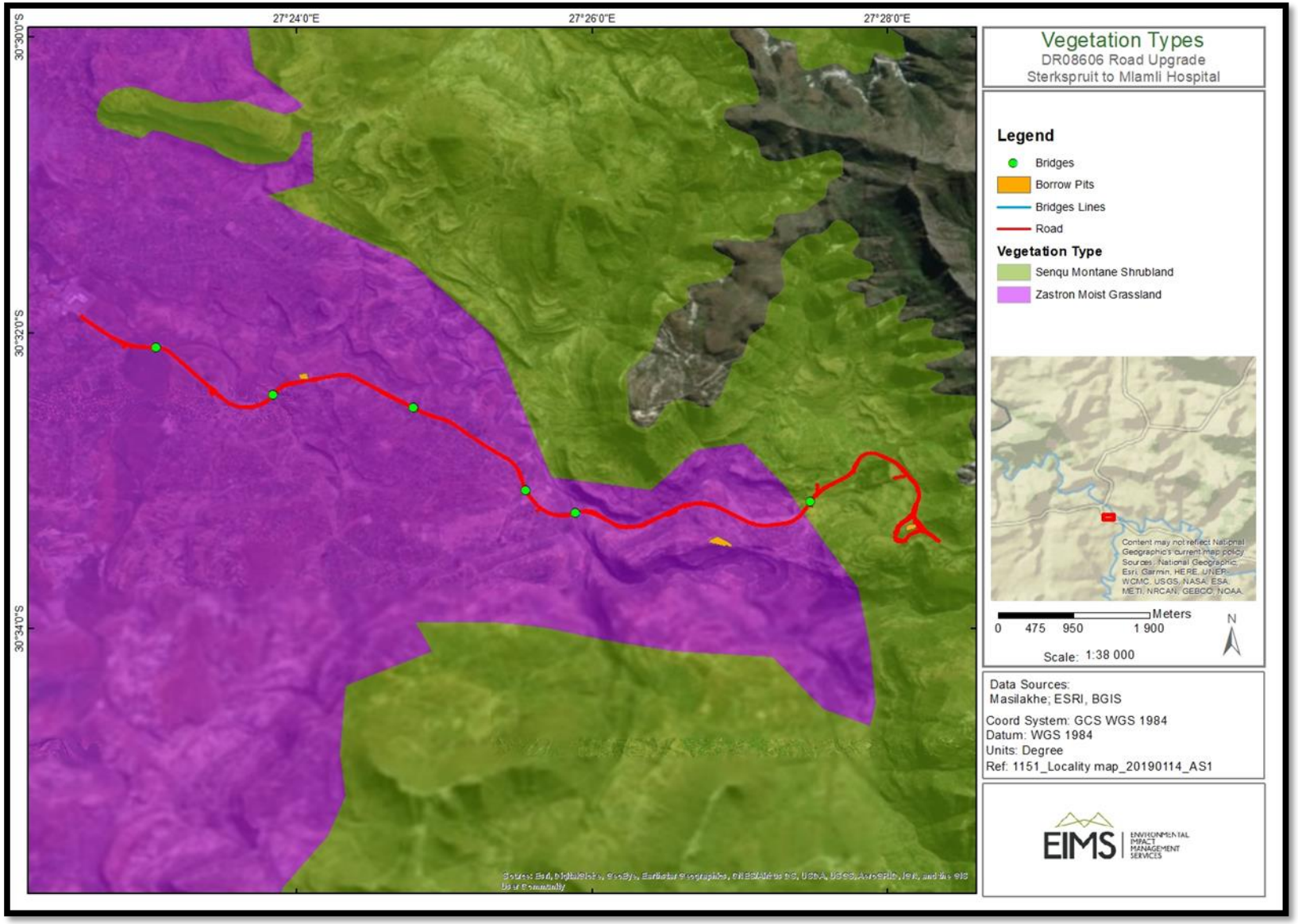

Figure 2: Vegetation types

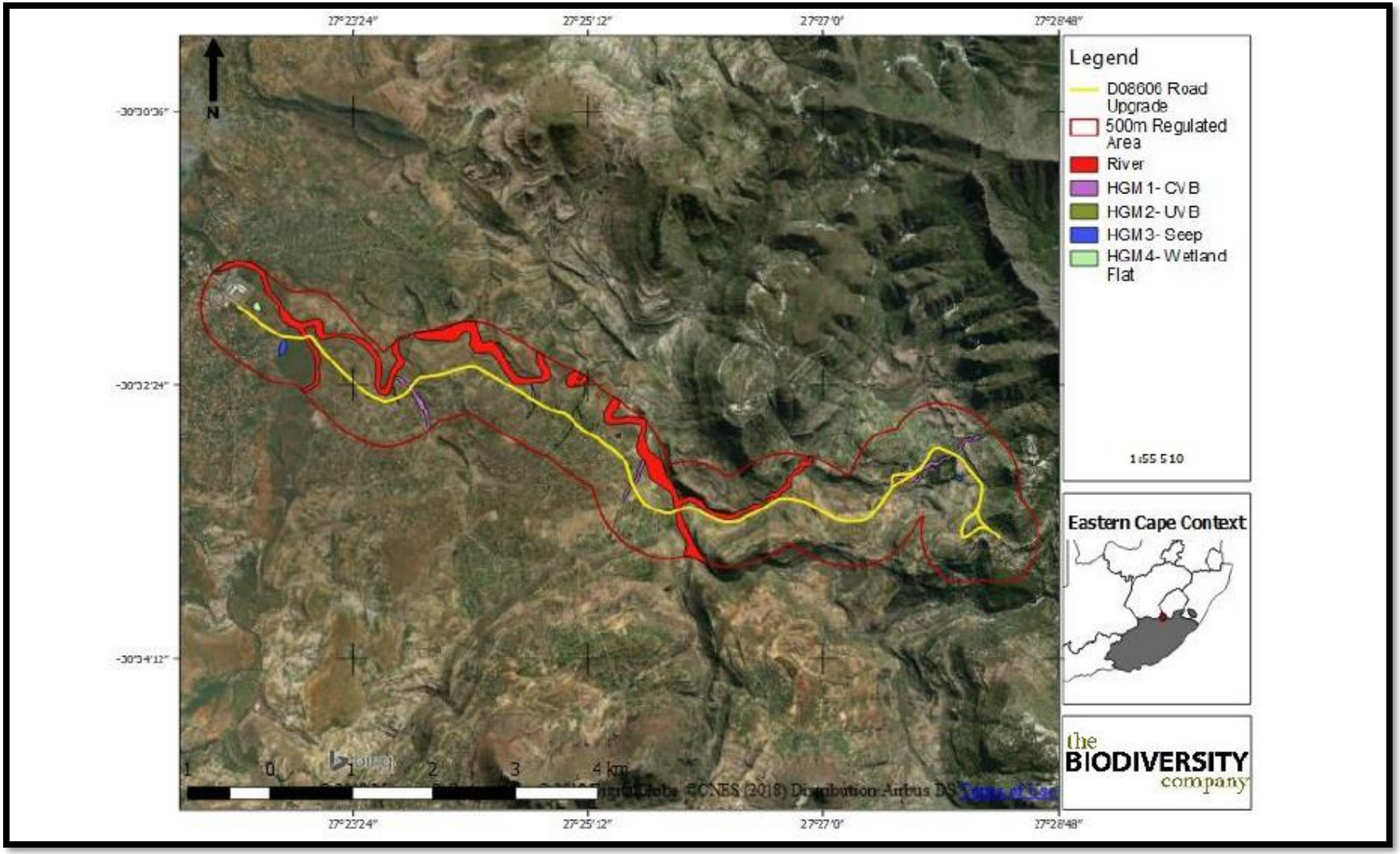

Figure 3: Watercourse delineations within the 500m regulated are (TBC, 2018)

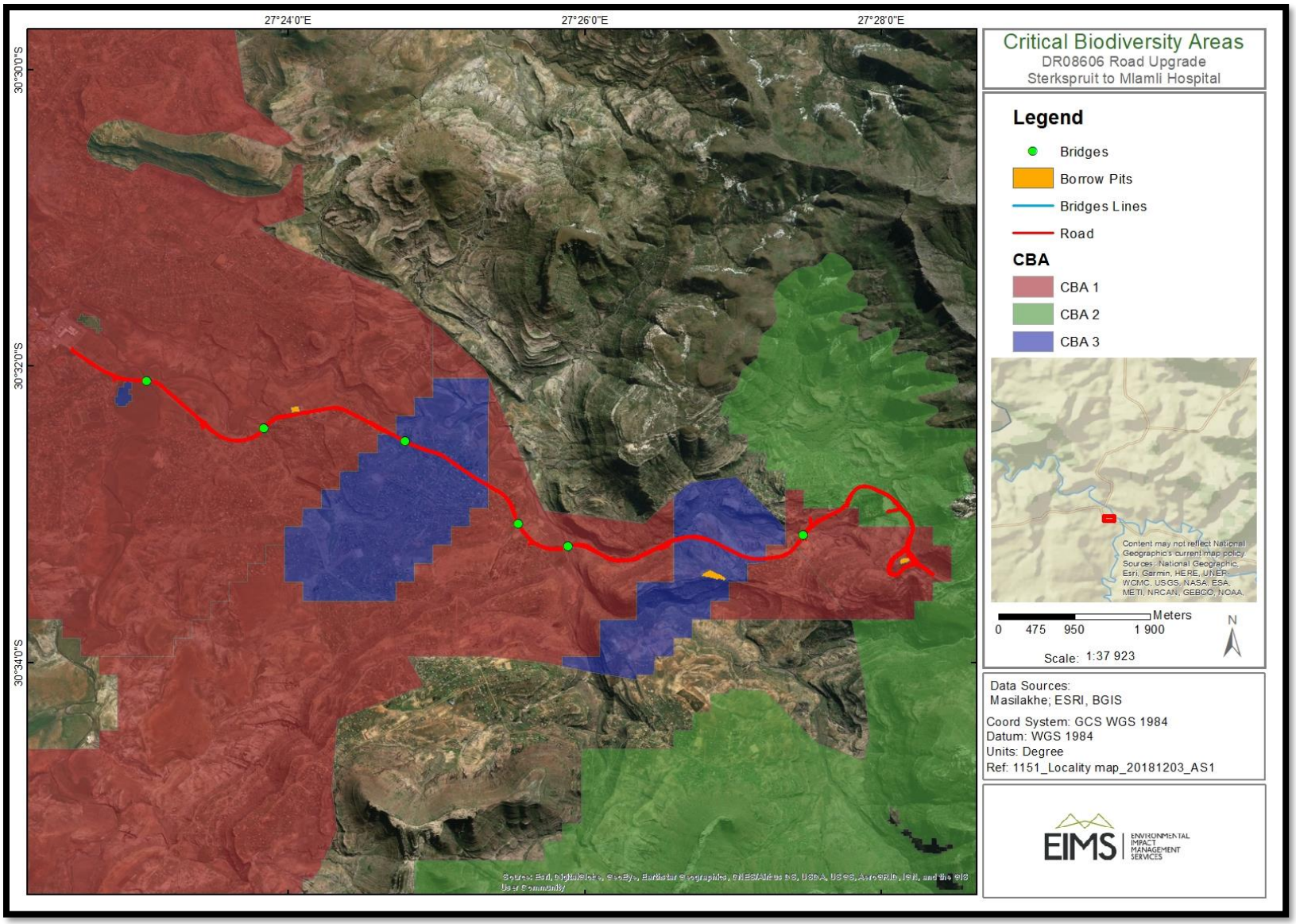

Figure 4: Critical Biodiversity Areas

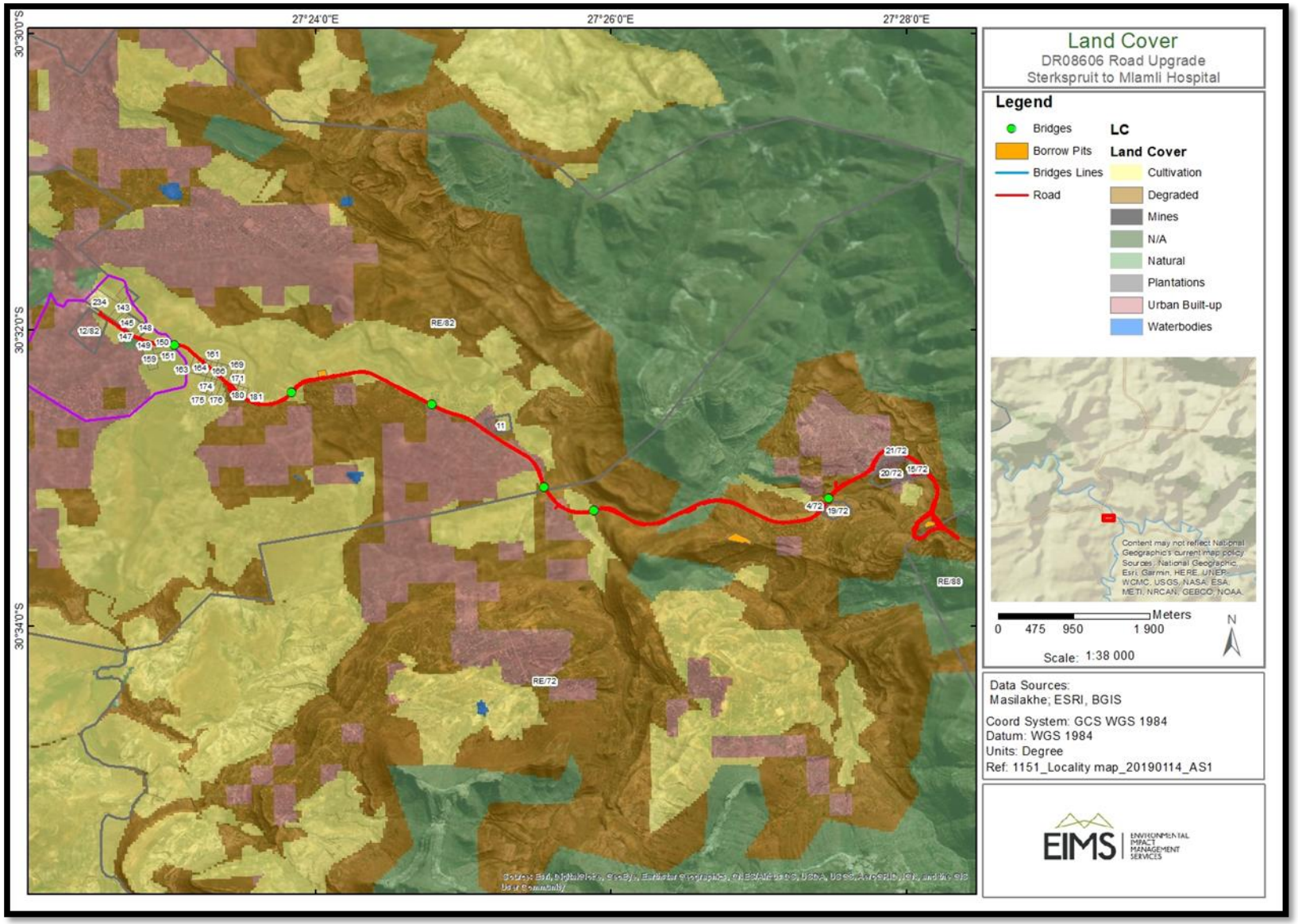

Figure 5: Land Cover

4.1 Site Description

4.1.1 TOPOGRAPHY

The topography is mainly flat and rolling but includes the escarpment itself. As can be seen in Figure 6 below, the average elevation is approximately 1524 m and the average slope is 4.2%.

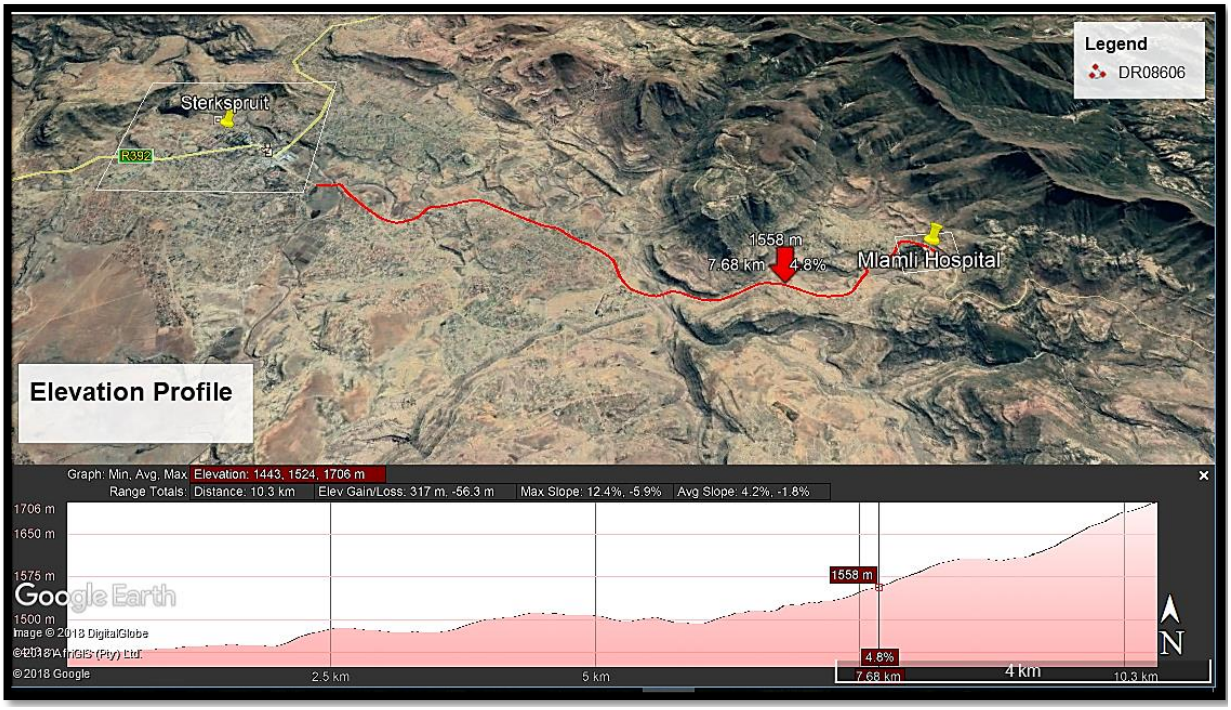

Figure 6: Elevation profile of proposed road development

4.1.2 CLIMATE

The climate for the project area is characterised by summer rainfall, which peaks in March (Mucina & Rutherford, 2006). This region receives an average of approximately 615 mm per year with a mean annual temperature of 14˚C and a frequent occurrence of frost during winter months. Summer months for this region are very hot, with winter months being extremely cold (Mucina & Rutherford, 2006).

4.1.3 GEOLOGY AND SOILS

The study area is underlain predominantly by Triassic aged rocks of the Molteno and Elliot Formations of the Stormberg Group and Jurassic aged Dolerite of the Karoo Supergroup as well as Quaternary aged Alluvium of the Senqu River and tributaries.

Clovelly and Avalon soil forms are common in this region with clayey soils located in lower lying areas, depressions and valley bottoms. The Db land type dominates this region and includes Estcourt and Oakleaf soil forms. Other land types that might occur to a lesser extent includes that of Fb and Ca (Mucina & Rutherford, 2006).

4.1.4 LAND COVER

As can be seen in Figure 5, The site transverses mostly degraded and urban/built up areas, however there are pockets of natural areas as well as land used for cultivation.

4.1.5 PROTECTED AREAS

There are no formally protected areas within the Senqu local municipal areas and thus the site does not fall within formal protected areas.

4.1.6 RAMSAR SITES & WORLD HERITAGE SITES

There are no Ramsar sites or World heritage sites in Senqu municipality.

4.1.7 TERRESTRIAL ECOSYSTEMS

The site falls within the Grassland Biome. Vegetation types which intersect with the road and associated structures are the Zastron Moist Grassland and the Senqu Montane Shrubland (Figure 2). These are described in Section 8 of the Ecology Specialist Report.

4.1.8 ECOSYSTEM THREAT STATUS

The project area overlaps entirely with ecosystems that are listed as Least concerned.

4.1.9 CRITICAL BIODIVERSITY AREAS (CBA)

Based on desktop information, the vast majority of the project area is identified as CBAs: 1,2 and/or 3 (Figure 4). The data used for this analysis is often captured remotely and therefore an important aspect of the ecology study was to ground-truth the boundaries of these areas. Please refer to Appendix D for more detail regarding the CBAs. .

4.1.10 WATERCOURSES

The site falls within the Upper Orange Water Management Area. The quaternary catchment is D12B. The Kromspruit River and the Sterkspruit River are intersected by the existing road. Four hydrogeomorphic (HGM) units were identified within the 500 m regulated area, namely a channelled valley bottom (HGM 1), an unchanneled valley bottom (HGM 2), a hillslope seep (HGM 3) and a wetland flat (HGM 4) (Figure 3).

4.2 Design Layout Alternatives

4.2.1 CONSIDERATION OF PROPERTY

No alternative properties were considered for this application as there is already an existing gravel road (DR08606) that runs from Sterkspruit town to Mlamli Hospital.

4.2.2 LOCATION, LAYOUT OR DESIGN OF THE ACTIVITY

As can be seen in Figure 1 only one layout or design alternative has been considered for the proposed upgrade of the road DR08606. Alternative 1 (preferred alternative) proposes to upgrade the existing road to surface condition and the alignment of the existing road has been modified at certain locations due to safety and design standard considerations. The option of upgrading the existing gravel road at exactly the same position without any re-alignments was considered, however due to the safety risk, erosion risk as well as the national design standards that the proposed road must conform to, this option was not assessed any further.

4.2.3 TECHNOLOGY ALTERNATIVES

No technology alternatives were assessed for this proposed activity due to feasibility. The motive for the proposed project is to upgrade the existing road from gravel to tar surface and the type of surfacing that has been selected is cape seal due to its durability and the rural nature of the site.

4.2.4 ACTIVITY ALTERNATIVES

Although Alternative 1 is the preferred alternative, it is paramount that the inputs of the specialists are taken into consideration in determining the most appropriate way to ensure that the general purpose and requirements of the activity are met. Therefore, the recommendations contained in the specialist reports have been incorporated into the EMPr. This alternative will emphasise resource protection and use stringent mitigation measures to minimise identified adverse impacts.

4.2.5 THE NO-GO ALTERNATIVE

The option of not implementing the activity (i.e. the no-go alternative) has also been assessed as Alternative 2. This alternative will imply that no development takes place and that the environment remains unchanged and unaltered.

Table 2: Alternatives Assessed

Alternative	Description of Alternative	Feasibility aspects
Alternative 1 (Preferred Alternative)	Alternative 1 (preferred alternative) proposes to upgrade the existing road to surface condition and the alignment of the existing road has been modified at certain locations due to safety and design standard considerations.	This alternative is optimal as it will mostly occur on already disturbed areas except for the location of the new bridges and proposed re-alignment sections. The design is safer and complies to national design standards. Mitigation measures recommended by the specialists such as rehabilitation of wetlands and adjacent natural areas, as well as adherence to the stipulated buffer zones will be implemented. The benefits of implementing this alternative include an improved road surface and wider bridges, which have been raised as an issue by the public, as well as job creation for the youth in the Sterkspruit area.

Alternative	Description of Alternative	Feasibility aspects
Alternative 2 (No-go Alternative)	Alternative 2. This alternative will imply that no development takes place and that the environment remains unchanged	There are no environmental or social benefits from the no-go alternative. The current condition of the road is negatively impacting on the rural communities adjacent to the road. Public responses indicate that travel to Mlamli hospital takes too long and vehicles deteriorate faster due to the gravel road and the narrow bridges are not safe as vehicles have to take turns to cross the bridge. Thus, although there are negative environmental impacts associated with the upgrading of the road DR08606, the no go alternative also has negative social impacts on the Sterkspruit communities.

4.3 Potential Impacts Identified

Potential impacts associated with the proposed activity at the selected site have been identified and addressed in the EMPr are summarised in the tables below:

Table 3: Impacts identified and assessed

Impact No. and Description	Phase of Development	Direct or Indirect
Impact 1. Further loss and fragmentation of the vegetation community	Construction	Direct
Impact 2. Spread and/or establishment of alien and/or invasive species	Operation	Indirect
Impact 3. Displacement, direct mortalities and disturbance of faunal community (including multiple threatened species) due to habitat loss and disturbances (such as dust and noise)	Construction	Direct
Impact 4. Loss of important Critical Biodiversity Areas	Construction	Direct
Impact 5. Continued displacement, direct mortalities and disturbance of faunal community (including multiple threatened species) due to habitat loss and disturbances (such as dust and noise)	Operation	Direct
Impact 6. Infringement by humans into the few remaining natural grassland and wetlands areas, with associated impacts such as poaching, litter and introduction of diseases.	Operation	Direct
Impact 7. Direct and indirect loss of wetlands caused by the upgrade of roads/bridges and supporting activities	Construction	Direct
Impact 8. Degradation of wetland areas due to spills and leaks, failing ablution facilities and pollution from domestic waste and stored chemicals	Construction	Indirect
Impact 9. Direct and indirect loss of wetlands caused by the construction of new roads/bridge and supporting activities (New Bridge)	Construction	Indirect

Impact No. and Description	Phase of Development	Direct or Indirect
Impact 10. Degradation of wetland areas due to spills and leaks, failing ablution facilities and pollution from domestic waste and stored chemicals (New Bridge)	Construction	Direct
Impact 11. Direct and indirect loss of wetlands caused by the operation of roads/bridges/borrow pits and supporting activities	Operation	Direct & Indirect
Impact 12. Degradation of wetland areas due to spills and leaks, failing ablution facilities and pollution from domestic waste and stored chemicals	Operation	Direct
Impact 13. Direct and indirect loss of wetlands caused by the operation of roads/bridges/borrow pits and supporting activities (New Bridge)	Operation	Direct & Indirect
Impact 14. Degradation of wetland areas due to spills and leaks, failing ablution facilities and pollution from domestic waste and stored chemicals (New Bridge)	Operation	Direct
Impact 15: Heritage Impact- Graves and Grave Areas identified along the area for the proposed road upgrade: RD_G2	Construction	Direct & Indirect
Impact 16. Impact on Palaeontological Resources	Construction	Direct
Impact 17. Traffic Impacts	Construction	Direct & Indirect
Impact 18. Air Quality	Construction	Direct
Impact 19. Noise and blasting impacts	Construction and Operation	Direct
Impact 20. Safety and Security	Construction	Direct
Impact 21. Improved road condition and connectivity of Senqu LM	Operation	Indirect
Impact 22. Job Creation	Construction and Operation	Direct

5 ENVIRONMENTAL MANAGEMENT APPROACH

The compilation of an EMPr for an activity which is likely to result in significant environmental impacts is typically compiled at the culmination of a thorough investigation into the receiving environment and the identification and assessment of likely environmental impacts (i.e. EIA). This EMPr for part of a Basic Assessment EIA process (under the provisions of the National Environmental Management Act (Act 107 of 1998)(NEMA)). This EMPr aims to comply with the requirement of Appendix 4 of the EIA Regulations (GNR 982). These requirements are systematically addressed in the subsequent sections of this report. The primary objectives of the EMPr are as follows:

- To promote sustainability and describe an action programme to mitigate negative impacts as far as possible;
- To be a practical document that sets out both the goals and actions required in mitigation. Though the term “mitigation” can be broad in definition, it means in this context to “allay, moderate, palliate, temper or intensify.” Mitigation of a negative impact means that its effect is reduced. Mitigation of a positive impact means that its effect is increased or optimised; and

- To indicate responsibilities for the implementation of these action items within the EMPr.

This EMPr shall be deemed to have contractual standing on the basis that its contents and specifically objectives are a detailed expansion of the environmental risks and consequent requirements of the EA (if, and when issued). Where relevant the Applicant is responsible for delegating responsibility for compliance to designated parties (internal or external). Such delegation must be legally binding to the extent relevant.

The objectives and targets in this EMPr are further guided by the NEMA, and specifically by GNR982. Thus the underlying principles of sustainable development are the ultimate objectives and target of this report. The EMPr has included measures to ensure the development activity complies with the following principles, as instilled in the NEMA, amongst others:

i. That the disturbance of ecosystems and loss of biological diversity are minimised and remedied;

ii. That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

iii. That waste is avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;

iv. That a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and

v. That negative impacts on the environment and on people's environmental rights be anticipated, prevented and remedied.

6 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

EIMS has been appointed by the Eastern Cape Department of Transport (the Applicant) to fulfil the role of Environmental Assessment Practitioner (EAP) and to compile this EMPr. EIMS is compliant with the definition of an EAP as defined in Regulation 13 (GNR982). This includes, inter alia, the requirement that EIMS is:

1) Objective and Independent;
2) Has expertise in conducting EIAs;
3) Comply with the NEMA, the Regulations and all other applicable legislation;
4) Takes into account all relevant factors relating to the application; and
5) Provides full disclosure to the applicant and the relevant environmental authority.

EIMS is a private and independent environmental management consulting firm with in excess of 20 years' experience in conducting EIAs. The CV of the EAP that compiled this EMPr is included in Appendix H of the BAR and provides details on the past experience and qualifications applicable to this project.

Table 4: Details of the EAP

Environmental Assessment Practitioner (EAP)	Environmental Impact Management Services (Pty) Ltd (EIMS)
Contact Person	GP Kriel
Postal Address	P.O Box 19731, Tecoma, 5214.
Telephone	043 722 7572

Environmental Assessment Practitioner (EAP)	Environmental Impact Management Services (Pty) Ltd (EIMS)
Email	gp@eims.co.za
Professional Affiliation	South African Council for Natural Scientific Professions (SACNASP)

7 APPLICANT DETAILS

Details of the applicant are provided below:

Table 5: Applicant details

Item	Details
Applicant:	Eastern Cape Department of Transport
Contact name:	Yanga Mshweshwe
Tel no:	043-604-7400 / 0717257272
E-mail address:	yanga.mshweshwe@dot.ecprov.gov.za; ymshweshwe@gmail.com
Postal address:	Private Bag X0023 King Williams Town 5601

8 LEGISLATIVE OVERVIEW

This section has attempted to identify relevant laws and regulations that are applicable to the proposed project. The purpose of this is to provide the applicant with an overarching understanding of how the different sections of legislations define and integrate the different spheres of the environment. Understanding these will ensure long term and continued alignment with their principals. The applicant should ensure that legislation applicable to the development is kept up to date. A description of specific listed activities associated with the proposed project is provided in Table 6 below.

Table 6: Detailed description of listed activities associated with the project

Listed activity as described in Listing Notice (LN) 1 and 3	Description of project activity that triggers listed activity
Listing Notice 1: Activity 12 ii (a)(c) The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —	The proposed road will have a physical footprint of greater than 100 square metres and will include the construction of bridges within a watercourse. The road itself and associated structures will be within 32 metres of a watercourse.
Listing Notice 1: Activity 19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	The proposed construction of the road and bridges may require the infilling or excavation of material into a watercourse and removal of material in excess of 10 cubic metres from a watercourse.

Listed activity as described in Listing Notice (LN) 1 and 3	Description of project activity that triggers listed activity
<u>Listing Notice 1: Activity 24 (ii)</u> **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 metres;**	The width of the proposed road is 9.8 metres. In some areas the road will follow the existing alignment and merely widen. In other areas the road will be re-aligned to follow a new alignment completely. Therefore this listed activity will only be triggered by the new areas.
<u>Listing Notice 1: Activity 48(i)(a)(c)</u> The expansion of— (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or where such expansion occurs— (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	The proposed project involves upgrading of an existing road to a tar surface and construction/upgrade of bridges, the footprint of the structures is greater than 100 square metres. Some of these activities will occur within a watercourse or within 32 metres of a watercourse.
<u>Listing Notice 1: Activity 56</u> The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (ii) where no reserve exists, where the existing road is wider than 8 metres;	The proposed project may widen the existing road by more than 6 meters or lengthen the road by more than 1km especially considering the re-aligned sections.
<u>Listing Notice 3: Activity 4 a i (ee)</u> The development of a road wider than 4 metres with a reserve less than 13,5 metres. a.Eastern Cape i.Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The proposed road is 9.8 metres wide and the vast majority of the project area is identified as Critical Biodiversity areas: 1,2 and/or 3. In some areas the road will follow the existing alignment and merely widen. In other areas the road will be re-aligned to follow a new alignment completely. Therefore this listed activity will only be triggered by the new areas which fall within CBAs.
<u>Listing Notice 3: Activity 12 a (ii)</u> The clearance of an area of 300 square metres or more of indigenous vegetation a. Eastern Cape ii. Within critical biodiversity areas identified in bioregional plans;	The proposed project will require clearance of more than 300 square metres of indigenous vegetation within areas identified as critical biodiversity areas for construction related activities such as widening/lengthening of the road, development of new sections of the road and construction of bridges.
<u>Listing Notice 3: Activity 18 a i (ee) (ii) (kk)</u> The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. a.Eastern Cape i.Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; (kk) A watercourse; or	The proposed development involves the construction of a 9.8m wide road in a critical biodiversity area and within a watercourse or within 100m of a watercourse. In some areas the road will follow the existing alignment and merely widen. In other areas the road will be re-aligned to follow a new alignment completely. Therefore the listed activity will only be triggered by the existing areas that are being widened or lengthened.
<u>Listing Notice 3: Activity 23 ii (a) a i(ee)</u> The expansion of—	The proposed project will involve the expansion of the physical footprint of the road and bridges by more

Listed activity as described in Listing Notice (LN) 1 and 3	Description of project activity that triggers listed activity
(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse**;** a. Eastern Cape i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	than 10 square meters within a watercourse or within 32 meters of a watercourse in the Eastern Cape, outside urban areas and within a critical biodiversity area.

Table 7 provides a broad overview of the general environmental legislation, and provides an overview of enviro-legal triggers that may be applicable to this project.

Table 7: General Environmental Legislation

Title of legislation, policy or guideline	Description
National Environmental Management Act (Act No. 107 of 1998 - NEMA)	The NEMA, aims to protect the environment, and stipulates that development must be socially, environmentally and economically sustainable, and that disturbances and pollution of the environment must be avoided, minimised and remedied. The Act also provides for the equitable access to environmental resources, to meet basic human needs. Decisions on the environment must be taken in an open and transparent manner, and resources must be held in trust for the public and protected as such. NEMA also makes provision for the cost of remedying pollution, and all such costs shall be paid by the polluter.
National Water Act (Act No. 36 of 1998 - NWA)	NWA provides the law relating to the water resources of South Africa. The purpose of the NWA is to manage and control the means by which all water resources are protected, used, developed, conserved and controlled.
The National Environmental Management: Air Quality Act (Act No. 39 of 2004 - NEMAQA)	NEMAQA is the main legislative tool for the management of air pollution and related activities. The objective of the Act is to protect the environment by providing reasonable measures for- the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development; and generally to give effect to Section 24(b) of the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and wellbeing of people.
National Environmental Management: Waste Act (Act No. 59 of 2008 – NEMWA)	The purpose of the NEMWA is to prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development. In addition sustainable development requires that the generation of waste is avoided, or where it cannot be avoided, that it is reduced, re-used, recycled or recovered and only as a last resort treated and safely disposed of.
National Environmental Management: Biodiversity Act (Act No. 10 of 2004 - NEMBA)	NEMBA "provides for: the management and conservation of South Africa's biodiversity within the framework of the NEMA; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters conducted therewith". NEMBA also deals with, amongst others, declared weeds and invaders in South Africa and categorises these species according to level of control required.

Title of legislation, policy or guideline	Description
National Veld and Forest Fire Act, (Act 101 of 1998)	Deals with the prevention of fires through mandatory firebreaks and other prevention measures.
Occupational Health and Safety Act (Act No. 85 of 1993 - OHSA)	Deals with the health and safety of all workers and includes employer obligation toward the safety of workers.
National Heritage Resources Act (Act No. 25 of 1999 - NHRA)	NHRA provides for the protection of heritage resources of South Africa, which are of cultural significance or other special value by introducing an integrated and interactive system for the management of national heritage resources.
Hazardous Substances Act (Act No. 15 of 1973)	Deals with the proper handling and disposal of hazardous substances and required licenses.
Environment Conservation Act, 1989 (Act No. 73 of 1989 - ECA)	ECA was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other Acts, however Section 25 of the ECA and the Noise Regulations (GN R. 154 of 1992) promulgated under this section are still in effect. These regulations serve to control noise and general prohibitions relating to noise impact and nuisance. South African National Standard 10103 also applies to the measurement and consideration of environmental noise and should be considered in conjunction with the ECA noise regulations

It remains the Applicants responsibility to ensure compliance with all relevant legislation. Additionally, should there be changes in legislation and/or regulations, then action must be taken to incorporate such changes and to pass these requirements on to the contractors. The remainder of this section provides a brief overview and description of the legislative context within which the project is located.

8.1 Environmental Management Principles

NEMA establishes a general framework for environmental law, in part by prescribing national environmental management principles that must be applied when making decisions that may have a significant impact on the environment. These principles are briefly summarised below:

8.1.1 Holistic Principle

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

8.1.2 Best Practicable Environmental Option

When it is necessary to undertake any action with environmental impacts, the different options that could be considered for the purpose must be identified and defined. The Best Practicable Environmental Option (BPEO) is defined in NEMA as "the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term." Other guidelines typically used for environmental management in terms of other legislation include: BPM which is the Best Practicable Means and BAT which is the Best Available Technology.

8.1.3 Sustainable Development

The concept of sustainable development was introduced in the 1980's with the aim to ensure that the use of natural resources is such that our present needs are provided without compromising the ability of future generations to meet their own needs. The constitution of South Africa is built around the fact that everyone has the right to have the environment protected through reasonable legislative and other measures that secure ecologically sustainable development. The National Environmental Principles included in the NEMA require development to be socially, environmentally and economically sustainable.

8.1.4 Preventative Principles

The preventative principle is fundamental to sustainable development and requires that the disturbance to ecosystems and the pollution, degradation of the environment and negative impacts on the environment be avoided, or, where they cannot be altogether avoided, are minimised and remedied.

8.1.5 The Precautionary Principle

The precautionary principle requires that where there is uncertainty, based on available information, that an impact will be harmful to the environment, it is assumed, as a matter of precaution, that the said impact will be harmful to the environment until such time that it can be proven otherwise. The precautionary principle requires that decisions by the private sector, governments, institutions and individuals need to allow for and recognise conditions of uncertainty, particularly with respect to the possible environmental consequences of those decisions. In South Africa, the DWS (then DWAF) adopted a BPEO guideline in 1991 for water quality management and in 1994 in the Minimum Requirements document for waste management.

In terms of DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, the precautionary principle is defined as, "Where a risk is unknown; the assumption of the worst case situation and the making of provision for such a situation." Here the precautionary principle assumes that a waste or an identified contaminant of a waste is "both highly hazardous and toxic until proven otherwise."

In the context of the EIA process in South Africa, the precautionary principle also translates to a requirement to provide sound, scientifically based, information that is sufficient to provide the decision making authority with reasonable grounds to

understand the potential impacts on the environment, the extent thereof and how impacts could be mitigated. If such information is not adequate for this purpose, the relevant authority cannot be satisfied as is required and then the authority should require that further information be collected and provided.

8.1.6 Duty Of Care And Cradle To Grave Principle

In terms of the NEMA Section 28, “Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.”

By way of example, the principle of “duty of care” in terms of waste management emphasises the responsibility to make sure that waste is correctly stored and correctly transported, as it passes through the chain of custody to final point of disposal. This means that waste must always be stored safely and securely. The company removing and disposing of waste also holds the responsibility to hold the relevant licenses, and that waste is transported alongside the necessary paperwork.

“Cradle to Grave” refers to the responsibility a company takes for the entire life cycle of a product, service or program, from design to disposal or termination. In terms of the DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, “any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorised transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, he retains responsibility for the waste generated or handled.” This places responsibility for a waste on the Generator, and is supported by the "Cradle to Grave" principle, according to which a "manifest" accompanies each load of Hazardous Waste until it is responsibly and legally disposed. This manifest is transferred from one transporter to the next along with the load, should more than one transporter be involved. Once the waste is properly disposed of at a suitable, permitted facility, a copy of the manifest must be returned to the point of origin.” Duty of Care offers one strategy to implement sustainable development.

8.1.7 Polluter Pays Principle

The "polluter pays principle" holds that the person or organisation causing pollution is liable for any costs involved in cleaning it up or rehabilitating its effects. It is noted that the polluter will not always necessarily be the generator, as it is possible for responsibility for the safe handling, treatment or disposal of waste to pass from one competent contracting party to another. The polluter may therefore not be the generator, but could be a disposal site operator or a transporter. Through the 'duty of care' principle, however, the generator will always be one of the parties held accountable for the pollution caused by the waste. Accordingly, the generator must be able to prove that the transferral of management of the waste was a responsible action. The polluter pays principle acceding to NEMA dictates that “the cost of remedying pollution, environmental degradation and consequent adverse effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.”

9 DUTY OF CARE RESPONSIBILITIES

Section 28 of the NEMA makes provision for duty of care, and remediation of environmental damage. The binding principles are described below:

1. Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

   (1A) Subsection (1) also applies to a significant pollution or degradation that-

   a) occurred before the commencement of this Act;

   b) arises or is likely to arise at a different time from the actual activity that caused the contamination; or

   c) arises through an act or activity of a person that results in a change to pre-existing contamination.

2. Without limiting the generality of the duty in subsection (1), the persons on whom subsection (1) imposes an obligation to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in which-

   a) any activity or process is or was performed or undertaken; or

   b) any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.

3. The measures required in terms of subsection (1) may include measures to-

   a) investigate, assess and evaluate the impact on the environment;

   b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;

   c) cease, modify or control any act, activity or process causing the pollution or degradation;

   d) contain or prevent the movement of pollutants or the cause of degradation;

   e) eliminate any source of the pollution or degradation; or

   f) remedy the effects of the pollution or degradation.

10 FAILURE TO COMPLY WITH ENVIRONMENTAL CONSIDERATIONS

Within the provisions of the relevant environmental legislation, there are a number of penalties for non-compliance or offences. Below a few extracts are presented for information purposes, however these must not be read in isolation and the reader is reminded that there are other Acts, or sections of Acts, that may be applicable to the relevant project:

- NEMA Section 49B(1): A person convicted of an offence in terms of section 49A(1)(a), (b), (c), (d), (e), (f) or (g) is liable to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years, or to both such fine or such imprisonment- this includes commencing with a listed activity without an EA or the non-compliance with conditions of any EA and associated EMPr;
- NEMA Section 49B(2): A person convicted of an offence in terms of section 49A(1)(i), (j) or (k) is liable to a fine not exceeding R5 million or to imprisonment for a period not exceeding 5 years, and in the case of a second or subsequent conviction to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years, and in both instances to both such fine and such imprisonment;
- NEMA Section 49B(3): A person convicted of an offence in terms of section 49A(1)(h), (l), (m), (n), (o) or (p) is liable to a fine or to imprisonment for a period not exceeding one year, or to both a fine and such imprisonment;
- NWA Section 151 (1c): No person may fail to comply with any condition attached to a permitted water use under this Act;
- NWA Section 151 (2): Any person who contravenes any provision of subsection (1) is guilty of an offence and liable, on the first conviction, to a fine or imprisonment for a period not exceeding five years, or to both a fine and such imprisonment and, in the case of a second or subsequent conviction, to a fine or imprisonment for a period not exceeding ten years or to both a fine and such imprisonment;
- NEM:BA Section 102 (1): A person convicted of an offence in terms of section 101 is liable to a fine not exceeding R10 million, or an imprisonment for a period not exceeding ten years, or to both such a fine and such imprisonment;
- NEM:WA Section 68 (1): A person convicted of an offence referred to in section 67(1)(b), (c), (d), (e), (f), (i), (j), (k) or (l) or section 67(2)(a), (b), (c), (d) or (e) is liable to a fine not exceeding R5 000 000 or to imprisonment for a period not exceeding five years, or to both a fine and such imprisonment, in addition to any other penalty or award that may be imposed or made in terms of the National Environmental Management Act;
- NEM:WA Section 68 (2): A person convicted of an offence referred to in section 67(1)(b), (c), (d), (e), (f), (i), (j), (k) or (l) or section 67(2)(a), (b), (c), (d) or (e) is liable to a fine not exceeding R5 000 000 or to imprisonment for a period not exceeding five years, or to both a fine and such imprisonment, in addition to any other penalty or award that may be imposed or made in terms of the National Environmental Management Act;
- NEM:WA Section 68 (3): Any person convicted of an offence referred to in section 67(1)(m) is liable to a fine or to imprisonment for a period not exceeding six months or to both a fine and such imprisonment;
- NEM:WA Section 68 (4): A person who is convicted of an offence in terms of this Act and who persists after conviction in the act or omission that constituted the offence commits a continuing offence and is liable on conviction to a fine not exceeding R1 000 or to imprisonment for a period not exceeding 20 days, or to both such fine and such imprisonment, in respect of each day that person persists with that act or omission;

It is recommended that a procedure for non-compliances (i.e. incentives or disincentives for conformance and non-conformance with the EMPr requirements) must be employed to ensure that the EMPr is adequately implemented. The system to be used must be determined before construction commences, included in the tender documents and contracts, and made clear to all project workers. The system may include that the

independent Environmental Control Officer (ECO) can be authorized to impose spot fines on the Contractor and/or his subcontractors for any of the defined transgressions. Such fines should be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications and or legal obligations.

11 ROLES AND RESPONSIBILITIES

The applicant will be responsible for ensuring overall compliance with the provisions of the EMPr. Implementation is the key to the success of the EMPr. In order to ensure that the EMPr and its mitigation measures are implemented, roles and responsibilities need to be clearly defined and documented prior to commencement. This section serves as a guide on which party is normally responsible for certain tasks. Specific roles are designated in the specific environmental management and mitigation requirements in this EMPr.

11.1 The Project Applicant/Proponent

The applicant is the principal party (Proponent) of the project. For the purposes of this proposal it is understood that the Applicant role is fulfilled by the Eastern Cape Department of Transport. The legal accountability for correct implementation of the relevant requirements of the EA and EMPr falls primarily upon the applicant and must therefore be built into all contractors contractual agreements. The applicant's role typically includes:

- Provide for all necessary supervision during the execution of the project including appointment of key personnel to act on his/her behalf during the construction phase (e.g.: Project Manager). The key personnel will be tasked with ensuring that the various contractors/developers comply with the necessary provisions of the EA and EMPr;
- Ensure that the various contractors and applicable sub-contractors appoint a suitably qualified, competent Environmental Officer (EO) that will be responsible for among others, ensuring daily compliance with the EMPr and EA throughout the construction of the relevant project components;
- Appoint a suitably qualified, competent Environmental Control Officer (ECO) who will undertake periodic audits on the various contractors works and/or land parcels under development;
- Notify the relevant competent authority of changes in the development resulting in significant environmental impacts;
- Assess the various contractors environmental performance during construction, in consultation with the ECO;
- Ensure compliance with regulations;
- To implement the projects as per the approved project plan;
- To ensure that implementation is conducted in an environmentally acceptable manner;
- To comply with special conditions as stipulated by surrounding landowners during the negotiation process (if any); and
- To inform and educate all employees about the environmental risks associated with the different activities that should be avoided during the construction process and lessen significant impacts to the environment.

Therefore, ultimately, the Applicant is responsible for the development and implementation of the EMPr and, where relevant, ensuring that the conditions in the EA are satisfied. Where construction activities are contracted out (e.g. to Contractors and Subcontractors), the liability associated with non-compliance still rests with the Applicant (unless otherwise agreed upon between the authorities, the Applicant and the contracting parties). The Applicant (and not the Contractor) is therefore responsible for liaising directly with the relevant authorities with respect to the preparation and implementation of the EMPr and meeting authorisation conditions.

11.2 The Project Manager

During the development, it is envisaged that there may be a number of contractors and sub-contractors undertaking various activities on the project. The Project Manager would oversee all contractors and sub-

contractors from a project management point of view. The roles of the Project Manager typically include the following:

- The Project Manager acts on behalf of the Applicant regarding the administration of contracts to sub-contractors, etc.;
- Provides and/or approves scheduling, aspects of co-ordination and estimating;
- Ensures implementation of the project plan within cost, time and quality constraints;
- Ensures that implementation of EMPr is executed as planned; and
- Keeps the asset owner informed of progress made during the life cycle of the project.

11.3 The Environmental Control Officer

The ECO is appointed by the Applicant and should be independent from the Applicant and the Contractors. The ECO should have appropriate training and/or experience in the implementation of environmental management specifications. The ECO must preferably have a tertiary qualification in an Environmental Management or appropriate field. The ECO provides feedback to the Project Manager regarding all environmental matters. The ECO's key role is auditing the implementation of the EMPr. For the purposes of implementing the conditions contained herein, the Applicant should appoint the ECO well before the start of construction. The ECO is responsible for the auditing function as well as the clarification of environmental conditions contained in this EMPr to anyone working on the site.

The ECO roles include:

- Recommendations for review and update of the EMPr;
- Liaison between the Applicant, Contractors, authorities and other lead stakeholders on high importance environmental concerns;
- Conducting a pre-construction survey of the site prior to construction;
- Review the site induction training to ensure environmental issues receive adequate attention and important site specific issues are included;
- Conduct environmental audits of the site/contractors including relevant documentation on a monthly basis;
- Validating the regular site inspection reports, which are to be prepared by the relevant contractor EO's;
- Maintain a record of all non-conformances and incidents to ensure that measures are put in place to remedy such;
- Maintain a public consultation register in which all complaints are recorded, as well as action taken; and
- Verification that all environmental monitoring programmes (sampling, measuring, recording etc. when specified) are carried out according to protocols and schedules.

It is important to note that where opportunity for interpretation occurs within the conditions of this EMPr, the interpretation of the ECO will take preference.

11.4 The Contractor

The contractor is usually a third party appointed by the applicant/project manager to undertake the actual construction of the project. In some cases the development components may also be undertaken by third party developers with their own contractors and sub-contractors. For the purposes of this section, any contractor on site (regardless of who appointed them) is referred to as the "contractor".

The relevant contractors are answerable to the Project Manager and ECO for all environmental issues associated with the project. Contractor performance will, amongst others, be assessed on health, safety and environmental management criteria. The principal contractor/s, any other contractors and sub-contractors will be required to

comply with the provisions contained herein, and accordingly, the EMPr and its provisions must form part of any contractual arrangements between the applicant and contractors, and contractors and their sub-contractors, etc. The contractor must comply with EMPr during construction and ensure that all his employees and sub-contractors appointed by him/her are familiar with the EMPr. The legal accountability for correct implementation of the relevant requirements of the EA and EMPr must be contractually bound to the appointed contractor.

The Contractors role includes:

- Provide all necessary supervision during the execution of the project;
- Appoint a suitably qualified, competent EO that will be responsible for amongst others, ensuring daily compliance with the EMPr, EA during the construction phase;
- To implement the projects as per the approved project plan;
- To ensure that implementation is conducted in an environmentally acceptable manner;
- To fulfil all obligations as per the agreed contract;
- To comply with special conditions as stipulated by surrounding Landowners during the negotiation process (if any); and
- Ensure that the Contractors staff and employees have received the appropriate environmental awareness training prior to commencing construction.

11.5 The Contractors Environmental Officer

The principle contractor shall appoint an Environmental Officer (EO), who is responsible for the on-site implementation of the EMPr. The Contractor must ensure that the Contractor's EO is suitably qualified and competent to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the ECO and the public. The Contractor's EO ensures that all Sub contractors working under the Contractor and sub-contractors abide by the requirements of the EMPr. The appointment of additional EO's and/or sub-contractors EO's is at the ECO's discretion. The costs related to the implementation of the EMPr will be the responsibility of the relevant Contractor/ Sub-contractor.

The Contractor's EO roles will include:

- Preparing activity based Environmental Method Statements where applicable and where required by the ECO;
- Review the contractors safe work procedures/risk assessments/induction training/DSTI's (daily safe task instruction) during the construction phase and include information relating to the relevant environmental risks and appropriate mitigation measures;
- Support the ECO in monitoring by maintaining a permanent presence on site;
- Establishing and maintaining an environmental incident register;
- Taking required corrective action within specified time frame in respect of non-conformances and environmental incidents;
- Assist in finding environmentally acceptable solutions to construction problems;
- Attendance at HSE meetings, toolbox talks and induction programmes (where relevant);
- Inspect the site as required to ensure adherence to the management actions of the EMPr on a daily basis;
- Complete a daily diary with the purpose of recording environmental issues and corrective measures on a daily basis;
- Report any complaints to the ECO to be captured in the Consultation register;

- Liaise with the construction team on issues related to implementation of, and compliance with the EMPr;
- Ensure adequate and compliant waste management; and
- Ensuring that environmental signage and barriers are correctly placed and maintained.

11.6 The Authorities

The authorities that should be involved include the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (ECDEDEAT) and the Department of Water and Sanitation (DWS). The authorities may be required to perform the following roles:

- Review Monitoring and Audit reports, if required;
- Review whether there is compliance by the Applicant and Contractor with the terms of the EMPr and permit/license conditions. Whenever necessary, the authorities should assist the Applicant in understanding and meeting the specified requirements; and
- The authorities may perform random controls to check compliance. In case of persistent non-compliance, the Applicant will be required to provide an action plan with corrective measures and have it approved by the authorities.

12 ENVIRONMENTAL MANAGEMENT SYSTEM

The purpose of this EMPr is to ensure that the environment is properly considered during the design, construction, operations, and decommissioning, and that negative impacts are minimised or prevented and positive impacts enhanced. At the same time the EMPr should provide a logical extension of the EIA, specialist studies, or any other technical planning and assessment documentation, to ensure that recommendations are implemented, and that the project does not deviate from the environmental profile that formed the basis of the assessment.

12.1 Document Control

A formal document control system should be established. The document control system must provide for the following requirements;

- Documents are approved for adequacy prior to use;
- Review and update documents as necessary and re-approve documents;
- Ensure that changes and the current version status of documents are identified;
- Ensure that relevant versions of applicable documents are available at points of use;
- Ensure that documents remain legible and readily identifiable;
- Ensure that documents of external origin necessary for the EMPr are identified and their distribution controlled; and
- Prevent unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

The responsibility for establishing a suitable document control system rests with the Project Manager.

12.2 Record Keeping

It is essential that an official procedure for control of records be developed to ensure records required to demonstrate conformity to environmental standards are maintained. The Applicant, or the Project manager (if assigned) is therefore required to develop and maintain a procedure for the identification, storage, protection, retrieval, retention and disposal of records as part of the EMPr. Records must be legible, identifiable and traceable.

12.3 Auditing and Reporting Procedures

Reporting procedures must be developed at the start of the project, for conveying information from the compliance monitoring activities and to ensure that management is able to take rapid corrective action should certain thresholds be exceeded. Different reporting procedures may include:

- Inspections;
- Accidents and emergencies;
- Measuring performance indicators and interpreting and acting on the indicators;
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes; and
- Training programmes and evidence of appropriate levels/amount of skills/capacities created.

All monitoring and auditing must be accompanied by applicable records and evidence (e.g. delivery slips, photographic records, etc.). All reports must be retained and made available for inspection by the ECO, the Applicant and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to ensure accountability. The Applicant must use the audit report findings to continually ensure that environmental protection measures are working effectively on site through a system of self-checking. The EMPr should be viewed as a dynamic document aimed at continual environmental performance improvement.

The following auditing and reporting shall be required throughout the construction phase:

- Daily Environmental Diary: These reports must be prepared by the contractors' EO and must aim to monitor and report on day to day activities so as to ensure compliance with, the relevant authorisations, licences and permits, the approved EMPr, and environmental method statements;
- Monthly Compliance Reports (EO): These reports must be prepared by the contractors' EO and must aim to provide a concise monthly performance report, including copies of relevant documents (e.g. waste manifests, incident registers, consultation registers, etc);
- Monthly Audit Reports: The ECO must compile monthly compliance reports (audits) which are to be submitted to the Applicant for review and correction of non-compliance issues. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified. Depending on the outcome of the permitting processes it may be a requirement to submit these to the relevant authorities.

12.4 Responding to Non Compliances

Non-compliance will be identified and managed through the following four key activities including:

- Inspections of the site and activities across the site;
- Monitoring of selected environmental quality variables;
- Audits of the site and relevant documentation as well as specific activities; and
- Reporting on a monthly basis.

An environmental non-conformance and incident register must be prepared and maintained by the ECO throughout the construction phase in order to track and monitor environmental concerns, incidents, and non-conformances. The register must include details of date, location, description of the NC or Incident, applicable environmental commitment/standard, corrective action taken, adequacy of corrective action, date rectified, etc.

Non-compliance with the EMPr or any other environmental legislation, specifications or standards shall be recorded by the ECO in the non-conformance register. This register shall be maintained by the ECO and will be sent to the Applicant and Contractor on a regular basis (monthly), and the Applicant shall ensure that the responsible party takes the necessary corrective actions. Non-conformances may only be closed out in the register by the ECO upon confirmation that adequate corrective action has been taken and/or documented proof provided. The register should be utilised to measure overall environmental performance.

12.5 Environmental Incidences

For the purposes of this project, an environmental incident can be divided into three levels, i.e. major, medium and minor. All Major and Medium environmental incidents shall be recorded in the ECO's non-conformance and incident register. Minor incidents shall be recorded by the contractor, and by the Applicant (operational phase) in their own incident register. Definitions and examples of environmental incidents are provided in Table 8.

Table 8: Description of incidents and non-conformances for the purpose of the project

Non-Conformance	Any deviation from work standards, practices, procedures, regulations, management system performance etc. that could either directly or indirectly lead to injury or illness, property damage, damage to the workplace environment, legal transgression or a combination of these.
Major Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread, long-term, irreversible significant negative impact on the environment and/or has a high risk of legal liability. A major environmental incident usually results in a significant pollution and may entail risk of public danger. Major environmental incidents usually remain an irreversible impact even with the involvement of long-term external intervention i.e. expertise, best available technology, remedial actions, excessive financial cost etc. Major environmental incidents may be required to be reported to the authorities. The ECO shall make the final decision as to whether a particular incident should be classified as a Major incident. An example of a Major environmental incident would be a significant spillage (e.g. 500 litres) of fuel into a watercourse.
Medium Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread or localised, short term, reversible significant negative impact on the environment and/or has a risk of legal liability. A medium environmental incident may be reported to the authorities, can result in significant pollution or may entail risk of public danger. The impact of medium environmental incidents should be reversible within a short to medium term with or without intervention. The ECO shall make the final decision as to whether a particular incident should be classified as a Medium incident. An example of a Medium environmental incident would be a large spill of fuel (e.g. >50 litres) onto land.
Minor Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, where the environmental impact is negligible immediately after occurrence and/or once-off intervention on the day of occurrence. An incident where there is unnecessary wastage of a natural resource is also classified as a minor environmental incident. An example would be leaking water pipes that result in the wastage of water. A minor environmental incident is not reportable to authorities. An example of a minor incident is day to day spills of fuel or oil onto the ground where the spill is less than fifty (50) litres.

The following incident reporting procedures shall apply to this project:

- All environmental incidents shall be reported to Contractor's EO, and the ECO, and shall be recorded in the contractors' respective incident registers;

- The ECO shall record the incident in the non-conformance and incident register and advise on the appropriate measures and timeframes for corrective action;
- An incident report shall be completed by the relevant party responsible for the incident for all medium and major incidents and the report shall be submitted to the Project Manager and ECO within 5 calendar days of the incident;
- The EO shall investigate all incidents and identify any required actions to prevent a recurrence of such incidents; and
- In the event of an emergency incident (unexpected sudden occurrence), including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed, the Applicant shall notify the relevant authorities in accordance with Section 30(3) of the NEMA. The Applicant shall engage the ECO who shall assess all major incidents and shall advise the Applicant when any such incident must be reported to the authorities as per the above requirement.

13 REVIEW AND REVISION OF THE EMPR

It is important to note that this EMPr is made legally binding on the Applicant through the EA and the approval of the EMPr by the decision making authority. It is important to consider that the EMPr is a dynamic document which may require such alteration and /or amendment as the project evolves. Conditions under which the EMPr would require revision include:

- Changes in legislation;
- Occurrence of unanticipated impacts or impacts of greater intensity, extent and significance than predicted;
- Inadequate mitigation measures (i.e. where environmental performance does not meet the required level despite the implementation of the mitigation measure);
- Secondary impacts occur as a result of the mitigation measures; and
- Instances where the implementation of the specified management, as a result of changes in circumstances, may become impractical or unreasonable to implement.

The Applicant in consultation with the ECO should be responsible for ensuring that the registration and updating of all relevant EMPr documentation is carried out. It shall be the responsibility of the Applicant, in consultation with the ECO, to ensure that all personnel are performing according to the requirements of the document control procedure, and to initiate the revision of controlled documents, when required by changes in process or operations.

The ECO must undertake a risk assessment of any proposed changes to the EMPr. This risk assessment must be included in the applicable monthly audit report, and where applicable supported by the necessary proof of public consultation. It is important to note that if alterations and/or amendments are required; these may only be effected with written approval from the competent authority and in accordance with the relevant legal processes.

14 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

Training and environmental awareness is an integral part of a complete EMPr. The overall aim of the training will be to ensure that all site staff are informed of their relevant requirements and obligations pertaining to the relevant authorisations, licences, permits and the approved EMPr and protection of the environment.

The applicant and contractor must ensure that all relevant employees are trained and capable of carrying out their duties in an environmentally responsible and compliant manner, and are capable of complying with the relevant environmental requirements. To obtain buy-in from staff, individual employees need to be involved in:

- Identifying the relevant risk;
- Understanding the nature of risks;

- Devising risk controls; and
- Given incentive to implement the controls in terms of legal obligations.

The Applicant shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees. All training must be formally recorded and attendance registers retained. The environmental training should, as a minimum, include the following:

- General background and definition of the environment;
- The importance of compliance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- Compliance with mitigation measures proposed for sensitive areas;
- Their roles and responsibilities in achieving compliance with the environmental policy and procedures and with the requirement of the applicant's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences (legal and/or other) of departure from specified operating procedures including fines (where applicable);
- The mitigation measures required to be implemented when carrying out their work activities; and
- All operational risks must be identified and processes established to mitigate such risk, proactively. Thus the applicant needs to inform the employees of any environmental risks that may result from their work, and how these risks must be dealt with in order to avoid pollution and/or degradation of the environment.

In the case of permanent staff required during the operational phase of the project, the Applicant / contractor shall provide evidence that such induction courses have been presented. In the case of new staff (including contract labour) the contractor / Applicant shall keep a record of adequate environmental induction training.

The specific requirements for environmental training during the construction phase include:

- Environmental Induction Training: All general workers must receive induction training which shall be presented by the Contractors HSE Manager Representatives. The induction training must include an environmental management component which will be prepared by the Contractor's EO and presented where possible by the Contractor's EO. The training material must include general environmental awareness and an overview of the approved EMPr and applicable authorisations, licences and permits. The Induction Training Material must be reviewed and approved by the ECO;
- Weekly Environmental Toolbox Talks: Environmental toolbox talks will be prepared by the Contractor's EO to cover a range of environmental topics and must be presented to relevant staff during applicable times during construction process (e.g. at the start of a day or activity). The aim of these toolbox talks will be to inform site employees of general environmental requirements pertaining to specific activities, as well as specific EMPr and EA requirements and obligations. The ECO shall review environmental toolbox talks on a periodic basis to ensure the material is relevant and appropriate;
- Informal training of all staff on site is also required on an on-going basis through informal discussions, on-site supervision and through facilitation of day to day activities. Such training must be given or otherwise facilitated by the Contractor's EO; and
- The Contractor's EO must review all safe work procedures/risk assessments/DSTI's (daily safe task instruction) from the safety department and include the relevant environmental risks and appropriate mitigation measures where necessary. Since the above procedures are specific to the applicable activity being undertaken, the inclusion of environmental measures aims to ensure each activity is undertaken in an environmentally responsible manner.

15 EMERGENCY RESPONSE PLAN

The Applicant must identify potential emergencies and develop procedures for preventing and responding to them. There are several options for dealing with high priority impacts and risks, as the paradigm has two components, probability and consequence. The design of control measures rests on understanding the cause and effect. Best practise is to intervene with the ultimate factors were feasible, rather than treat the outcomes. Emergency response therefore has the option of reducing probability, or reducing the consequence while reducing the probability is the preferred option. Below are some common emergency preparedness approaches:

- Threat consequence if and when the risk eventuates, when the risk becomes an issue;
- Combine reducing the probability and treating the consequence;
- Offset environmental losses by investing in other assets;
- Not manage some of the risks because there are too many; and
- Make provision to manage residual impacts or issues that arise because of shortcomings in risk identification and rating, avoidance and mitigation or because a rare event has occurred.

Residual impacts are those impacts that despite reducing the probability and consequence might still occur. In these cases parties will have to be compensated, pollution cleaned up and damage to the environment remediated.

The Applicant shall be required to develop and implement an Emergency Preparedness and Response Plan prior to commencing work. The Applicant must ensure that the Emergency Preparedness and Response Plan makes provision for environmental emergencies, including, but not limited to;

- Fire Prevention;
- Fire Emergency Response;
- Spill prevention;
- Spill Response;
- Contamination of a water resource;
- Accidents to employees; and
- Use of hazardous substances and materials, etc.

The Applicant and Contractor must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the project.

15.1 Spill Response Procedure

The Contractor must ensure that all employees, staff and labourers are informed and instructed regarding implementation of spill prevention measures and spill response procedures. In the event of a spill, the following general requirements shall apply and the detailed spill procedure must cater for these requirements;

- Immediately reporting of spills by all employees and/or visitors to the relevant supervisor and EO (this requirement must be including in induction training);
- Take immediate action to contain or stop the spill where it is safe to do so;
- Contain the spill and prevent its further spread (e.g. earth berm or oil absorbent materials for spill to land or by deploying booms and/or absorbent material for a spill to water);
- Dispose of any contaminated soil or materials according to appropriate waste disposal procedure. Note: Waste from spills of hazardous materials shall be disposed of as hazardous waste at a suitably licensed waste disposal facility;
- The Contractor’s EO shall record details of the spill in their respective incident registers;

- Photographic evidence shall be obtained of the spill clean-up.

In the case of large spills, the services of a specialist spill response agency shall be required, who shall advise on appropriate clean-up procedures and follow-up monitoring (if required). The incident procedures as defined in Section 12.5 shall also apply.

The Applicant must also, (as per Section 30 of the NEMA) notify the Director-General (DWS, ECDEDEAT, DEA and DMR), South African Police Services, Provincial Environmental Authority, the Local Municipality, and any persons whose health may be affected of the nature of an incident including:

- Any risks posed to public health, safety and property,
- Toxicity of the substance or by products released by the incident and
- Any step taken to avoid or minimise the effects of the incident on public health and the environment

15.2 Measures To Control Or Remedy Any Causes Of Pollution Or Degradation

The broad measures to control or remedy any causes of pollution or environmental degradation as a result of the proposed activities taking place on the project are provided below:

- Limit the size of the area to be disturbed as far as is practically possible;
- Ensure that the environmentally sensitive areas are adequately demarcated throughout the construction phase;
- Ensure topsoil, subsoil and rock dumps are provided with adequate storm water runoff measures;
- Contain potential pollutants and contaminants (where possible) at source;
- Handling of potential pollutants and contaminants (where possible) must be conducted in bunded areas and on impermeable substrates;
- Ensure the timeous clean-up of any spills;
- Implement a waste management system for all waste streams present on site;
- Investigate any I&AP claims of pollution or contamination as a result of the project activities; and
- Rehabilitate the site in line with the requirements of the rehabilitation plan.

16 MANAGEMENT AND MITIGATION

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
16.1 Legal Compliance							
A	The Applicant shall identify and comply with all relevant national, provincial and local legislation, including associated regulations and bylaws and shall establish and maintain procedures to keep track of, document and ensure compliance with environmental legislative changes.	Planning Construction Operation Decommissioning	Prior to construction and ongoing	Applicant	ECO (Monthly)	Ensure compliance with relevant legislation.	Up to date legal register. (Legal register) (ECO Monthly Audit)
B	Should there be changes in legislation and/or regulations the Applicant shall take the necessary actions to incorporate such changes and to pass these requirements on to the Contractors.	Planning Construction Decommissioning	Prior to construction and ongoing throughout construction	Applicant ECO	ECO (Monthly)	Ensure compliance with relevant legislation / Confirmation that requirements in terms of updated legislation are passed onto the contractors.	(Contractors contractual agreements) (ECO Monthly Audit)
16.2 Appointment of ECO							
A	The Applicant shall appoint a suitably qualified ECO who shall be independent from the Applicant and the Contractor. The ECO must preferably have a tertiary qualification in Environmental Management or appropriate environmental science field. The ECO should have appropriate qualification and experience in the implementation of environmental management specifications. For the purposes of implementing the conditions contained in this EMPr. The Applicant shall provide the ECO with the necessary support to ensure that the environmental aspects relating to the development is adhered to. The appointment of the ECO shall remain in force until all obligations of this EMPr have been met (e.g. including rehabilitation phase).	Planning	Prior to construction	Applicant	Applicant (once off prior to construction)	Appoint ECO to ensure monitoring of successful implementation of the EMPr.	Confirmation that ECO has been appointed and is suitably qualified to perform the duties contained in this EMPr. (ECO appointment and CV)
B	The Applicant is responsible for the maintenance, update and review of the EMPr. The ECO shall include any recommendations for proposed amendments/alterations of the EMPr to the Applicant who shall engage the	Planning Construction Operation Decommissioning	As required	Applicant ECO	ECO (Monthly) Applicant (as and when necessary)	Ensure EMPr is reviewed and updated where necessary to ensure adequate mitigation for all	Audit results and recommendations (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	competent authority, to the extent required, with regards to such changes.					impacts associated with the project.	
16.3	**Planning and Design**						
A	• A suitable storm water plan must be compiled for the road. This plan must attempt to displace and divert storm water from the road and discharge the water into adjacent areas without eroding the receiving areas. It is preferable that run-off velocities be reduced with energy dissipaters and flows discharged into the local watercourses. • An alien vegetation management plan must be compiled and implemented for the entire site during the construction and operation phases. • The contractor should compile a detailed Traffic Management Plan that will contain details regarding their management of access, traffic and parking arrangements to ensure that the adjacent properties and the roads are not negatively affected by the proposed development. This plan should be developed in consultation and to the satisfaction of the relevant traffic planning department of the local/ District municipality.	Planning and Design	Prior to construction	Applicant	ECO (Once-off at the start of individual contractors work	Ensure that appropriate planning and assessment of risks and opportunities is undertaken prior to construction.	Approved stormwater management plan
B	The following permitting, licensing or authorisations have been identified: • Section 21c and 21i of the National Water Act (36 of 1998) applies for the watercourses that will be impacted by the construction of the road and bridges. • Should water be abstracted from surface or ground water sources for the purpose of construction related to the road upgrade, then Section 21a of the National Water Act also applies. • The above mentioned water uses may not commence without the relevant permits being issued by DWS.	Planning	Prior to construction	Applicant	ECO (Once-Off)	Ensure compliance with relevant legislation	Permit acquired
16.4	**Appointment of Contractors**						
A	The EMPr must be made binding on the contractor/s and should be included in tender documentation and contracts. The costs related to the implementation of the	Planning Construction	Prior to construction and Ongoing	Applicant Contractors	ECO (Once-off at the start of individual	Ensure that the contractor is in possession of the EMPr and that they	Confirmation that contractor has received EMPr, and that EMPr has been made contractually binding.

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	EMPr during construction must be provided for in the contract.				contractors work)	understand their obligations thereto.	(Contractual agreements) (ECO Monthly Audit)
B	All contractors and sub-contractors must have a copy of this EMPr on site and should be briefed by the EO with regards to the use and implementation of the EMPr.	Planning Construction	Prior to construction and Ongoing	Contractor	ECO (Monthly Applicant (once off per contractor)	Ensure all contractors are aware of EMPr requirements.	Confirmation that contractors have received training relating to EMPr implementation. (Training records) (ECO Monthly Audit)
C	The Contractor shall appoint a dedicated Contractor's EO who is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the ECO and the public. The Contractor's EO shall be appointed prior to the onset of construction works.	Planning	Prior to construction and Ongoing	Contractor	ECO (Once-off)	Ensure a suitably qualified EO is present on site to oversee day to day activities and ensure successful implementation of EMPr during construction.	Confirmation that EO has been appointed and is suitably qualified to perform the necessary duties contained in this EMPr. (ECO Monthly Audit)
D	The Contractor shall ensure that all sub-contractors working under them abide by the requirements of the EMPr through the inclusion of the EMPr and applicable environmental requirements in contractual agreements for all sub-contractors.	Construction	Ongoing	Contractor	EO (Weekly) ECO (Monthly)	Ensure that the contractor implements all the mitigation measures as described in the EMPr.	Signed declaration of understanding by contractors (EO weekly checklist) (ECO Monthly Audit Report)
16.5 Service Detection							
A	The contractor shall engage the Applicant with regards to any existing services on the site prior to surface disturbance. The contractor must take all reasonable measures to ensure the location of underground and above-ground services are identified and damage or interruptions to such services are avoided. The Joe Gqabi District Municipality's Water Services Unit must be informed prior to any works that may affect the water pipeline in the area.	Construction	Construction phase	Applicant Contractor	ECO (Once-off)	Ensure no damage or disruption to existing services.	Results of service detection Incident register indicating disruption to services (EO weekly checklist) (ECO Monthly Audit Report) (Incident Register) (Consultation register)
B	In the event that construction activities take place near to existing services, thorough service detection should be undertaken and services exposed (where necessary) in the area to be disturbed to ensure there is no damage or disruption to services. Where appropriate, suitable buffer zones should be fenced off or demarcated around such areas to prevent any damage as a result of construction activities.	Construction	Prior to construction and ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure no damage or disruption to existing services.	Results of service detection Incident register indicating disruption to services (EO weekly checklist) (ECO Monthly Report) (Incident Register) (Consultation register)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
C	In all cases, where services must be temporarily disrupted, the relevant landowner and/or affected parties must be notified timeously (at least two weeks prior) prior to the service disruption. Appropriate alternative supply must be arranged for the service recipients in the event that repair will require a significant amount of time.	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Minimum disruption to existing services.	Affected parties / verification that relevant parties have been timeously notified prior to, or immediately after accidental disruption of services. (Proof of notification and response thereon from affected party)
16.6 Safety and Traffic Management							
A	The Applicant through the Project Manager shall ensure: • That reasonable measures are taken to ensure the safety of all site staff; • Provide appropriate Personal Protective Equipment (PPE) where required; • Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993) and associated regulations; • That all construction vehicles using public roads are in a roadworthy condition, that they adhere to the speed limits and that their loads are secured and that all local, provincial and national regulations are adhered to; • The applicant/ contractor must ensure that regular users of the nearby roads are not unreasonably delayed due to construction activities. • That all accidents and incidents are recorded and reported to the Project Manager and EO/ECO; and • The Applicant and Contractor must ensure that he/she has the contact details of the nearest emergency rooms (hospitals) to the site, of both private and public hospitals.	Construction	Ongoing	Project Manager Contractor	Safety Department	Ensure compliance with legal provisions of OHSA.	(safety reports) (safety audits)
B	• Appropriate signage and barriers must be provided for open trenches and other dangerous/ hazardous locations on site where deemed necessary. The ECO has the discretion to request additional safety measures. • The applicant should ensure that a maintenance plan is prepared for the road and associated structures.	Construction Operation	Ongoing	Contractor	Safety Department ECO (Monthly)	No incidents as a result of un-barricaded or un-marked hazards. Ensure safety of road users and surrounding communities.	(safety reports) (safety audits) (ECO Monthly Audit Report)
	• The final design of the road should include safety measures such as speed humps and speed limit signs	Operation	Ongoing	Contractor / Applicant	Safety Department	Ensure safety of road users and surrounding communities.	(safety reports) (safety audits) (ECO Monthly Audit Report)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	to ensure safety of road users, adjacent land occupants and pedestrians. • Pedestrian walkways and animal crossing points should be located at suitable positions along the road. • Awareness campaigns regarding road safety must be conducted.				ECO (Monthly)		
16.7	**Emergency Response / Disaster Management Planning**						
A	• Develop and implement an Emergency Preparedness and Response Plan (EPRP) for implementation during the construction phase. This should be revised periodically as the various phases of the construction work takes place. • Identify suitable individuals that can be trained and used as first aid officers on site (levels 1 to 3). Training of these individuals should ideally take place during the planning phase of the project to ensure that qualified first aid officers are on site once construction commences. • Consult with ambulance services and/or hospitals so that they are aware of the project and would be able to provide emergency and/or medical services if needed.	Planning Construction	Prior to construction. Implementation ongoing during construction phase	Contractor	ECO (Once-off)	Ensure emergency preparedness and response systems in place.	Verification that EPRP is in place. (ECO Audit) (EPRP) (Incident Reports)
16.8	**Fire Prevention**						
A	The Applicant, Contractor and ECO shall assess the risk of fires and where required the relevant party shall ensure that fire breaks are created prior to the onset of construction. Fires breaks must be maintained as necessary to ensure they remain effective. Relevant firefighting equipment is to be provided in relevant locations as per the Safety Specifications on site. The equipment must be serviced at the required intervals. A fire response plan must be prepared by the contractor.	Planning Construction	Prior to construction and Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Protect site and adjacent properties from runaway fires.	Verification that appropriate fire prevention measures and response plans are in place where required. (EO weekly checklist) (ECO Monthly Audit)
16.9	**Cultural & Heritage Resources**						
A	• RD_G3 and RD_G4 are single graves located within the confines of the homesteads. No negative impact from the construction activities is expected.	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Protection of Heritage resources.	Visual observation that no heritage sites have been unearthed or damaged. (EO weekly checklist)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• RD_G5 contains several graves and is fenced. The area is located about 40 m west from the existing road. The proposed upgrade plans to reroute this road which would then be situated about 150 m west from the locations of the graves area. No negative impact from the construction activities is expected. • RD_G1 is an unfenced cemetery situated about 60 m east of the existing road. No negative impact from the construction activities is expected • RD_G2 is an unfenced cemetery with the nearest graves located about 30m east of the existing road. It is unlikely that the construction activities for the road upgrade would negatively impact on the graves, however, it is recommended that the area be clearly demarcated and formally fenced, at the onus of the developer, before construction activities commence. The graves are currently at risk of being damaged by domesticated stock grazing within the area and over the graves. The fence will also deter people employed during the road upgrade project from entering the area and vandalising or damaging the graves. The fencing of the area must also be discussed with the local community, including the Headman and Chief, who have familial ties to graves to acquire their input and permission. • If concentrations of pre-colonial archaeological heritage material (such as shell middens and associated material) and/or human remains (including graves and burials) are uncovered during construction, all work must cease immediately and be reported to the Albany Museum (046 622 2312) and/or the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) (043 745 0888) so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the archaeological / heritage site will then be conducted to establish the contextual status of the sites and possibly remove the archaeological deposit before development activities continue. • A person must be trained as a site monitor to report any archaeological sites found during the development. Construction managers/foremen and/or the						(ECO Monthly Audit Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	Environmental Control Officer (ECO) should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites						
B	Significant fossils are expected when deep excavation (>1.5m) are done and if fossils are recorded it will contribute significantly to our knowledge of the Palaeontological Heritage of Eastern Cape. It is recommended that: • The EAP and ECO must be informed of the fact that a Moderate Palaeontological Sensitivity is allocated to the Alluvium in the study area. A Very High Palaeontological sensitivity is allocated to the Molteno and Elliot Formations as well as the Dolerite Dyke structures due to the groundwater potential of these units. If fossils are observed during construction the HIA specialist and Palaeontologist must be informed to take immediate and appropriate action to preserve the fossils. • A suitably qualified Palaeontologist must be appointed to apply for the necessary collection permit from SAHRA and to do a Phase 1 Palaeontological Assessment of the entire length of the route. A "Chance Find Protocol" must be prepared before the contractor is allowed on site. • In the light of the recent discovery of highly significant dinosaur remains in the region of this project (Authors' Note at end of Reference List for publications), is it recommended that a Phase 1 Palaeontological field survey be completed by a suitably qualified palaeontologist before any earthworks are started in this study area. It is important to indicate to the developer and the contractor that a suitably qualified Palaeontologist will have to visit the site during the entire lifetime of the project and that a "Chance Find Protocol" will be needed for Palaeontological finds. The "Chance Find Protocol" must be done after completion of the Phase 1 field assessment. • The EAP and Project Manager must be on the alert that a Phase 2 PIA assessment will most probably be required. An arrangement for a "Chance Finds Protocol" between the Palaeontologist, the	Planning Construction	Prior to construction. Implementation ongoing during construction phase	Applicant Contractor	EO (Weekly) ECO (Monthly) Palaeontologist (As required)	Protection of Palaeontological resources.	Visual observation that no Palaeontological sites have been unearthed or damaged. (EO weekly checklist) (ECO Monthly Audit Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	Evolutionary Studies Institute at WITS University (at the moment the Institute with leading scientists on new dinosaurs discovered at Zastron) and the contractor must be in place, to remove fossils as soon as they are recorded in all excavation sites for the Project.						
16.10 Socio-Economic Considerations							
A	• Directly affected landowners must be consulted prior to commencement of construction. • The Project manager must ensure that a system is established and maintained for the recording of public and community comments and concerns. The comments and concerns must be addressed as far as reasonable possible.	Planning Construction	Prior to construction Ongoing	Applicant/ Project manager	ECO (Monthly)	Ensure that socio-economic considerations are considered and implemented where necessary	Preparation and maintenance of a consultation register. (ECO Monthly Audit Audit) (Consultation register)
B	• Without compromising construction and schedules, it is recommended that local labour is employed as far as possible. • Those employed should be provided with the appropriate skills development and training, as required.	Planning Construction	Prior to construction Ongoing	Applicant/ Project manager	ECO (Monthly)	Ensure that socio-economic considerations are considered and implemented where necessary	List of names of personnel appointed on site with residential details. Training Records
16.11 Terrestrial & Aquatic Ecology							
A	As far as possible, the proposed developments should be placed in areas that have already been disturbed (low sensitivity areas as defined in the specialist report), and the loss of secondary grassland or wetlands should be minimised;	Planning Construction	Prior to construction and ongoing	EO ECO	EO ECO	Minimize degradation of new sensitive areas Ensure environmental awareness	Environmental Awareness training ECO (Monthly) Report
B	It is recommended that areas to be developed be specifically demarcated so that during the construction phase and operational phase, only the demarcated areas be impacted upon. All work areas, offices, tailings dumps, and access roads must be clearly demarcated from surrounding natural areas and no persons should be allowed to enter these areas under any circumstances;	Planning and construction	Ongoing	Contractor and EO	ECO	Limit disturbance to surrounding natural areas	ECO monthly checklist/report
C	• Areas of indigenous vegetation, even secondary communities should under no circumstances be fragmented or disturbed further or used as an area for dumping of waste.	Planning	Prior to construction	Applicant EO ECO	EO (Weekly) ECO (Monthly)	Mitigate biodiversity loss Effectively control alien vegetation on site	Appointment of Search and Rescue Specialist Search and Rescue Report ECO (Monthly) Report

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• The areas rated as highly sensitive in the project area as defined in this report, should be declared a 'no-go' area during the construction phase and operational phase and all efforts must be made to prevent access to this area from construction workers and machinery. • It should be made an offence for any staff to bring any plant species into any portion of the project site, including offices. No plant species whether indigenous or exotic should be brought into the project area, to prevent the spread of exotic or invasive species.	Construction					
D	A qualified environmental control officer must be on site when construction begins to identify species that will be directly disturbed and the applicant should appoint a specialist where necessary to relocate fauna/flora that is found during construction (this includes all species of flora and fauna).	Construction	Prior to construction until completion of works and rehabilitation	Applicant	ECO	To monitor compliance with EMPr and relevant environmental legislation	ECO appointment letter ECO reports during construction
E	• Areas of indigenous vegetation should be delineated, and rehabilitation measures implemented in areas where the indigenous community is still present but degraded; • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species; • Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines. This includes on-going maintenance of such topsoil piles so that they can be utilised during decommissioning phases and re-vegetation;	Construction	Ongoing	Contractor and EO	ECO	Limit disturbance to surrounding natural areas Promote re-vegetation of disturbed areas	ECO monthly checklist/report
F	Unnecessary disturbance to flora and fauna must be prevented, this includes amongst others: • No fauna or flora may be purposefully captured, injured or killed without the written approval of the ECO. • No worker may disturb, hunt, set traps/snares, utilise dead or alive fauna /livestock /wildlife, collect or remove firewood or medicinal plants or other plants/crops/fruit. • Where reasonably possible direct impacts on small fauna (e.g. invertebrates, reptiles) must be prevented. • The siting of any equipment or activities must where reasonably possible avoid or at least minimise the	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	Limit disturbance to flora and fauna.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	physical disturbance to existing faunal residents (e.g. burrows, nests, etc).						
G	Access roads must be demarcated and the indiscriminate movement of construction vehicles and personnel outside of these demarcated areas must be strictly prohibited. Regularly service and inspect construction vehicles to ensure there are no leaks. Use bunded surfaces within designated areas for re-fuelling vehicles. Clean up any spillages, immediately. Remove contaminated soil and dispose of it appropriately.	Planning and construction	Ongoing	Contractor and ECO	ECO (Monthly)	Disturbance of wetland habitat is avoided Leaks of fuel and oils are avoided	ECO monthly checklist/report
H	• Limit vegetation removal to the disturbance footprint only. This can be improved by fencing in the footprint areas with danger tape so as to prevent encroachment into the surrounding areas by construction workers and vehicles. • Rehabilitate any disturbance areas with indigenous grasses, bulbs and trees.. • An Environmental Control Officer to oversee the implementation of the EMPr at strategic intervals e.g. site demarcation, site checks, rehabilitation and closure.	Construction	Ongoing	ECO	ECO	Erosion and sedimentation of wetlands is avoided	ECO monthly checklist/report
I	• Compile a site rehabilitation plan for implementation.	Planning Construction Operational	Construction phase	Contractor	EO(Weekly) ECO(Monthly)	Ensure that disturbed areas are rehabilitated.	Appointment of a rehabilitation specialist Rehabilitation plan
J	• An alien vegetation management plan must be compiled and implemented for the entire site, including the surrounding project area and especially the wetland areas • Removal of alien and invasive species as listed by NEMBA Alien and Invasive Species Regulations (GN R598 of 2014). • The Contractor will be responsible for clearing and destroying any newly emerging alien invasive plants. • During operations, prevent the spread of alien invasive plants (as required in terms of the NEMBA regulations). • It is recommended that any species noted are removed by hand.	Planning and construction Operations	Ongoing	Contractor and EO	EO(Weekly) ECO(Monthly)	All specified alien and invasive species are removed	ECO monthly checklist/report
K	• The primary mitigation measure recommended for the project area is for there to be no development in the high-sensitivity wetlands and grasslands portions of the project area where species of conservation concern occur;	Planning and construction Operations	Ongoing	Applicant and Contractor	EO (Weekly) ECO (Monthly)	To protect faunal habitats and ensure they remain intact	Visual assessment of site EO weekly reports ECO monthly reports

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
L	• If any faunal species are recorded during construction, activities should temporarily cease, and an appropriate specialist should be consulted to identify the correct course of action. This is applicable to all species, even smaller species such as rodents, reptiles and amphibians; • Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited; • Should any protected tress or plants be identified within the construction footprint during construction, the relevant permits must be obtained from DAFF to remove or relocate the plants.	Construction and Operations	Ongoing	Applicant and Contractor	EO (Weekly) ECO (Monthly)	To protect faunal recorded on site	Visual assessment of site EO weekly reports ECO monthly reports Induction/Training records
M	• All livestock must be kept out of the wetland and grassland areas in order to prevent overgrazing of potential SCC avifauna habitat; and • As far as possible, the proposed alignment should be placed in areas that have already been disturbed, and no further loss of secondary vegetation should be permitted. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon; • The areas rated as highly sensitive in the project area as defined in this report should be treated as such and the movement of construction vehicles and construction workers within these areas should be strictly prohibited, unless required for the project (controlled access); • Where possible, existing access routes and walking paths must be made use of, and new routes limited; • All laydown, storage areas etc should be restricted to within the project area;	Planning and construction Operations	Ongoing	Applicant and Contractor	EO (Weekly) ECO (Monthly)	To protect faunal habitats and ensure they remain intact	Visual assessment of site EO weekly reports ECO monthly reports
N	The following road construction specific mitigation measures are provided: • The footprint area of the road should be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas;	Construction	Ongoing	Contractor	EO (Weekly) ECO (Monthly)	To protect water resources intersected by the road and minimize erosion and sedimentation	Demarcation of development footprint area EO Reports Photographic records Erosion control measures in place ECO Reports

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• All construction activities and access must make use of the existing road; • Exposed road surfaces awaiting grading must be stabilised to prevent the erosion of these surfaces. Signs of erosion must be addressed immediately to prevent further erosion of the road; • Silt traps and fences must be placed in the preferential flow paths along the road to prevent sedimentation of the watercourse; • Temporary storm water channels should be filled with aggregate and/or logs (branches included) to dissipate flows; • A suitable storm water plan must be compiled for the road. This plan must attempt to displace and divert storm water from the road and discharge the water into adjacent areas without eroding the receiving areas. It is preferable that run-off velocities be reduced with energy dissipaters and flows discharged into the local watercourses.						Storm water plan
O	• The following watercourse crossing specific mitigation measures are provided: • The recommended 21m buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse a watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone; • It is critical to spread flows across the system (within the existing river channel), avoiding incisions in the landscape caused by concentrated flows; • It is recommended that the material surrounding and holding the culverts in place include a coarse rock layer that has been specifically incorporated to increase the porosity and permeability to accommodate flooding and very low flows; • The culverts used in the design should be as large as possible, partially sunken and energy dissipating material must be placed at the discharge area of each culvert to prevent erosion of these areas; • Large aggregate outsourced or from the project area (if available) can be used for energy dissipation in the channel downstream of the culverts to reduce the likelihood of scouring the river bed and sedimentation	Construction	Ongoing	Contractor	EO (Weekly) ECO (Monthly)	To protect water resources intersected by the road and minimize degradation	Buffer zones adhered to Photographic records EO Reports ECO Reports Inspect culvert systems

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	of the catchment. It is preferable that larger aggregate be used to avoid flows removing material from the site;						
P	• The use of larger culverts will prevent the build-up of debris by allowing the free movement of debris through the large culverts; • Culverts should avoid inundation (damming) of upstream areas by facilitating streamflow and catering properly for both low flows and high flows; • The footprint area of the culvert upgrade should be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas; • Temporary storm water channels should be filled with aggregate and/or logs (branches included) to dissipate flows; • The scouring of substrates should be avoided through the implementation of appropriately sized and shaped piers.	Construction	Ongoing	Contractor	EO (Weekly) ECO (Monthly)	To protect water resources intersected by the road and minimize degradation of watercourses	Footprint demarcated Photographic records EO Reports ECO Reports Inspect culvert systems
Q	• The contractors used for the project must have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly. The following general mitigation measures are provided: • The water resources outside of the specific project site area must be avoided where possible; • The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access; • Laydown yards, camps and storage areas must be beyond the aquatic areas. Where possible, the construction of the crossings must take place from the existing road and not from within the watercourse and associated buffer;	Construction	Ongoing	Contractor	EO (Weekly) ECO (Monthly)	To protect water resources intersected by the road and minimize degradation	Spill kits on site No-go areas demarcated Photographic records EO Reports ECO Reports
R	• It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces; • Prevent uncontrolled access of vehicles through the water resources system that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas; • All chemicals and toxicants to be used for the construction must be stored outside the channel system and in a bunded area;	Planning and Construction	Ongoing	Contractor	EO (Weekly) ECO (Monthly)	To protect water resources intersected by the road and minimize degradation	Controlled access on site Induction and training records maintained Vehicle inspection sheets Emergency incident procedures in place Visual inspection of site EO Reports ECO Reports

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site; • All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping"; • Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems; • All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the watercourse. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.						
16.12 Soil Management and Erosion Control							
A	• Erosion and sedimentation into the channel must be minimised through the effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed banks;	Planning Construction Operation	Construction phase and ongoing	Applicant Hydrological Engineer EO	EO (Weekly) ECO (Monthly)	Limit environmental disturbance. Ensure that measures are in place to minimize erosion due to stormwater.	Demarcated working area. (EO weekly checklist) (ECO Monthly Audit)
B	Management of topsoil: • Topsoil must be separated from sub-soils. Depth of topsoil to be separated must be approved by the ECO. • Separated topsoil must be stored separately to other materials, and reinstated during the rehabilitation or provided to the affected landowner as a resource (if the landowner agrees to this). • Topsoil and other materials (including sub-soils, rock, and imported materials) must not be mixed. • Locate soil stockpiles so that re-handling of soil is minimized and prevent unnecessary compaction of topsoil. • The area to be cleared must be clearly demarcated and this footprint strictly maintained. • Topsoil must be reused where possible to rehabilitate disturbed areas.	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	No loss of topsoil.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• Construction vehicles must only use existing tracks or pre-planned access routes.						
C	Erosion Control: • Soils (including sub-soils) exposed to the elements as a result the construction activities must be adequately protected from erosion. • The extent of exposed surfaces and the duration that exposed surfaces are left un-rehabilitated should be reduced as far as reasonably practical, to ensure that erosion remains manageable. • Erosion across the site must be prevented as far as possible. • Adequate control measures need to be implemented and maintained to prevent erosion scouring. • Stormwater must be managed so as not to result in concentrated runoff on exposed surfaces, and consequent erosion channels. • All erosion control mechanisms need to be regularly maintained. • Retention of vegetation where possible to avoid soil erosion. • Re-vegetation of disturbed surfaces should occur as soon as practically possible after the construction activities are completed. • Surface run-off from the roads flowing down the embankments often scours the watercourse on the sides of the culvert causing sedimentation of the channel. This should be catered for with adequate concreted storm water drainage depressions and channels with energy dissipaters that channel these flows into the river in a controlled manner. • The culvert installations should further take into account the scouring action of high flows and gabion structures or similar should be placed on both sides of the culvert on the embankments both upstream and downstream. This will serve as retention of the soils from scouring around and underneath the culvert structures aiding in the protection of the structure. • Large aggregate outsourced or from the project area (if available) can be used for energy dissipation in the channel downstream of the culverts to reduce the likelihood of scouring the river bed and sedimentation	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	No erosion.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	of the catchment. It is preferable that larger aggregate be used to avoid flows removing material from the site. • Signs of erosion must be addressed immediately to prevent further erosion.						
D	Dewatering of water collected in the trenches or other excavations must be undertaken in a manner that ensures that erosion does not occur as a result of the discharge (e.g. at the discharge point).	Construction	Construction phase	EO	EO (Weekly) ECO (Monthly)	No erosion.	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit Report)
E	• Only remove vegetation that is required within the construction and development footprint. • Any disturbed areas should be rehabilitated with indigenous species. • During construction, the use of bidum or hessian or other such measures should be implemented if bare exposed soils are created. • Stockpile topsoil for later rehabilitation, but ensure that stockpiles are appropriately sized, contoured, sited and managed (e.g. bidum covering or other, if necessary). The topsoil may also provide vegetative material to assist with re-vegetation, if not stockpiled for an extended period. • Control and management of the spread of alien plants during construction by the Contractor. Alien invasive plants that establish in disturbed areas should be removed immediately by hand.	Planning Construction	Prior and during construction	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure adequate management of soil	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit Report)
16.13 Air Quality							
A	• Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated. No dust is allowed, whether intentionally or otherwise, to be blown across the wetland areas as they are demarcated in the specialist report; • Reduction of vehicle speeds on unpaved roads. • Cover all loaded haul trucks on and off the site as required to prevent dust off site.	Construction	Construction phase	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure that no excessive dust or air quality impacts are perceived	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
B	The extent of exposed surfaces and the duration that exposed surfaces are left un-rehabilitated should be reduced as far as reasonable practical, to ensure that dust risk remains manageable.	Construction	Construction phase	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure that no excessive dust or air quality impacts are perceived	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
C	• Construction vehicles must be maintained to ensure that excessive emissions are not being released. • The volumes of vehicles travelling to, and from, the site must be managed where possible to reduce the volumes. • The use of car pools or public transport to, and from, the site must be encouraged.	Construction	Construction phase	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure that no excessive air quality impacts are perceived	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
D	• Ensure that ablution facilities are regularly serviced to prevent odour nuisance.	Construction Operational	As required	Applicant EO	EO (Weekly) ECO (Monthly)	Ensure that odour emanating from ablution facilities is minimized.	Regular servicing slips Consultation register
16.14 Noise & Blasting							
A	• Noise-generating activities associated with construction activities should be kept to a minimum. • Compliance with the appropriate legislation/ any local by-laws and regulations regarding the generation of noise must be adhered to; • The construction camp and noisy construction activities must be located away from the noise sensitive areas (i.e. residential areas). • All the relevant permits must be obtained prior to commencement of blasting activities; • Noises that could cause a major disturbance (e.g. blasting) should only be carried out in areas located in close proximity to communities and/or residences during normal working hours. Should noise-generating activities have to occur at night (e.g. drilling of blast holes), communities and/or landowners in the vicinity of the drilling should be warned about the noise well in advance and the activities should be kept to a minimum. Compliance with the appropriate legislation with respect to noise will be mandatory. • All plant and construction equipment to be kept in good repair to ensure that point source noise emissions are reduced.	Construction	Construction (ongoing)	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure that noise levels are controlled within acceptable limits. No complaints relating to noise.	Confirmation that noise levels are within acceptable limits and relevant notifications undertaken (e.g.: blasting). (EO weekly checklist) (ECO Monthly Audit Audit) (Consultation register)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• Adjacent property owners should also be consulted if any night time construction activities are to take place. • Blasting permits (obtained from DMR for borrow pits and quarries and from the Chief Inspector of Explosives Unit (SAPS) for earthworks in the road alignment). • The Contractor shall obtain a current and valid authorisation for blasting from the relevant authorities prior to any blasting activity. A Method Statement shall be required for any blasting-related activities. The Method Statement should include a locality plan of the blast site on which shall be shown the zones of influence of the ground and air shock-waves and expected limits of fly-rock. The plan shall also show each dwelling, structure, service and water sources within the zones of influence • The Contractor shall take all necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock. Environmental damage caused by blasting/drilling shall be repaired at the Contractor's expense. At least one week prior to blasting, the Contractor shall notify the relevant occupants/owners of surrounding land and address any concerns. Buildings within the potential damaging zone of the blast shall be surveyed, preferably with the owner present, and any cracks or latent defects pointed out and recorded either using photographs or video. • Where loss of livestock production due to blasting has been adequately demonstrated, compensation should be considered • Strive for compliance with the relevant South African National Standards (e.g. SANS 10103) and other noise control legislation. Monitoring should be carried out. The ECO has the discretion to instruct that monitoring be undertaken.						
16.15 Site access, Security and Traffic Management							
A	Access to the site must be controlled to restrict unauthorised personnel from entering the site. Only authorised personnel shall be allowed on site.	Construction	Ongoing	Applicant Contractor	Safety Department (Daily) EO (Weekly)	Site access control in place	Visual confirmation of site access control. (EO weekly checklist) (ECO Monthly Audit Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
					ECO (Monthly)		
B	• The extent of the working areas must be clearly demarcated prior to commencement. Construction activities outside of the demarcated areas must be avoided. • On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation, and to minimise disruption of traffic.	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Minimise footprint of environmental impact.	Visual observation of vehicle access. (EO weekly checklist) (ECO Monthly Audit Audit)
C	No person will be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects on-site, or to enter the site while under the influence of alcohol or drugs.	Construction	Ongoing	Applicant Contractor	Safety Department (Daily) EO (Weekly) ECO (Monthly)	Ensure safety and security is maintained on site.	No incidents (Site induction material) (Consultation register)
D	Staff, employees and construction workers will not be allowed to keep (or have in their possession at any point in time) any animals, including livestock, poultry, wildlife or pets on site.	Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Avoid public nuisance, introducing foreign species/diseases to area and unsanitary conditions.	(EO weekly checklist) (ECO Monthly Audit)
E	Construction activities that require the use of local public roads may not significantly disrupt traffic.	Construction	Ongoing	Applicant Contractor	Safety Department (weekly) ECO (Monthly) EO (Weekly)	Construction impacts on traffic minimised	(EO Weekly Checklists) (ECO Monthly Audit)
F	• Construction activities must be limited to 07h00 to 17h00 during weekdays and 09h00 to 15h00 on weekends, unless negotiated otherwise with affected residents. • The contractors must ensure that all affected roads are maintained during the construction period. • All temporary access roads and stockpiles must be rehabilitated prior the contractor moving off site, through written approval by the relevant landowner.	Construction	Ongoing	Applicant Contractor	ECO (Monthly) EO (Weekly)	Construction impacts on traffic minimised	(EO Weekly Checklists) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
16.16 Hazardous Substance Management							
A	• All hazardous substances (e.g. fuel, grease, oil, brake fluid, hydraulic fluid) must be handled, stored and disposed of in a safe and responsible manner (in accordance with relevant MSDS) so as to prevent pollution of the environment or harm to people or animals. • Appropriate measures must be implemented to prevent spillage and appropriate steps must be taken to prevent pollution in the event of a spill. • Relevant permits for storage of hazardous substances such as diesel on site must be obtained and kept on file.	Construction Operation	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Appropriate hazardous storage to reduce potential for pollution of environment.	Visual observation that hazardous substance storage complies with EMPr requirements and relevant norms and standards. (EO weekly checklist) (ECO Monthly Audit)
B	• Hazardous substances shall be confined to specific and secured areas, and in such a way that does not pose any danger of pollution even during times of high rainfall. • Hazardous storage areas shall be bunded (impermeable) with adequate containment (at least 110% the largest volume stored) for potential spills or leaks. • Bunded storage areas shall be provided with an oil separator or sump where applicable. Waste from spillages shall be removed and recycled or disposed of responsibly. • Should spills occur, a register should be maintained, recording the type, quantity and location of the spilled material.	Construction Operation	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Adequate provision for spill prevention and containment	Visual observation that storage facilities comply with EMPr requirements and relevant norms and standards. (EO weekly checklist) (ECO Monthly Audit)
16.17 Pollution Prevention							
A	• All dumping of waste material, especially bricks and contaminated materials or soils, must be prevented; and • Equipment used during construction must be adequately maintained so that during operations it does not spill oil, diesel, fuel, or hydraulic fluid. • All equipment must be inspected regularly (at least weekly) to ensure that it is in good working condition,	Construction Operation	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Limit leaks and spills that can pollute the environment	Visual inspection of plant and equipment that it complies with EMPr requirements. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	clean, and free from leaks of oil, petrol, diesel, hydraulic fluid and contaminating substances. • Avoid the use of material with pollution causing potential where possible. • Clean up any spillages (e.g. concrete, oil, fuel), immediately. Remove contaminated soil and dispose of it appropriately. Proof of safe disposal of contaminated material must be maintained on file.						
B	• Any equipment that may leak, and does not have to be transported regularly, shall be placed on watertight drips trays to catch any potential spillages of pollutants. • The drip trays shall be of an adequate size to collect and contain potential spills. • Daily inspections shall be carried out to ensure such spill prevention measures are in place and remain effective. • Drip trays shall be cleaned regularly and shall not be allowed to overflow. • All spilled hazardous substances must be collected and adequately disposed of at a suitably licensed facility.	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Adequate spill prevention measures to avoid pollution of the environment	Visual observation that drips trays are present and utilised. (EO weekly checklist) (ECO Monthly Audit)
C	• Labour intensive methods are encouraged, where feasible, which should reduce the need for construction vehicles/equipment. • If maintenance procedures are required at the site, these should take place at the designated construction camp. • Vehicles and construction equipment should not undergo maintenance procedures on site; unless under emergency situations. • The mixing of cement should not take place directly on the ground. • The mixing of cement should take place on a bunded surface. • An emergency operational plan should be in place in the event of accidental spillages of hazardous chemicals (petrol and oil) and sewage which could potentially pollute surface and groundwater. • Accidental oil and fuel spillages should be cleaned up immediately by the Contractor, placed in sealed containers and disposed of at a licensed waste disposal site.	Construction Operation	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Avoid effluent pollution and water quality degradation of groundwater	Visual observation Site Plans (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• Hazardous and chemical wastes (includes old containers) should be disposed of at registered landfill sites. • If storage of fuels, oils and other hazardous materials is required at the Construction Camp, storage areas with bunded surfaces should be provided. • All solid wastes should be stored and disposed of appropriately. • Rehabilitate any spillage areas with indigenous species. • Audit reporting by the Environmental Control Officer during camp site establishment (and to remain within the construction area).						
D	• Portable toilets to be placed at the formalised site camp, to be located at the greatest distance from the River, beyond 100 m, on bunded surfaces and fenced in. • Portable toilets to be managed to prevent leakages and spillages. • An emergency operational plan should be in place in the event of accidental spillages of hazardous chemicals (petrol, diesel and oil). • Accidental oil and fuel spillages should be cleaned up immediately by the Contractor, placed in sealed containers and disposed of at a licensed waste disposal site. • Vehicles and construction equipment should not undergo maintenance procedures on site or near the river; unless under emergency situations. • If storage of fuels, oils and other hazardous materials is required, this shall be a formalised site camp, to be located at the greatest distance from the River, beyond 100 m, on bunded surfaces and fenced in. • All equipment and vehicles will be stored at the formalised site camp - to be located at the greatest distance from the River, beyond 100 m. • Any hazardous waste should be disposed of at a licensed waste disposal site. • Appropriate staff environmental awareness raising should be provided by the Environmental Control Officer.	Construction Operation	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Avoid effluent pollution and water quality degradation of surface and groundwater	

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• Rehabilitate any spillage areas with indigenous species, where necessary.						
16.18 Waste Management							
A	The Contractor shall develop and implement a waste management plan for their works which complies with the principles of the NEMWA and provides a mechanism for the effective management of waste.	Planning	Prior to construction	Contractor	EO (Once-off) ECO (Once-off)	Effective waste management and compliance with regulatory requirements.	Clean and tidy site No Litter onsite Waste Management Area compliant with regulatory requirements and environmental management principles. (Waste management plan) (Waste register) (Waste disposal records) (Safe disposal certificates) (ECO Monthly Audit)
B	• The Applicant and Contractor(s) shall comply with the environmental management principles referenced in the NEMA. • In respect of waste management, the 'cradle-to-grave' principle in particular must be adhered to so as to ensure accountability for correct waste handling, storage and disposal.	Planning Construction Operation Decommissioning	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Accountability for waste management	Paperwork audits to verify compliance with cradle-to-grave principle. (Waste register) (Waste disposal records) (Safe disposal certificates) (EO weekly checklist) (ECO Monthly Audit)
C	• The waste management system shall provide for adequate waste storage (in the form of bins with lids), waste separation for recycling, and frequent removal of non-recyclable waste for permanent disposal at an appropriately licensed waste disposal facility. • No dumping of construction material on-site may take place; and • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported. • Under no circumstances may there be any burial of waste on the site. • No excess asphalt or bitumen may be stockpiled directly on bare ground or near watercourses.	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Ensure waste is adequately controlled in a responsible manner	Visual observation that waste management complies with EMPr requirements and relevant norms and standards. (Waste register) (Waste disposal records) (Safe disposal certificates) (EO weekly checklist) (ECO Monthly Audit)
D	• All refuse shall be disposed of in refuse bins which shall be emptied on a daily basis.	Construction	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Ensure waste is adequately controlled	Visual observation that waste management complies with EMPr requirements and

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• These bins must be adequate in number and accessibility to effectively manage the waste generated on site. • Refuse bins shall be watertight, wind-proof and scavenger proof and shall be appropriately placed throughout the site and shall also be conspicuous. • Refuse must also be protected from rain, which may cause pollutants to leach out. Particular caution is to be exercised with regards to handling of hazardous waste, to ensure that it does not spill or leak from the waste collection containers. • Hazardous waste must be stored in separate waste containers from general waste. • The contractor must ensure that records of removal and safe disposal are maintained on site for auditing purposes.					in a responsible manner	relevant norms and standards. (EO weekly checklist) (ECO Monthly Audit)
E	• If skips are utilised for waste storage, these shall be provided with tarpaulins/lids to prevent the ingress of water and waste being blown by the wind. • Skips utilised for inert waste streams such as concrete rubble or wood do not need to be covered with tarps.	Construction Operation	Ongoing	Applicant Contractor	EO (Daily) ECO (Monthly)	Prevent contamination of environment from waste storage	Visual observation that waste management complies with EMPr requirements and relevant norms and standards. (EO weekly checklist) (ECO Monthly Audit)
16.19 Sewage and Sanitation							
A	• Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation); • Under no circumstances will pit latrines, french drain systems or soak away systems be allowed.	Planning Construction Operation Decommissioning	Ongoing	Applicant Contractor	Safety Department ECO (Monthly)	Safe, hygienic and effective sanitation that complies with legal provisions of OHSA regulations	Visual observation that EMPr and legal requirements relating to sewage and sanitation are met. (Safety audit reports) (ECO Monthly Audit)
C	• In the case of chemical toilets, there must be a minimum of one chemical toilet provided per 15 persons. • The provision of toilets on site shall comply with the relevant construction regulations and provisions of the Occupational Health and Safety Act.	Planning Construction	Ongoing	Applicant Contractor EO	Safety Department ECO (Monthly)	Safe and effective sanitation that complies with legal provisions of OHSA and regulations	Visual observation that EMPr and legal requirements relating to sewage and sanitation are met. (Safety audit reports) (ECO Monthly Audit Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• The toilets shall be of a neat construction and shall be provided with doors and locks and shall be secured to prevent them from falling over. • Toilet paper dispensers shall be provided in all toilets and toilet paper shall be supplied at all times. • Toilet facilities must be adequately serviced and maintained. • Toilets must be kept in a clean, neat and hygienic condition. • Chemical toilets shall be cleaned and emptied before the contractor's long weekends or public holidays.						
D	• All reasonable measures shall be taken to ensure that no spillage occurs when chemical toilets are cleaned and emptied. • Any accidental spillage must be reported to the EO and cleaned up immediately.	Planning Construction	Ongoing	Contractor	Safety Department EO (Weekly) ECO (Monthly)	Prevent pollution of environment	Visual observation that there are no spillages from cleaning of chemical toilets. (Safety audit reports) (EO weekly checklist) (ECO Monthly Audit Audit)
E	If the Contractor (or reputable toilet-servicing company) fails to provide and/or maintain all site sanitation facilities in a clean and hygienic condition, the ECO may request the contractor to suspend work until the requirements have been met.	Planning Construction	Ongoing	Applicant Contractor	Safety Department EO (Weekly) ECO (Monthly)	Prevent pollution of environment	Visual observation that there are no spillages from cleaning of chemical toilets. (Safety audit reports) (EO weekly checklist) (ECO Monthly Audit Audit)
F	• Disposal of sewage shall be in a safe and responsible manner and at an approved facility specifically for that purpose. • The Contractor shall retain proof of sewage removal and disposal on file for auditing purposes.	Planning Construction Operational	Ongoing	Contractor	Safety Department EO (Weekly) ECO (Monthly)	Responsible disposal of sewage	Visual observation that there are no spillages from cleaning of chemical toilets) (Safety audit reports) (Disposal records) (EO weekly checklist) (ECO Monthly Audit Audit)
16.20 Construction Camps, offices, etc.							
A	• Construction camps, site camps, offices, workshops, and any other facilities required on the site for construction shall be situated in a manner that minimises any potential negative impacts on the environment. • The site selection shall be undertaken in consultation with the ECO. The construction camp and laydown areas must be located outside of the wetlands and buffer areas.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Limit construction footprint and minimise excessive environmental disturbance to the environment and potential for pollution	Visual observation that the facility complies with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• Clearly demarcate the construction camp, laydown areas, access roads and the construction footprint area. Strictly prohibit any vehicle or activity outside of the demarcated areas.						
B	• No workers (including sub-contractors) shall be allowed to stay on the neighbouring sites, unless it is cleared with the neighbouring owner (in writing). • In such an event all relevant requirements for the contractor's camp will apply.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Limit construction footprint and minimise excessive environmental disturbance to the Environment and potential for pollution	(EO weekly checklist) (ECO Monthly Audit Audit)
C	• The physical footprint of any construction or site camp shall be minimised and vegetation clearance should be kept to the minimum required area. • Topsoil shall be handled in accordance with the soil management principles presented in this EMPr.	Planning Construction	Ongoing	Applicant Contractor	EO (once-off) ECO (once-off)	Limit construction footprint and minimise excessive environmental disturbance	(EO weekly checklist) (ECO Monthly AuditAudit)
D	• All construction and/or site camps shall be enclosed with a fence. • The mesh size should be small enough for the fence to act as a catch net for windblown debris and as a demarcation of the site. • The fence shall be maintained as required to ensure access control remains effective. • All temporary fences erected by the contractor shall be removed and the site restored on completion of construction, unless otherwise agreed in writing with the Applicant, landowner, and ECO.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Visual observation that fences are maintained and comply with EMPr provisions.	(EO weekly checklist) (ECO Monthly Audit Audit)
E	• The contractor shall maintain good housekeeping practises and shall comply with the relevant HSE regulations in terms of materials storage. • Stockpiles of construction materials may only be placed within demarcated areas. • Laydown areas must be kept neat and tidy and free of litter or waste at all times.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Prevent pollution of the environment.	Visual observation that litter control and housekeeping materials comply with EMPr requirements and construction regulations. (EO weekly checklist) (ECO Monthly Audit Audit)
F	• A waste storage area must be established within the site camp/construction camp that provides for appropriate and adequate waste storage and waste separation for recycling. • All waste must be adequately contained so as to prevent ground and/or water pollution.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Appropriate waste storage to reduce potential for pollution of environment.	Visual observation that waste management complies with EMPr requirements and relevant norms and standards. (EO weekly checklist) (ECO Monthly Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
G	• The site camp/construction camp shall have adequate provision for the storage of hazardous waste (e.g. old oil filters, soil from spills etc.) and the waste shall be contained within closed containers to prevent the possibility of spillages.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Appropriate hazardous waste storage to reduce potential for pollution of environment.	Visual observation that waste management complies with EMPr requirements and relevant norms and standards. (EO weekly checklist) (ECO Monthly Audit)
H	• All fuel storage areas shall be bunded to contain at least 110 % of the volume stored and will comply with the relevant safety regulations. • The total volume of fuel stored at any fuel storage facility may not exceed 30 cubic metres (30 000l) without the necessary authorisation in terms of the NEMA (if applicable). • The installation must comply with the applicable SABS's code of standards. • The local fire department must be informed of the temporary installation/s.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Appropriate fuel storage to reduce potential for pollution of environment.	Visual observation that fuel storage complies with EMPr requirements and relevant norms and standards. (Notification to local authorities) (EO weekly checklist) (ECO Monthly Audit)
I	• Site camps/construction camps shall be provided with relevant fire extinguishing equipment, in accordance with all relevant legislation and this equipment must be readily accessible. • The fire extinguishing equipment must be serviced, as required.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Adequate fire prevention measures.	Visual observation that firefighting equipment is readily available and maintained to standard. (EO weekly checklist) (ECO Monthly Audit Audit)
K	• The Contractor(s) shall designate eating areas for use during normal working hours. • There shall be adequate provision of refuse bins near to eating areas that must be cleaned on a daily basis. • The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Avoid pollution of environment and provide hygienic conditions to prevent illness.	Visual observations that eating areas comply with EMPr requirements. (EO weekly checklist) (ECO Monthly Audit)
L	• No open fires shall be permitted within the site, site camp/construction camp, except where approved by the responsible safety officer, the EO, and ECO and within a designated structure designed for that purpose. • In such cases firefighting equipment must be readily available in the vicinity of the fire place. • All fires shall be fully extinguished after use.	Planning Construction	Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Prevent veld fires and damage to environment or harm to people and animals.	Visual observation for compliance with EMPr condition. (EO Monthly checklist) (ECO Monthly Audit Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
16.21 Rehabilitation and Management							
A	• The contractor must prepare a rehabilitation plan and submit same to the ECO for review and approval as soon as possible following commencement of construction. • The requirements of this EMPr must be incorporated to the extent necessary within this plan.	Planning Construction	As soon as possible following commencement of construction.	EO	EO (Once off)(Weekly) ECO (Once off approval) (monthly)	Compliance with approved rehabilitation plan.	(Approved rehabilitation plan) Visual observation for compliance with EMPr condition. (EO weekly checklist) (ECO Monthly Audit Audit)
B	• All infrastructure, equipment, temporary structures, waste materials (including excess inert wastes, excavated materials, aggregates, etc.) and other items used during the construction period will be removed from the site and disposed of responsibly and in agreement with the ECO. • In the event that certain structures or infrastructure are to be left on site, then consent must be obtained from the relevant landowner, and where applicable the ECO and Authorities.	Rehabilitation	Upon completion of construction.	Applicant Contractor	EO (As and when applicable) ECO (As and when applicable)	Ensure all plant and infrastructure are removed from site to allow successful rehabilitation of the site	Visual observation that de-establishment complies with EMPr and legal requirements. (EO weekly checklist) (ECO Monthly Audit Audit)
C	General Rehabilitation Measures / Landscaping: • 100 % vegetation cover should be achieved in areas that are re-vegetated, which should determine the rehabilitation period (including maintenance or establishment period). • Where compaction of soil has occurred due to heavy vehicular activity, ensure that the soil surface is loosened (scarified and ripped) prior to replacing the topsoil. • Composting of planting holes can be implemented to enhance survival and establishment of individually planted species. • Planting holes should be of adequate size to fit the root ball of plants and promote survival. • Watering will be required to ensure establishment of plants (or grass sods), unless sufficient rainfall is experienced during the rehabilitation period. • The maintenance period shall not be less than 3 months, or until acceptable cover is established. • Alien plant cover shall be removed by the Contractor during the maintenance/rehabilitation period.	Rehabilitation	Upon completion of construction.	Applicant Contractor	EO (As and when applicable) ECO (As and when applicable)	Ensure that appropriate species are planted where possible post construction.	Approved rehabilitation plan Appointed rehabilitation specialist Visual observation for compliance with EMPr condition. (EO weekly checklist) (ECO Monthly Audit Audit)

TECHNICAL OR MANAGEMENT OPTIONS							
Item No.	**Technical or Management Option**	**Phase**	**Timeframes**	**Responsible Party**	**Monitoring Party (Frequency)**	**Target**	**Performance Indicators (Monitoring Tool)**
	• The (Horticultural) Contractor to provide detailed rehabilitation specifications in the method statements (e.g. water supply, compost, mulching, plant plan etc.). • Non-indigenous or exotic species should not be used for landscaping purposes.						
D	• The Applicant shall prepare a Maintenance plan for implementation during the operational phase of the development. This is to ensure that the road is adequately monitored for efficiency of watercourse crossing structures, structural integrity of the road and bridges and environmental pollution/littering that may cause blockages in the watercourse crossings. • This plan shall be submitted to the Engineer and ECO for review and approval. • Where applicable, input from the relevant specialist must be obtained in compilation of the maintenance plan. The draft plan must be submitted to ECDEDEAT in Aliwal North for review and comment prior to finalization.	Operational	Prior to completion of development	Applicant	EO ECO	To ensure that the upgraded road is adequately maintained	Development and implementation of Road Maintenance Plan.
16.22 Decommissioning							
A	Should the project reach decommissioning stage, the relevant permits / licences and/or authorisations must be applied for.	Decommissioning	Upon completion of development	Applicant	Applicant (As and when necessary)	Ensure that the decommissioning activity is undertaken in a legally responsible manner.	Visual observation that decommissioning complies with EMPr and legal requirements. Applicant (permits / licences / authorisations in hand)
B	Prior to decommissioning the entire project or aspects of the project, a suitably qualified specialist must prepare a decommissioning plan that addresses the following aspects as a minimum: • Waste management; • Effluent management; • Pollution prevention; • Camp/staff and machinery management; and • Rehabilitation.	Decommissioning	Upon completion of development or aspects thereof.	Applicant	Applicant (As and when necessary) ECO (As and when necessary)	Ensure that decommissioning plan is prepared and approved (if necessary).	Visual observation that decommissioning complies with EMPr and legal requirements. (decommissioning plan/s) Applicant (permits / licences / authorisations in hand) ECO (Reports)

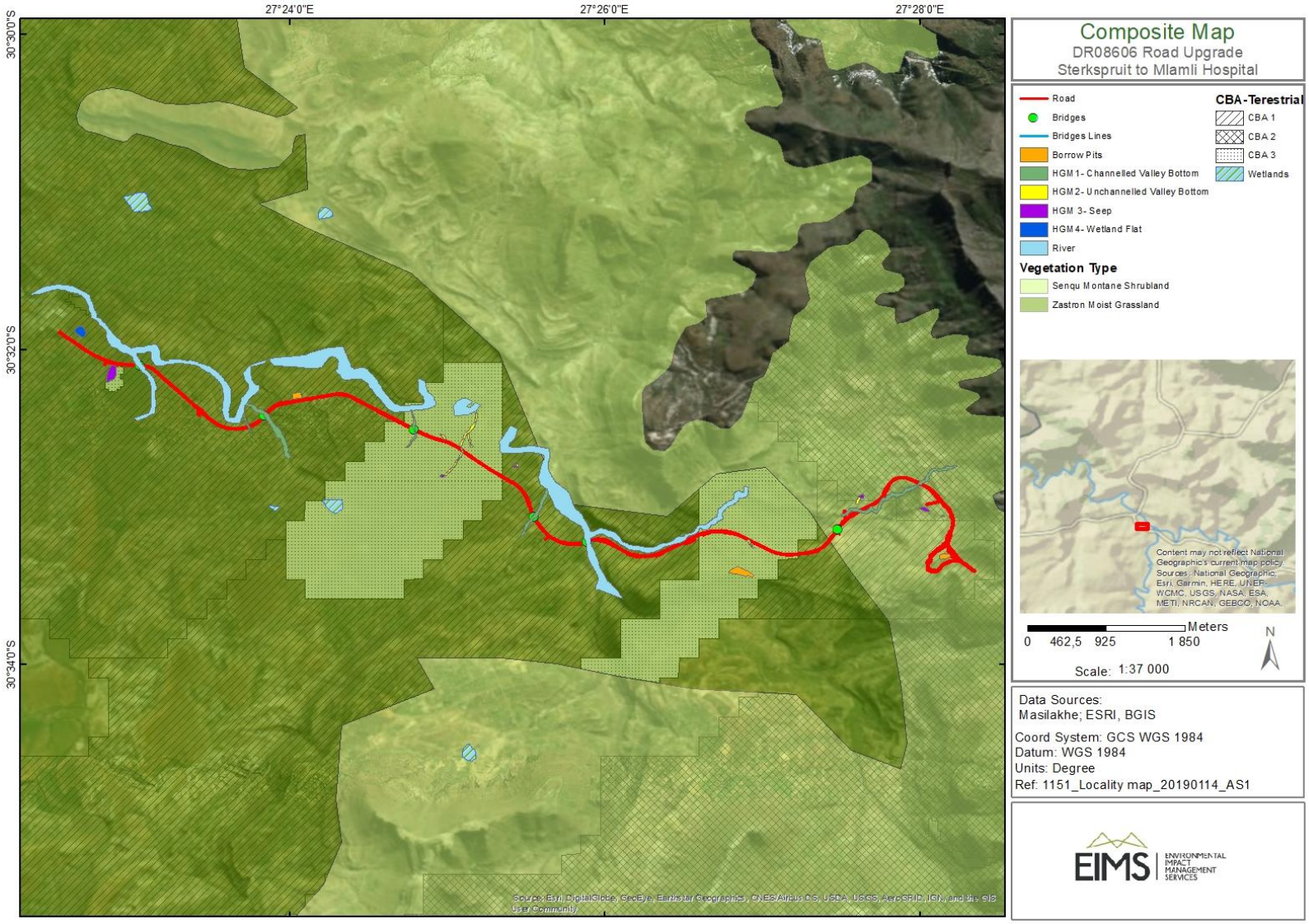

Figure 7: Composite Map