

**PERIODIC MAINTENANCE OF TRUNK ROAD 83/1, KM
25.78 TO KM 34.00 AND KM 48.50 TO KM 58.00, TRUNK
ROAD 83/2 FROM KM 0 TO KM 11,16 AND KM 15.25 TO KM
23.01, MAIN ROAD 365 FROM KM 0 TO KM 14.12, AND
TRUNK ROAD 31/5 FROM KM 0.42 TO KM 0.90, BETWEEN
RIVERSDALE TO LADISMITH**

AMENDED ENVIRONMENTAL MANAGEMENT PROGRAMME

DEA&DP Ref:16/3/3/1/D5/16/0005/22

**(INCLUDING THE WASTE, WATER USE AND ELECTRICITY CONSUMPTION
MINIMIZATION AND MANAGMENT PLAN)**

Prepared for:

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ABREVIATIONS

DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DWS.....	Department of Water and Sanitation
EA	Environmental Authorisation
EAP.....	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EO.....	Environmental Officer
ER.....	Employer's Representative
ESO	Environmental Site Officer
GNEC.....	Guillaume Nel Environmental Consulting
I&AP.....	Interested and Affected Parties

DEFINITIONS

Alien species - Plants and animals which do not arrive naturally in an area - they are brought in by humans. Alien plants often force indigenous species out of the area. Rooikrans is a good example of alien species in the Cape.

Alternative - A possible course of action, in place of another, that would meet the same purpose and need defined by the development proposal. Alternatives considered in the EIA process can include location and/or routing alternatives, layout alternatives, process and/or design alternatives, scheduling alternatives or input alternatives.

Aspect – Element of an organisation's activities, products or services that can interact with the environment.

Auditing - A systematic, documented, periodic and objective evaluation of how well the environmental management programme is performing with the aim of helping to safeguard the environment by: facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.

Biodiversity - The rich variety of plants and animals that live in their own environment. Fynbos is a good example of rich biodiversity in the Cape.

Built environment - Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours.

Conservation - Protecting, using and saving resources wisely, especially the biodiversity found in an area.

Contamination - Polluting or making something impure.

Corrective (or remedial) action - Response required to address an environmental problem that is in conflict with the requirements of the EMPr. The need for corrective action may be determined through monitoring, audits or management review.

Degradation - The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

Ecology - The scientific study of the relationship between living things (animals, plants and humans) and their environment.

Ecosystem - The relationship and interaction between plants, animals and the non-living environment.

Environment - Our surroundings, including living and non-living elements, e.g. land, soil, plants, animals, air, water and humans. The environment also refers to our social and economic surroundings, and our effect on our surroundings.

Environmental Impact Assessment (EIA) - An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of a proposed development. The EIA includes an evaluation of alternatives; recommendations for appropriate management actions for minimising or avoiding negative impacts and for enhancing positive impacts; as well as proposed monitoring measures.

Environmental Management System (EMS) - Environmental Management Systems (EMS) provide guidance on how to manage the environmental impacts of activities, products and services. They detail the organisational structure, responsibilities, practices, procedures, processes and resources for environmental management. The ISO14001 EMS standard has been developed by the International Standards Organisation.

Environmental policy - Statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.

Fynbos - Low-growing and evergreen vegetation found only in the south Western Cape. Fynbos is known for its rich biodiversity.

Habitat - The physical environment that is home to plants and animals in an area, and where they live, feed and reproduce.

Hazardous waste - Waste, even in small amounts, that can cause damage to plants, animals, their habitat and the well-being of human beings, e.g. waste from factories, detergents, pesticides, hydrocarbons, etc.

Impact - A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

Indigenous species - Plants and animals that are naturally found in an area.

Infrastructure - The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage.

Integrated - Mixing or combining all useful information and factors into a joint or unified whole. See Integrated Environmental Management.

Integrated Environmental Management (IEM) - A way of managing the environment by including environmental factors in all stages of development. This includes thinking about physical, social, cultural and economic factors and consulting with all the people affected by the proposed developments. Also called "IEM".

Land use - The use of land for human activities, e.g. residential, commercial, industrial use.

Mitigation - Measures designed to avoid, reduce or remedy adverse impacts

Natural environment - Our physical surroundings, including plants and animals, when they are unspoiled by human activities.

Over-utilisation - Over-using resources - this affects their future use and the environment.

Policy - A set of aims, guidelines and procedures to help you make decisions and manage an organisation or structure. Policies are based on people's values and goals. See Integrated Metropolitan Environmental Policy.

Process - Development usually happens through a process - a number of planned steps or stages.

Proponent – Developer. Entity which applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the Environmental authorisation (EA) and requirements of the EMPr.

Recycling - Collecting, cleaning and re-using materials.

Resources - Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.

Scoping Report - A report presenting the findings of the scoping phase of the EIA. This report is primarily aimed at reaching closure on the issues and alternatives to be addressed in the EIA (in the case of a full EIA process).

Stakeholders - A subgroup of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term includes the proponent, authorities and all interested and affected parties.

Storm water management – Strategies implemented to control the surface flow of storm water such that erosion, sedimentation and pollution of surface and ground water resources in the immediate and surrounding environments are mitigated. This is specifically important during the construction and decommissioning phases of a project.

Sustainable development - Development that is planned to meet the needs of present and future generations, e.g. the need for basic environmental, social and economic services. Sustainable development includes using and maintaining resources responsibly.

Sustainability - Being able to meet the needs of present and future resources.

Waste Management – Classifying, recycling, treatment and disposal of waste generated during construction and decommissioning activities.

Wetlands - An area of land with water mostly at or near the surface, resulting in a waterlogged habitat containing characteristic vegetation species and soil types e.g. vleis, swamps.

Zoning - The control of land use by only allowing specific type development in fixed areas or zones

REFERENCES

DEAT (1992) Integrated Environmental Management Guideline Series, Volumes 1-6, Department of Environmental Affairs, Pretoria.

DEAT (2004a) Environmental Management Plans, Integrated Environmental Management, Information Series 12, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

Department of Environmental Affairs and Development Planning Generic Environmental Management Plan Guideline, prepared by Strategic Environmental Focus, 2007

FEN Ecological Network (FEN) Consulting (Pty) Ltd., 2021. Freshwater ecological verification and DWS risk Assessment for the proposed maintenance activities associated with various maintenance activities associated with various roads near Ladismith and Riversdale, Western Cape Province.

Lochner, P. 2005. Guideline for Environmental Management Plans. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

National Environmental Management Act 107 of 1998 (NEMA).

Scientific Terrestrial Services, 2021, Terrestrial, Plant and Animal Sensitivity Verification and Impact assessment for the proposed periodic maintenance activities associated with various roads near Ladismith and Riversdale, Western Cape Province.

SECTION 1 - INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION AND BACKGROUND

The Western Cape Government: Department of Transport and Public Works, as proponent of the proposed maintenance will use this Planning, Construction and Operational Phase Environmental Management Programme (EMPr) as a tool in managing the impacts of the proposed periodic maintenance of the mentioned roads, after environmental approval from the Department of Environmental Affairs and Development Planning (DEA&DP) in terms of the **NEW** Environmental Impact Assessment Regulations (GN R. No. 983, GN R. No. 984 and GN R. No. 985 [4 December 2014, as amended 07 April 2017]) under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), is obtained.

This document is based on the EMPr Guideline provided by DEA&DP which was compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development (DEAT, 1992). IEM is a key instrument of the National Environmental Management Act [NEMA] (Act No. 107 of 1998). NEMA promotes the integrated environmental management of activities that may have a significant effect on the environment, while IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental and management tools that are appropriate for the various levels of decision-making. One such tool is an Environmental Management Programme (EMPr).

The IEM guidelines intend encouraging a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels. The basic principles underpinning IEM are that there be:

- informed decision-making;
- accountability for information on which decisions are taken;
- accountability for decisions taken;
- a broad meaning given to the term environment (i.e. one that includes physical, biological, social, economic, cultural, historical and political components);
- an open, participatory approach in the planning of proposals;
- consultation with interested and affected parties;
- due consideration of alternative options;
- an attempt to mitigate negative impacts and enhance positive aspects of proposals;
- an attempt to ensure that the 'social costs' of development proposals (those borne by society, rather than the developers) be outweighed by the 'social benefits' (benefits to society as a results of the actions of the developers);
- democratic regards for individual rights and obligations;

- compliance with these principles during all stages of the planning, implementation and decommissioning of the proposals (i.e. from ‘cradle to grave’), and
 - The opportunity for public and specialist input in the decision-making process.
- These principles are in line with NEMA, which has repealed a number of the provisions of the Environment Conservation Act, 1989 [ECA] (Act No. 73 of 1989), and is focussed primarily on co-operative governance, public participation and sustainable development. The Environmental Impact Assessment Regulations that took effect in July 2006 regulate the procedures and criteria for the submission, processing, consideration and decision on applications for environmental authorisation of listed activities.

1.2 SCOPE AND TERMS OF REFERENCE

The general principles contained within this document apply to all **PRE-CONSTRUCTION, CONSTRUCTION AND OPERATIONAL** activities.

Principles of this EMPr

This EMPr is compiled using the following concepts and implementation requirements so that the higher principles of sustainable development are realised:

- **Continuous improvement.** The project proponent (or implementing organisation) must be committed to review and to continually improve environmental management, with the objective of improving overall environmental performance.
- **Broad level of commitment.** A broad level of commitment will be required from all levels of management as well as the workforce in order for the development and implementation of this EMPr to be successful and effective.
- **Flexible and responsive.** The implementation of the EMPr must be responsive to new and changing circumstances, i.e. rapid short-term responses to problems or incidents. The EMPr is a dynamic “living” document and thus regular planned review and revision of the EMPr must be carried out.
- **Integration across operations.** This EMPr is integrated across existing line functions and operational units such as health, safety and environmental departments in a company/project. This is done to change the redundant mindset of seeing environmental management as a single domain unit.
- **Legislation.** It is understood that any development project during its construction phase is a dynamic activity within a dynamic environment. The Developer, Engineer, Contractor and sub-contractor must therefore be aware that certain activities conducted during construction may require further licensing or environmental approval, e.g. river or stream diversions, bulk fuel storage, waste disposal, etc. The Contractor must consult the ER, EO and ECO on a regular basis in this regard.

SECTION 2 – SITE SPECIFIC INFORMATION

2.1 PROPOSED ACTIVITY AND LOCAL CONTEX

Introduction and Background

The proposed periodic maintenance of Trunk Road 83/1, Trunk Road 83/2, Trunk Road 31/5 and Main Road 365 is located between Riversdale and Ladismith in the Oudtshoorn area and is maintained by the Garden Route District Municipality on behalf of the Western Cape Government: Department of Transport and Public Works. Riversdale is situated on the N2 National Road and is approximately 350 kilometers east of Cape Town. The total distance between Riversdale and Ladismith is roughly 82 kilometers. The dominant land-use activity along the TR83/1, TR83/2, TR31/5 and MR365 route relates to agricultural activities.

MPA Mot (Pty) Ltd., on behalf of the Western Cape Government: Department of Transport and Public Works, appointed Guillaume Nel Environmental Consultants (GNEC) to conduct a Basic Assessment Process for the proposed Periodic Maintenance of TR83/1, TR83/2, TR31/5 and MR365.

The proposed maintenance will include maintenance repairs such as:

- General maintenance;
- Erosion control;
- Surface patching;
- Repair of base failure
- Culvert maintenance
- Bridge maintenance; and
- Repairs.

Project Proposal

The proposed maintenance will take place within the the following roads:

1. Trunk Road 83/1 from km 25.78 to km 34.00;
2. Trunk Road 83/1 from km 48.50 tom km 58.00;
3. Trunk Road 83/2 from km 15.25 to km 23.01;
4. Trunk Road 83/2 from km 0.00 to km 11.16;
5. Main Road 365 from km 0.00 to km 14.12 and
6. Trunk Road 31/5 from km 0.42 to km 0.90.

The total length of the road being repaired is 51.24 kilometers.

The mentioned roads are located within the Garden Route area, being partially located in both Hessequa and Kannaland Municipal areas of jurisdiction, as well as being partially located within the Riversdale and Ladismith Administrative Regions.

According to the Contract Document Book compiled by the Western Cape Government: Department of Transport and Public Works (October 2020), the periodic maintenance entails repair to the existing pavement defects of the mentioned roads, which will also include maintenance such as surface patching, functional patching, base repairs, rut filling, edge break repairs, crack sealing, repair of eroded shoulders, together with the necessary layer works and texture treatment with a fine slurry (FEN Consulting, 2021). After all the maintenance work have been completed, it is proposed that the resealing of the roads will be applied using a bitumen rubber single seal consisting of a 14 mm stone.

TR83/1, TR83/2, TR31/5 and MR365 (The indicated sections) are existing surfaced roads with stormwater infrastructure being present at different locations along the road to ensure that stormwater is adequately attenuated and dispersed. Some of these stormwater structures require maintenance.

There are approximately 199 minor concrete pipe culverts passing under the road of which 10 are Armco pipes of varying diameters. Generally, all the culvert inlets and outlets need to be cleaned, and many culvert barrels need to be cleaned out as they are blocked. The culverts will therefore be repaired and cleaned. Erosion protection measures are needed on steep gradients or where erosion has taken place. Some 600mm diameter culverts will be installed under some of the farm and local accesses to improve longitudinal drainage. Proper concrete headwalls, wingwalls and aprons are needed to replace the existing masonry structures, which are mainly in poor condition.

The proposed maintenance period will take approximately 22 months to complete.

The listed activities in term of the National Environmental Management Act (NEMA) EIA Regulations, 2014 (as amended) for the proposed maintenance work are triggered by the construction activities taking place within the watercourses on the site. There are a number of watercourse structures included in the scope of works. These include:

TR83/1

4 Bridges and 6 large Armco type **culverts**

- **Bridge 5090:** TR 83/1 at km 52.91

The existing bridge is a 4 span simply supported in-situ concrete structure of which each span is 5m in length. Vegetation overgrowth and silt deposits are to be removed to ensure the free flow of water. Vertical cracks, where moisture is evident, greater than 2.5mm in the abutments, wingwalls and piers are to be neatly cut open (in the form of a v-notch), sealed by crack injection and the v-

notch repaired with cementitious repair compound. Cracks smaller than 2.5mm to be sealed using crack injection. Weep holes are to be cleaned out at both abutments. Gabion mattresses are to be installed along the foundation footprint to avoid further scouring. The quantity of gabions and riprap will exceed 10 m³ - thus triggering a listed activity. Expansion movement joints at the piers and abutments are to be replaced with Thorma joints.

- **Bridge 5007: TR 83/1 at km 54.00**

The existing bridge is a 10No. 21m span simply supported curved in-situ concrete monolithic beam and slab structure on a 45-degree skew. Vegetation overgrowth and debris deposits on the foundations are to be removed to ensure the free flow of water. Vertical and horizontal cracks in the abutment, piers, wingwalls and deck, exceeding 2.5mm in width, are to be neatly cut open (in the form of a v-notch), sealed by crack injection with an approved epoxy and the v-notch repaired with cementitious repair compound. Cracks smaller than 2.5mm to be sealed using crack injection. Dump rock riprap shall be neatly placed around the piles to prevent further scouring and erosion. The quantity of riprap will exceed 10 m³ - thus triggering a listed activity. The deck soffit surface (concrete) shall be cleaned using a high-pressure water jet to establish the cause of efflorescence and then sealed with an approved cementitious repair compound. Damaged concrete areas to piers, deck and parapets are to be neatly cut out, reinforcement cleaned of all oxidation and treated with a noncorrosive compound, then reinstated with a cementitious repair compound. Concrete spalling is to be repaired with an epoxy repair mortar to prevent further aggregate loss and exposure. Expansion movement joints at the piers and abutments are to be replaced with Thorma joints.

- **Bridge 4837: TR 83/1 at km 57.49**

The existing bridge is an 8 span simply supported in-situ concrete monolithic beam and slab structure consisting of 13m spans. Dense vegetation overgrowth and debris deposits are to be removed to ensure the free flow of water. Vertical cracks in excess of 2.5mm in abutments, piers, wingwalls and the deck are to be neatly cut open (in the form of a v-notch), sealed by crack injection with an approved epoxy and the v-notch repaired with cementitious repair compound. Cracks smaller than 2.5mm to be sealed using crack injection. Backfilling is required with suitable imported materials and dump rock riprap shall be neatly placed around the piers and abutments to prevent further scouring and erosion. The quantity of riprap will exceed 10 m³ - thus triggering a listed activity.

Damaged and spalled concrete areas to piers, abutments, wingwalls, deck and parapets are to be neatly cut-out, reinforcement cleaned of all oxidation and treated with a non-corrosive compound, then repaired with a cementitious repair compound. Joints at abutments and deck are to be clearly separated at their interface. All concrete spalling is to be repaired with an epoxy repair

mortar to prevent further aggregate loss and exposure. Expansion movement joints at the piers and abutments are to be replaced with Thorma joints.

- **Bridge 4838:** TR 83/1 at km 57.61

The existing bridge is a 2 span simply supported in-situ concrete monolithic beam and slab structure consisting of 13m spans. Dense vegetation overgrowth and debris deposits are to be removed to ensure the free flow of water. Vertical and horizontal cracks in the abutments and wingwalls, in excess of 2.5mm, are to be neatly cut open (in the form of a v-notch), sealed by crack injection with an approved epoxy and the v-notch repaired with cementitious repair compound. Cracks smaller than 2.5mm to be sealed using crack injection. Backfilling is required with suitable imported materials and dumped rock riprap shall be neatly placed around the piers and abutments to prevent further scouring and erosion. The quantity of riprap will exceed 10 m³ - thus triggering a listed activity. Expansion movement joints at the pier and abutments are to be replaced with Thorma joints. All road drains to be cleared.

- **Culvert 10875:** TR 83/1 at km 26.24

Dense vegetation at the inlet and outlet are to be removed and trimmed and silt deposits inside the barrel are to be removed and carted to spoil. The clearing of the vegetation and silt from the culvert can be described as maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with the Maintenance Management Plan (MMP).

- **Culvert 10874:** TR83/1 at km 29.99

The existing structure is a double cell Armco drainage culvert with an approximate 3.7 m wide x 3.0 m high opening. The overall culvert length is approximately 35.0 m. Dense vegetation at the inlet and outlet is to be trimmed and removed, and silt deposits inside the barrel are to be removed and carted to spoil. Dump rock is to be neatly packed at the inlet to prevent further scouring and erosion. The quantity of riprap will exceed 10 m³ - thus triggering a listed activity. New guardrails as per the WCG Standard Plans are to be installed for safety requirements. The clearing of the vegetation and silt from the culvert can be described as maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with the Maintenance Management Plan (MMP).

- **Culvert 10692:** TR 83/1 at km 30.63

The existing structure is a single cell Armco drainage culvert with an approximate circular diameter of 1.85m. The overall length is approximately 21.3m. The ends of the Armco panels are exposed and are additionally not supported on a concrete slab. The Armco panels are nevertheless in a fair condition with minimal corrosion damage to the joints and panels. There is

an accumulation of debris and silt deposits within the barrel and there is dense vegetation overgrowth in the waterways due to a lack of maintenance. The existing head and wingwalls are stone pitched and they are in a fair condition. The existing in-situ concrete apron slabs at both the inlet and outlet have a loss of aggregates and require rehabilitation. There are no guardrails for the culvert, which increases the associated safety risk towards road users. The clearing of the vegetation and silt from the culvert can be described as maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with the Maintenance Management Plan (MMP).

- **Culvert un-numbered:** TR83/1 at km 49.97

General maintenance will take place. The clearing of the vegetation and silt from the culvert can be described as maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with the Maintenance Management Plan (MMP).

- **Culvert 10089:** TR 83/1 at 50.82

The existing structure is a single cell Armco drainage culvert with an approximate 4.9m wide x 4.9m high opening. The overall length is approximately 25.85m. Dense vegetation and debris is to be removed and carted to spoil. Gabion baskets are to be installed along the waterway and embankments to prevent further scouring and erosion. The gabion baskets will exceed 10 m³ and therefore triggers a listed activity. The Armco barrel walls are to be cleaned, affected corroded areas painted with a cold galvanized paint and the entire internal surface area is to be painted with a mastic asphalt coating to prevent further corrosion. The cracks less than 2.5mm in the sloping headwall are to be sealed by injection and cracks greater than 2.5mm are to be cut back with a v-notch and sealed with cementitious repair compound. New guardrails as per the WCG Standard Plans manual are to be installed for safety requirements.

- **Culvert 10360:** TR 83/1 at km 52.61

The existing single cell Armco drainage culvert is 3.2m wide x 2.1m high structure in very poor condition. There is significant chemical attack and corrosion evident in the walls and roof of the Armco structure. The culvert is to be repaired by placing a new prefabricated concrete pipe within the existing culvert and the remaining space to be filled with self-compacting concrete. The hydraulic information indicates that an 1800mm concrete pipe is sufficient. The length of the new culvert is to be confirmed on site. A new headwall, apron slab and wingwalls are to be constructed at the outlet and new gabion mattresses are to be installed to prevent further scouring and erosion. The new gabions, headwall, wingwalls and apron slabs will exceed 10 m³ and therefore a listed activity is triggered.

- **Culvert 10867:** TR 83/1 at 55.19

The existing structure is a single cell, in-situ portal drainage culvert with an approximate opening of 3.2m wide x 2.0m high. The overall length is approximately 12.8m. Vegetation is to be cleared and debris is to be removed. The existing deck at both the inlet and outlet are to be demolished and reconstructed with a raised headwall. New guardrails as per the WCG Standard Plans are to be installed for safety requirements. The total disturbance will be less than 10 m³ and therefore no listed activities are triggered by the proposed maintenance activities.

TR 83/2

2 **Bridge** and 4 concrete culverts:

- **Bridge 5359:** TR 83/2 at km 6.73

The existing bridge is a 4 span simply supported in-situ concrete deck slab structure of with 10.6m spans. Clear vegetation and remove all debris from the waterway. Clean all scuppers and abutment weep holes. Replace existing expansion joints with Thorma joints. Cracks greater than 2.5mm are to be cut back and repaired with a cementitious repair compound and cracks less than 2.5mm are to be sealed by injection with an approved epoxy. The clearing of the vegetation and silt from the culvert can be described as maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with the Maintenance Management Plan (MMP).

- **Bridge 5490:** TR83/2 at km 15.56

The existing bridge is a 7-span prestressed, continuous concrete deck slab consisting of 12.5m spans. The structure is in good condition with minor repairs required. Crack in deck slab to be sealed by injection with an approved epoxy. Seal all damaged concrete with epoxy repair mortar. All road drains and existing joints to be unblocked and cleaned. The total disturbance will be less than 10 m³ and therefore no listed activities are triggered by the proposed maintenance activities. The proposed maintenance does not require any approvals in terms of the NEMA EIA Regulations, 2014 (as amended).

- **Culvert 10972:** TR 83/2 at km 9.32

The existing structure is a single portal, cast in-situ concrete structure with a deck slab supported on in-situ RC walls. The culvert opening is 3.0m wide with an approximate height of 1.7m. The overall culvert length is approximately 20.7m. Clear out the dense vegetation and remove debris from the waterway. Regrade the banks at a slope of 1:1.5 to prevent material spillover. All scuppers and weepholes to be cleared. Clear out the dense vegetation and remove debris from the waterway. The clearing of the vegetation and silt from the culvert can be described as

maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with the Maintenance Management Plan (MMP).

- **Culvert** 10976: TR83/2 at km 19.93

The existing culvert is a single portal, cast in-situ concrete structure. The culvert opening is approximately 3.9m wide and 2.0m high. Vegetation at wingwalls is to be removed and gabion boxes installed to prevent further scour. Gabion mattresses are to be installed in outlet waterway to prevent further scour and erosion. The new gabion mattresses will not exceed 10m³ and therefore does not trigger a listed activity. Spalled and damaged concrete areas to deck are to be neatly cut out, reinforcement cleaned of all oxidation and treated with a non-corrosive compound, then reinstated with a cementitious repair compound. All weepholes are either entirely or partially buried and must be fully exposed and cleared. Cracks greater than 2.5mm are to be cut back and repaired with a cementitious repair compound and cracks less than 2.5mm are to be sealed by injection with an approved epoxy. New guardrails as per the WCG Standard Plans are to be installed for safety requirements. The clearing of the vegetation and silt from the culvert can be described as maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with the Maintenance Plan (MMP).

- **Culvert** un-numbered: TR83/2 at km 20.37

The existing culvert is a minor single portal, cast in-situ concrete structure. The culvert opening is approximately 2.0m wide and 2.0m high. Vegetation overgrowth is to be cleared at the inlet and sediment build up removed in waterway. New gabion boxes are to be installed in outlet waterway to prevent further scour. The new gabion boxes will not exceed 10 m³ and therefore does not trigger a listed activity. Damaged concrete areas to deck are to be neatly cut out, reinforcement cleaned of all oxidation and treated with a non-corrosive compound, then reinstated with a cementitious repair compound. All weepholes are either entirely or partially buried and must be fully exposed and cleared. Cracks greater than 2.5mm are to be cut back and repaired with a cementitious repair compound and cracks less than 2.5mm are to be sealed by injection with an approved epoxy. The clearing of the vegetation and silt from the culvert can be described as maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with the Maintenance Management Plan (MMP).

- **Culvert** 10977: TR83/2 at km 22.25

The existing culvert is a double cell portal, cast in-situ concrete structure. Each cell's openings are approximately 2.9m wide and 2.9m high. New guardrails as per the WCG Standard Plans are to be installed for safety requirements. Vegetation overgrowth is to be cleared at the inlet. Excessive erosion is evident in the eastern cell due to the rerouting of the waterway by a vagrant living in the

western cell. The eastern cell is to be partially backfilled and the natural waterway reinstated. The vagrant is to be removed from the western cell. Damage and spalling of deck edge to be neatly cut out, reinforcement cleaned of all oxidation and treated with a noncorrosive compound, then reinstated with a cementitious repair compound or concrete. Crack at deck/abutment interface to be sealed and joint to be reinstated to allow for movements. Cracks greater than 2.5mm are to be cut back and repaired with a cementitious repair compound and cracks less than 2.5mm are to be sealed by injection with an approved epoxy. The clearing of the vegetation and silt from the culvert can be described as maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with the Maintenance Management Plan (MMP).

MR 365

2 Bridges and 3 large in- situ concrete culverts

- **Bridge 9061: MR 365 at km 3.30**

The existing bridge is a single cellular cast in-situ concrete structure with a deck slab supported on abutment walls. The opening is 7.8m wide with an approximate height of 3.5m. Clear vegetation adjacent the wingwalls and remove debris in the waterway. Damaged deck edge to be neatly cut out, reinforcement cleaned of all oxidation and treated with a non-corrosive compound, then reinstated with a cementitious repair compound or concrete. Cracks greater than 2.5mm are to be cut back and repaired with a cementitious repair compound and cracks less than 2.5mm are to be sealed by injection with an approved epoxy. Regrade existing backs to a slope of 1:1.5 to avoid material spillover. Damaged area at abutment and wingwall to be demolished, reinforcement to be exposed and portion to be recast. Joint between crack and abutment to be reinstated to ensure cracking does not reoccur. New guardrails as per the WCG Standard Plans are to be installed for safety requirements. Roadway cracks to be sealed. The replacement of the wingwalls relates to the Like for Like replacement of infrastructure and does not trigger a listed activity. Additionally, less than 10 m³ of material will be disturbed as part of the maintenance activities and therefore no approvals in terms of the NEMA EIA Regulations, 2014 (as amended) are required for the proposed maintenance activities.

- **Bridge 4515: MR 365 at km 13.10**

The existing bridge is a 3 span simply supported cast in-situ concrete deck slab structure consisting of 9.8m spans. Clear vegetation in the waterway and cart to spoil. Excavate, shape and remove boulders from within the waterway to match original design level. Replace existing deck movement joints with thorma joints, at piers and at abutments. Spalling of parapet to be neatly cut out, reinforcement cleaned of all oxidation and treated with a non-corrosive compound, then reinstated with a cementitious repair compound or concrete. Remove damaged deck edge and repair with approved cementitious repair compound. Cracks in excess of 2.5mm, are to be

neatly cut open (in the form of a v-notch), sealed by crack injection with an approved epoxy and the v-notch repaired with cementitious repair compound. Seal all cracks less than 2.5mm in with, with an approved epoxy by crack injection. All weep holes in the abutments to be cleared. The proposed maintenance relates to the shaping of the watercourse can be described as maintenance activities and does not trigger a listed activity as the maintenance will be conducted in line with Maintenance Management Plan (MMP).

- **Culvert 10969:** MR 365 at km 4.54

The existing structure is a single cell, in-situ portal drainage culvert with an approximate 5.5m wide x 2.1m high opening. The overall length is approximately 12.0m. Vegetation is to be cleared and carted to spoil. Repair all vertical cracks in walls, wingwalls and deck in excess of 2.5mm, are to be neatly cut open (in the form of a v-notch), sealed by crack injection with an approved epoxy and the v-notch repaired with cementitious repair compound. Seal all cracks less than 2.5mm in with, with an approved epoxy by crack injection. Remove damaged deck edge and repair with approved cementitious repair compound. Crack between abutment and slab to be reinstated to avoid further restraint cracking. New guardrails as per the WCG Standard Plans are to be installed for safety requirements. The total disturbance will be less than 10 m³ and therefore no listed activities are triggered by the proposed maintenance activities. The proposed maintenance does not require any approvals in terms of the NEMA EIA Regulations, 2014 (as amended).

- **Culvert 10970:** MR 365 at km 5.57

The existing structure is a single cell, in-situ portal drainage culvert with an approximate 5.2m wide x 2.7m high opening. The overall length is approximately 12.0m. Clear all vegetation from the waterway and cart to spoil. Repair all cracks in walls, wingwalls and deck in excess of 2.5mm, are to be neatly cut open (in the form of a v-notch), sealed by crack injection with an approved epoxy and the v-notch repaired with cementitious repair compound. Seal all cracks less than 2.5mm in with, with an approved epoxy by crack injection. Install new guardrails as per the WCG Standard Plans for safety requirements. The total disturbance will be less than 10 m³ and therefore no listed activities are triggered by the proposed maintenance activities. The proposed maintenance does not require any approvals in terms of the NEMA EIA Regulations, 2014 (as amended).

- **Culvert 10971:** MR 365 at km 8.33

The existing structure is a single cell, in-situ portal drainage culvert with an approximate 3.7m wide x 3.0m high opening. The overall length is approximately 11.2m. Remove all debris from the waterway. Install new gabion boxes and mattresses in the waterway and embankments. The new gabion boxes and mattresses will exceed 10 m³ and therefore a listed activity is triggered. Deviate

existing services. Missing culvert number to be replaced. Repair all cracks in walls and wingwalls in excess of 2.5mm, are to be neatly cut open (in the form of a v-notch), sealed by crack injection with an approved epoxy and the v-notch repaired with cementitious repair compound. Seal all cracks less than 2.5mm in with, with an approved epoxy by crack injection. Install new guardrails as per WCG Standard Plans for safety requirements.

TR31/5

- **Culvert** Unknown Number: TR31/5 at km 0.7

Vegetation clearing and removal of debris from the culvert. Less than 10 m³ of material will be disturbed as part of the maintenance activities and therefore no approvals in terms of the NEMA EIA Regulations, 2014 (as amended) are required for the proposed maintenance activities.

Terrestrial Biodiversity

According to the Screening Tool Report, the overall terrestrial sensitivity for the roads is considered of Very High sensitivity. Scientific Terrestrial Services (STS) conducted a Terrestrial, Plant and Animal Sensitivity Verification and Impact Assessment and noted that portions of the roads are considered of low sensitivity.

The site's vegetation along the route is mapped to have the following vegetation types:

- FRs13 Eastern Ruens Shale Renosterveld
- FFc1 Swellendam Silcrete Fynbos
- FFs16 South Langeberg Sandstone Fynbos
- FFb4 Central Coastal Shale Band Vegetation
- FFs15 North Langeberg Sandstone Fynbos
- FFh8 Montagu Shale Fynbos
- SKv10 Little Karoo Quartz Vygieveld
- FRs7 Montagu Shale Renosterveld
- AZi8 Muscadell Riviere
- SKv8 Western Little Karoo
- SKv9 Western Gwarrieveld

According to STS (2021), the habitat of the area is associated with the identified roads and is highly fragmented and located within the existing public road reserve. Therefore, historically and at present, the road infrastructure has led to the transformation of vegetation and habitat. Habitat associated with the locations of major road crossings (culvert crossings) might still contain some indigenous vegetation. The identified roads fall within seven vegetation types, as confirmed by STS (2021):

1. **Little Karoo Quartz Vygieveld** (Least Concern): Flat and slightly undulating plains covered by open, low vegetation dominated by fruticose or compact lead-succulent dwarf members of Aizoaceae (*Gibbaeum*), Crassulaceae and Euphorbiaceae, accompanied by non-succulent acaesous shrubs and dwarf shrubs.
2. **Matjiesfontein quartzie fynbos** (Least Concern): Low flat mountains and parallel ridges in a west-east orientation. Fynbos and Succulent Karoo vegetation. It is a medium dense, medium tall shrubland.
3. **Montagu Shale Renosterveld** (Least Concern): Undulating hilly landscape with broad valleys supporting a complex open, tall shrubland in a medium dense matrix of short, divaricate shrubs.
4. **Muscadel Riviere** (Endangered): Flat, in places very broad alluvia originally supporting complex of riverine thickets dominated by *Acacia karoo* and accompanying succulent gannabos (*Salsola species*) and low vygie shrublands.
5. **North Langeberg Sandstone Fynbos** (Least Concern): Gentle to steep, north-facing slopes, not much dissected over much of the range. Surface is gently sloping foothills of Waboomsberg, Warmwaterberg and Aasvoëlberg.
6. **Western Gwarrieveld** (Least Concern): Low hilly country supporting low Succulent Karoo shrublands, peppered with solitary trees and tall shrub group (*Euclea*, *Lycium*, *Pappea*, *Rhus*).
7. **Western Little Karoo** (Least Concern): Flat or slightly undulating landscapes dominated by a mosaic of Karoo shrublands of low and medium height encompassing (as dominants) both nonsucculent (*Chrysocoma*, *Pentzia*, *Pteronia*, *Rhigozum*, *Tripteris*) as well as succulent (*Crassula*, *Euphorbia*, *Ruschia*, *Tylecodon*) shrubs.

It should be noted that the road sections are surfaced with stormwater infrastructure present. According to Scientific Terrestrial Services (2021), the habitat associated with the identified roads is highly fragmented and located within an existing public road. Therefore, historically and at present, the road infrastructure has led to the transformation of vegetation and habitat. STS also noted that the conditions within the road reserve are suboptimal for Species of Conservation Concern (SCC) fauna and flora due to a lack of suitable habitat and habitat fragmentation.

STS found that the direct impact of the proposed maintenance on the floral ecology of the site is anticipated to vary between low and very low with the implementation of the mitigation measures. Additionally, the proposed maintenance is anticipated to have a very low impact on faunal communities.

Freshwater

According to the specialist study conducted by Freshwater Ecological Network (FEN) Consulting, the watercourses identified to be traversed by the identified roads are all riparian watercourses and no wetlands were identified along the route. The riparian watercourses are predominantly

ephemeral drainage lines with riparian vegetation and larger ephemeral river systems with smaller associated tributaries. Due to the historical construction of the roads requiring maintenance activities and current surrounding agricultural land uses, degradation to the ecological integrity of these watercourses were evident (FEN, 2021).

The existing road crossings (culvert and bridges) were the most prevalent impact affecting the hydrology of the watercourses, second to the erosion of the embankments of the watercourses (specifically at the outlets of the road crossings).

It should be mentioned that not all culverts requiring periodic maintenance are associated with a watercourse. Some culverts convey stormwater from upstream to downstream areas while others allow for spill over water from impoundments. FEN Consulting confirmed that the risk significance of the proposed maintenance to the watercourses are low, should the mitigation measures be implemented. A Water Use Authorisation (in the form of a General Authorisation) will be submitted to the Department of Water and Sanitation in terms of Section 21 of the National Water Act, 1998 (Act No. 36 of 1998).

According to FEN Ecological Consulting (2021), due to the proposed periodic maintenance activities occurring in the existing road reserve and the degraded nature of the watercourses, there is no anticipated irreplaceable loss to the watercourses already traversed by the identified roads.

Please refer to **Addendum H** for the Rehabilitation and Alien Clearing Management Plan compiled by GNEC for the proposed upgrade activities at the storm water infrastructures associated with watercourses.

Geology

The dominant underlying rock formations along the route are mainly, sedimentary rocks from the Witteberg Group. From kilometres 15.25 of TR83/2, the first 34% of the route borders the Traka and Weltevrede subgroups with the next 33% of the route falling within the Weltevrede Subgroup and therefore the last 33% falls within the Traka Subgroup. The Weltevrede Subgroup only has the Swartruggens Formation present. The Swartruggens Formation comprises of shale and siltstone with micaceous sandstone beds.

Heritage

No impacts are expected on any heritage or visual resources on site. The site is zoned for Transport purposes and has been previously disturbed due to activities such as previous road construction, ongoing road maintenance and ongoing erosion. No heritage resources were identified on site. A Notice of Intent to Develop (NID) application was submitted to Heritage Western Cape in terms of Section 38 of the National Heritage Resources Act, 1999 (Act No. 25 of

1999). Heritage Western Cape's response on the 16th of April 2021 was that *"since there is no reason to believe that the proposed maintenance and upgrades of various roads. 1. Trunk Road 83/1 from km 25.78 to km 34.00, 2. Trunk Road 83/1 from km 48.50 to km 58.00, 3. Trunk Road 83/2 from km 0.00 to km 11.16, 4. Trunk Road 83/2 from km 15.25 to km 23.01, 5. Main Road 365 from km 0.00 to km 14.12, 6. Trunk Road 31/5 from km 0.42 to km 0.90, Riversdale and Ladismith will impact on heritage resources, no further action under Section 38 of the National Heritage Resources Act (Act 25 of 1999) is required"*.

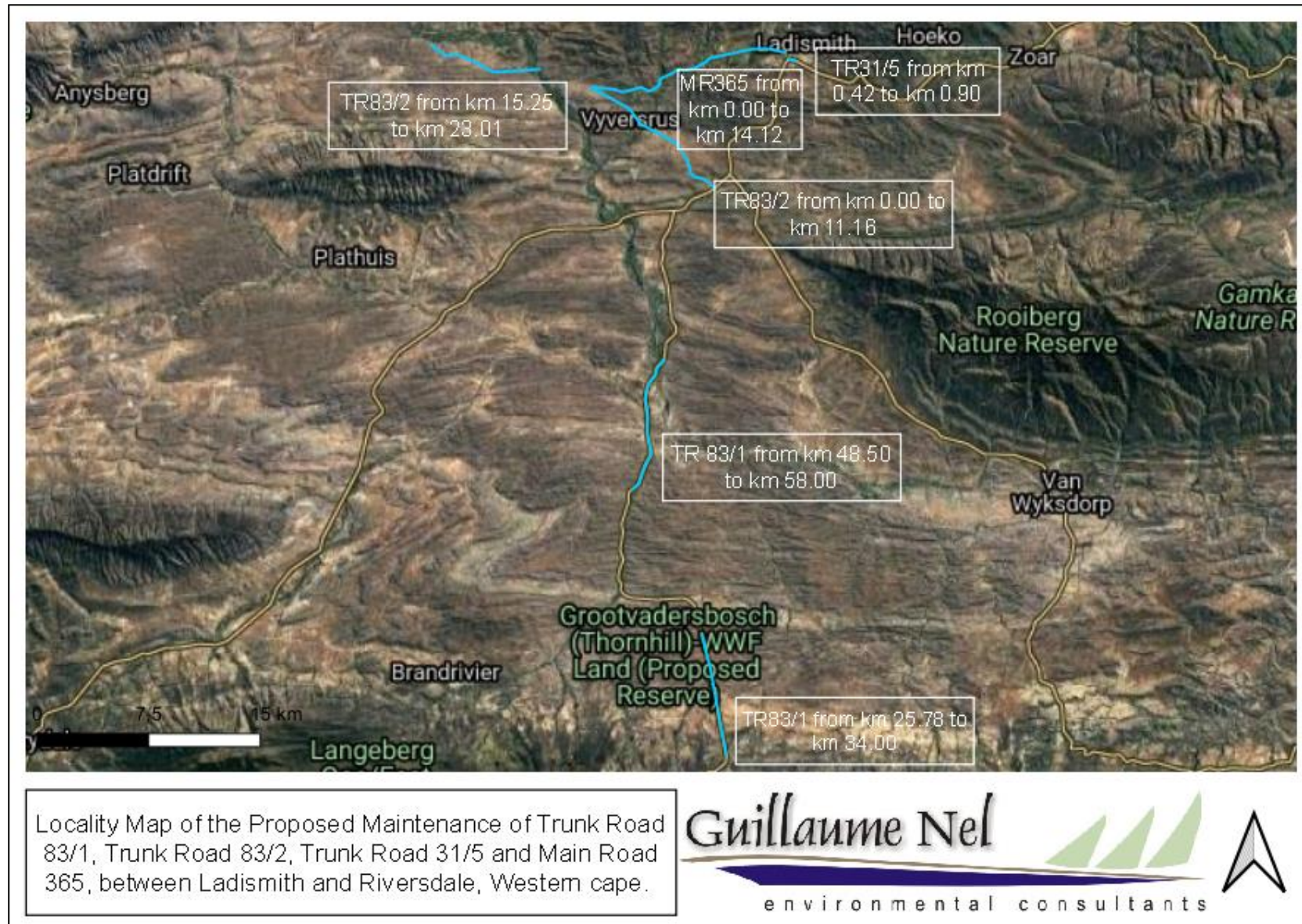


Figure 1: Locality Map of the mentioned roads between Ladismith and Riversdale, Western Cape.

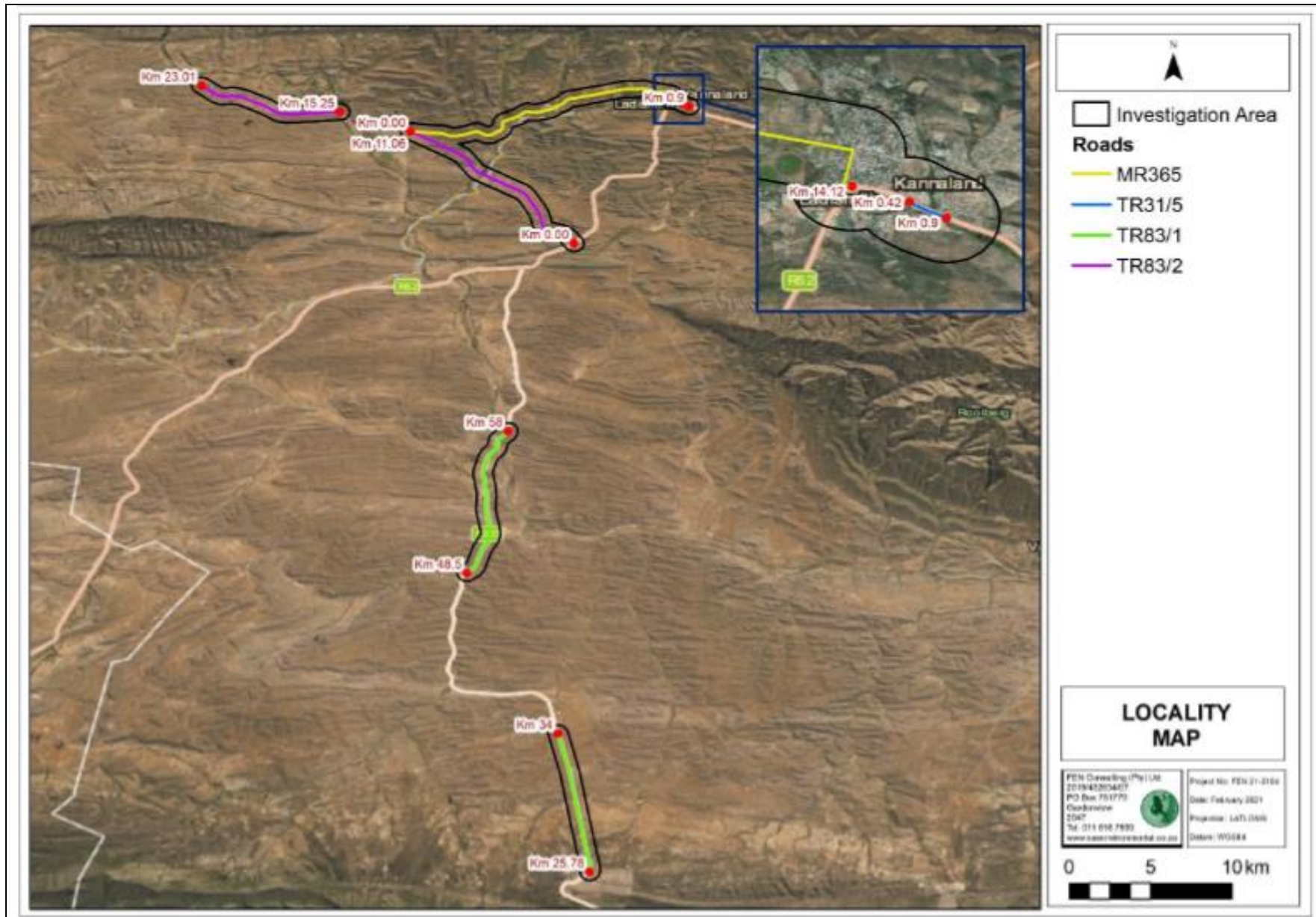


Figure 2: Digital satellite image depicting the identified roads requiring periodic maintenance (FEN, 2021).

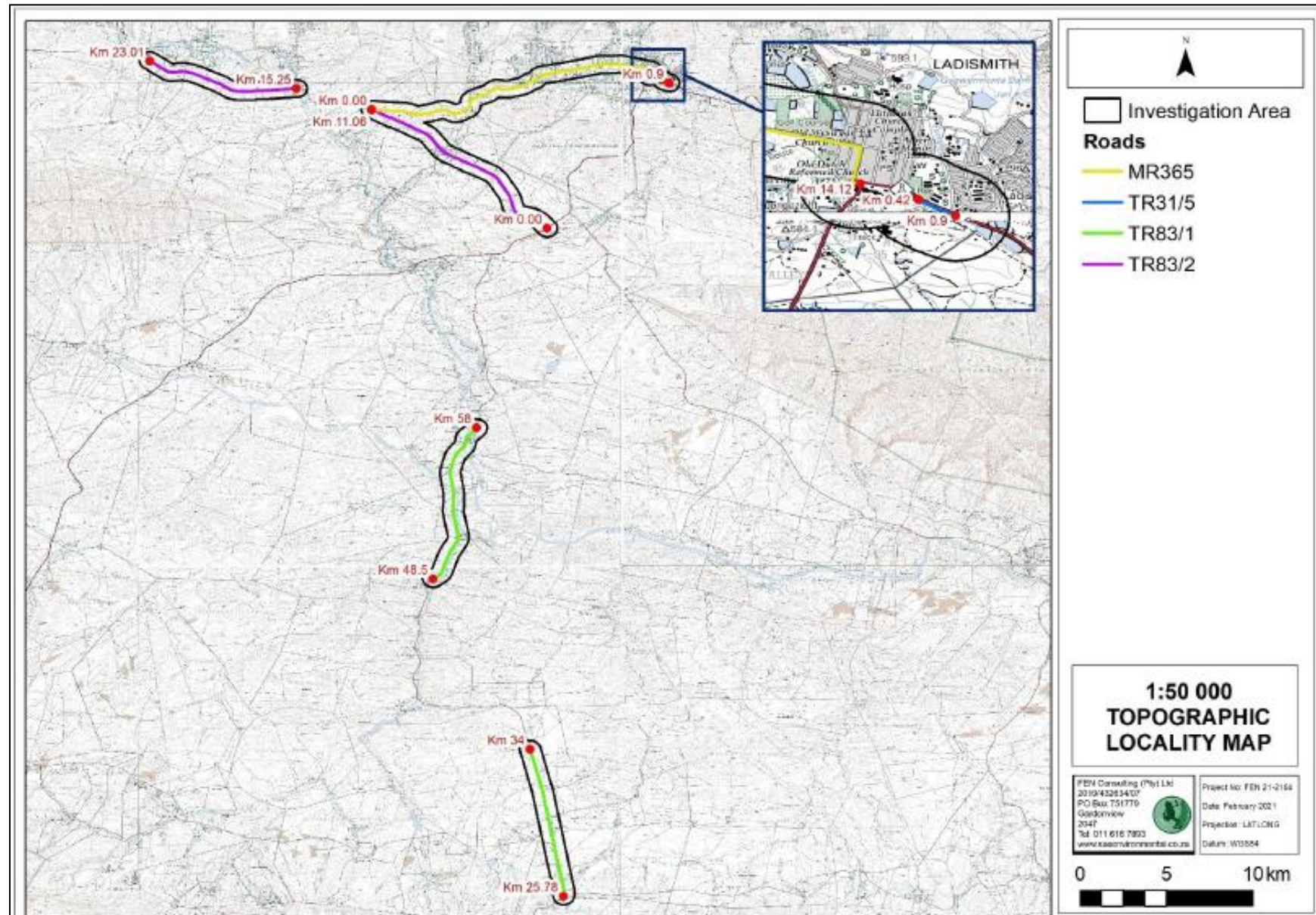


Figure 3: Location of the identified roads requiring periodic maintenance and investigation areas depicted on a 1:50 000 topographical map (FEN 2021).

2.1.1 SUMMARY OF IMPACTS ASSOCIATED WITH THE PROPOSED ACTIVITY

Freshwater Resources:

According to the specialist study conducted by Freshwater Ecological Network (FEN) Consulting, the watercourses identified to be traversed by the identified roads are all riparian watercourses and no wetlands were identified along the route. The riparian watercourses are predominantly ephemeral drainage lines with riparian vegetation and larger ephemeral river systems with smaller associated tributaries. Due to the historical construction of the roads requiring maintenance activities and current surrounding agricultural land uses, degradation to the ecological integrity of these watercourses were evident (FEN, 2021).

The existing road crossings (culvert and bridges) were the most prevalent impact affecting the hydrology of the watercourses, second to the erosion of the embankments of the watercourses (specifically at the outlets of the road crossings).

It should be mentioned that not all culverts requiring periodic maintenance are associated with a watercourse. Some culverts convey stormwater from upstream to downstream areas while others allow for spill over water from impoundments. FEN Consulting confirmed that the risk significance of the proposed maintenance to the watercourses are low, should the mitigation measures be implemented. A Water Use Authorisation (in the form of a General Authorisation) will be submitted to the Department of Water and Sanitation in terms of Section 21 of the National Water Act, 1998 (Act No. 36 of 1998).

According to FEN Ecological Consulting (2021), due to the proposed periodic maintenance activities occurring in the existing road reserve and the degraded nature of the watercourses, there is no anticipated irreplaceable loss to the watercourses already traversed by the identified roads.

Please refer to **Addendum H** for the Rehabilitation and Alien Clearing Management Plan compiled by GNEC for the proposed upgrade activities at the storm water infrastructures associated with watercourses.

Impact on fauna:

According to the specialist study conducted by STS (2021), the proposed development footprint is anticipated to have a low to very low impact on faunal communities prior to mitigation. The loss of habitat associated with the development may lead to a loss of faunal species diversity and abundance within the footprint areas, but with minimal significance and consequence. The habitat integrity of the majority of the identified roads are common and widely spread throughout the region. The identified roads and the associated habitat within the road servitude are somewhat fragmented by man-made barriers such as fencing, commercial infrastructure, agricultural areas

and the roads themselves, which limit faunal movement within the area. As part of the rehabilitation actions, stormwater runoff must be managed, and an AIP control plan implemented and the remaining vegetated/non-developed areas rehabilitated in such a way as to create habitat for faunal species. Culverts should be maintained and kept clear, as may smaller faunal species utilise the structures as movement corridors between habitats fragmented by the road structure.

Impact on flora:

According to STS (2021), the direct impact of the proposed development on floral ecology of the identified roads is anticipated to vary between medium-low and very low prior to the implementation of mitigation measures. If mitigation measures are implemented, the impact significance for the identified roads is anticipated to vary between low and very low. The historic and current disturbances within the identified roads, i.e., the transformation of vegetation communities during the development of the existing road and culvert crossings and fragmentation from the surrounding natural vegetation communities, has resulted in a decreased habitat integrity and floral communities that are indicative of disturbance events. The proposed upgrade and maintenance activities may result in the loss of indigenous species, but the impact will be localised within the footprint area and no regional impact on floral communities are anticipated. Although the road upgrade falls within CBAs, ESAs and vulnerable ecosystems, the impact is expected to be less significant and unlikely to alter the function, objectives and targets from these unique landscapes, with the implementation of proposed mitigation measures.

Heritage impact:

No impacts are expected on any heritage or visual resources on site. The site is zoned for Transport purposes and has been previously disturbed due to activities such as previous road construction, ongoing road maintenance and ongoing erosion. No heritage resources were identified on site. A Notice of Intent to Develop (NID) application was submitted to Heritage Western Cape in terms of Section 38 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999). Heritage Western Cape's response on the 16th of April 2021 was that *"since there is no reason to believe that the proposed maintenance and upgrades of various roads. 1. Trunk Road 83/1 from km 25.78 to km 34.00, 2. Trunk Road 83/1 from km 48.50 to km 58.00, 3. Trunk Road 83/2 from km 0.00 to km 11.16, 4. Trunk Road 83/2 from km 15.25 to km 23.01, 5. Main Road 365 from km 0.00 to km 14.12, 6. Trunk Road 31/5 from km 0.42 to km 0.90, Riversdale and Ladismith will impact on heritage resources, no further action under Section 38 of the National Heritage Resources Act (Act 25 of 1999) is required"*.

Visual impact:

Minimal and temporary visual impacts are expected to occur during the construction phase on the proposed maintenance site. The future visual effects of the proposed maintenance site have been given due consideration.

It should be noted that the proposed project entails the maintenance of existing roads, therefore the infrastructure is already built and in place. Therefore, the proposed maintenance of the mentioned roads would have a very low visual impact on the surrounding environment as no high buildings will be constructed and hence the views of the surrounding landscape will not be impacted on.

Noise pollution:

Some noise impacts can be expected as a result of the proposed construction activities. However, these impacts are not expected to be significant, given the temporary nature of the construction activities. No significant impact related to noise is expected during the operation phase of the project proposal.

No odour impacts are expected during the construction or operational phases.

Socio-Economic:

Social impact refers to economic changes, i.e., what impact would the proposed maintenance of the specific roads have on the existing community as well as what associated economic improvement would occur. The maintenance of the existing roads will however have a positive socio-economic impact.

The land uses of the properties surrounding the proposed maintenance roads include residential and agricultural practices. The proposed maintenance of the mentioned roads will ensure the creation of employment opportunities during the construction phase of the proposed site. The proposed maintenance of the roads will therefore significantly contribute towards the socio-economic value of the area. Access to a maintained road is a basic right and the creation of more job opportunities in the area is of high importance, especially in a rural environment and community. This project will have a positive effect on the economic state for the specific area.

2.1.2 Proposed maintenance's environmental management policy and commitments

The proponent understands the importance of conserving the environment and will endeavour to apply all necessary mitigation measures to conserve and maintain sensitive areas and prevent environmental degradation.

2.1.3 Interpretations

The implementation of the EMPr is not an additional or "add on" requirement. The EMPr is legally binding through NEMA and the relevant EA. This EMPr is to be used during the planning, construction and operational phases of the proposed project. The Environmental Control Office, appointed by the developer after environmental approval, must use this EMPr during the ECO audits to determine the developer's compliance to it.

Further on, the proponent is to ensure that through the project tender process the EMPr forms part of the Project Construction Contract Document to be incorporated in line with:

- General project specifications; and
- SANS 1200 A or SANS 1200 AA, as applicable.

The proponent is also to ensure that through any tender or appointment process, the operational EMPr forms part of the management contract with all service providers and contractors, for a period of time as stipulated by the DEA&DP during which the development will be audited for compliance to the operational EMPr. This EMPr is compiled in line with relevant legislation and general construction project specifications. However, to ensure sound environmental practice, the measures as described in the operational EMPr should be implemented for the full operational life of the development.

2.1.4 Project phase

The first part of this EMPr is specifically compiled for the ***period of time prior to commencement of and activities associated with construction of the above mentioned activity***, and for the ***operational phase*** of the proposed development.

If and when applicable, where specific activities of the proposed development fall outside of the general principles contained herein, the Department will attach further 'activity – specific' EMPr's as appendices to this document.

2.1.5 Role players and responsibility matrix

In order for the EMPr to be successfully implemented, all the role players involved in the project need to co-operate. For this to happen, role players must have a clear understanding of their roles and responsibilities in the project, must be professional, form respectful and transparent relationships, and maintain open lines of communication. The EMPr therefore clearly defines the role players involved and indicates their role in the implementation of the generic EMPr.

Typically, these role players or the project team may include the Authorities (A), Other Authority (OA), Developer/Proponent (D), Consulting Engineers (CE), Employer's Representative (ER), Environmental Officers (EO), Environmental Site Officer (ESO), Environmental Control Officer (ECO), Project Manager (PM), Contractors (C), and Environmental Assessment Practitioner (EAP). Further, landowners, interested and affected parties and the relevant environmental and project specialists are also important role players.

Figure 4 below indicates the proposed reporting channels and highlights the relationships that need to be established between these role players to ensure that the EMPr is effectively implemented.

SECTION 3 – ENFORCEMENT, MONITORING AND AUDITING

3.1 PRE-CONSTRUCTION AND CONSTRUCTION PHASE

The applicant must appoint, at his own cost, an **ECO** and full time EO (as part of the construction team) who will oversee the implementation of the EMPr.

Both the Hessequa Municipality and Kannaland Municipality as well as DEA&DP must be informed of the appointment of the ECO prior to construction activities. Please note that the responsibility of the particular ECO may end at the end of the construction period. In the event that an ECO is appointed during the operational phase, it must be noted that this ECO may be different from the original ECO and both DEA&DP as well as the Hessequa and Kannaland Municipalities must be notified of this appointment again.

The independent ECO is responsible for fortnightly audits (site inspections) on compliance to relevant environmental legislation, conditions of the Environmental Authorisation (EA), and the EMPr for the project.

The ECO shall conduct fortnightly independent environmental audits (site inspections) **Formal Monthly Audit reports** are to verify the projects compliance with the EMPr and conditions of the Environmental Authorisation (EA). Fortnightly site visits are to be undertaken, with an **Informal Audit Report in the middle of each month and a Formal Audit Report at the end of each month.**

Before any construction activities commence, the ECO must compile, for the approval by the Department, an audit checklist based on the contents of this EMPr and conditions of the Environmental Authorisation (EA). The ECO will submit the monthly reports to the Competent Authority and at the request of Municipalities it could be submitted to them.

Evidence of the following as **key performance indicators**, must be included in the audit reports:

- Complaints received from landowners and actions taken.
- Environmental incidents, such as oil spills, concrete spills, etc. and actions taken (litigation excluded).
- Incidents leading to litigation and legal contraventions.
- Environmental damage that needs rehabilitation measures to be taken.

A copy of all ESO and EO monitoring reports, contractor method statements and pro forma documentation must be held by the ESO and/or the EO on site and be made available to the Department and/or the ECO upon request.

3.2 OPERATIONAL PHASE

A suitably qualified independent person shall conduct, at a frequency as determined by the DEA&DP and stipulated in the relevant Environmental Authorisation (EA) for the project, conduct independent environmental audits. The audits are to verify the developments compliance with the operational EMPr and conditions of the Environmental Authorisation (EA).

A suitably qualified independent person must compile, for the approval by the DEA&DP, an audit checklist based on the contents of this EMPr and conditions of the Environmental Authorisation (EA). A suitably qualified independent person shall at the request of the DEA&DP forward audit reports to the Department at a frequency determined by the Department which shall be stipulated in the Environmental Authorisation (EA).

The following **Key Performance Indicators** must be included in the audit reports:

- Complaints received from landowners and actions taken.
- Environmental incidents, such as oil spills, fires etc. and actions taken.
- Incidents possibly leading to litigation and legal contraventions.
- Environmental damage that needs rehabilitation measures to be taken.

The minutes of site meetings, to which the suitably qualified independent person will have unrestricted access to, shall be the official record of environmental activities, complaints and communications. These minutes will be circulated to the entire project team. A copy of the standard site meeting agenda is available on request.

3.3 FORMAL ENVIRONMENTAL COMMUNICATION CHANNELS

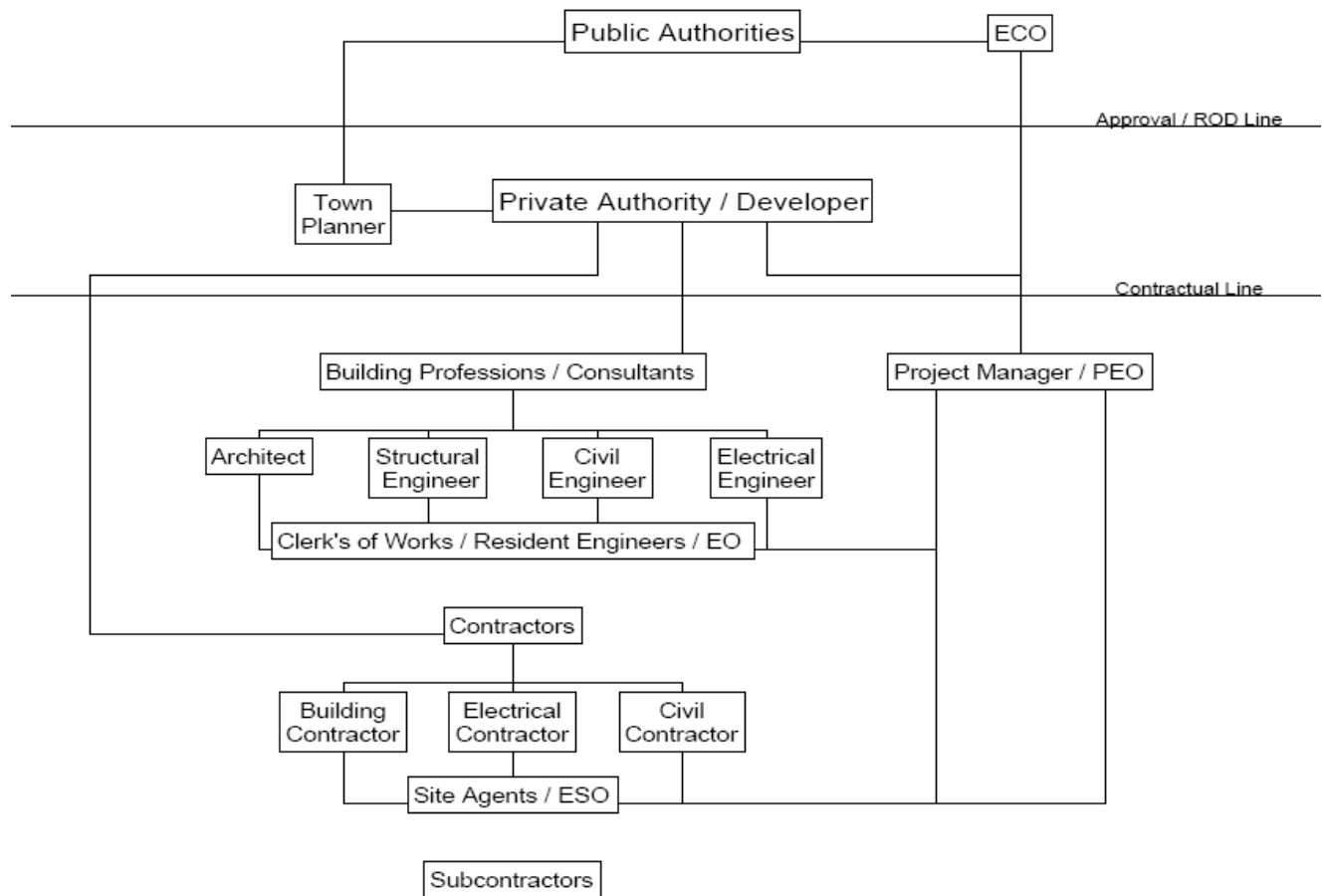


Figure 4: Reporting structure and role players involved in the periodic maintenance of the mentioned roads, between Riversdale and Ladismith, Western Cape.

Please note that due to the timeline of the development as well as the coming and leaving of consultants and contractors, as well as the many crossed channels of communication in the DEAD&DP EMPr Guideline, it was decided by the project team to use the GACP-channels of communication whereby the Project Manager remains the central pivot between all the disciplines. All instructions and reports shall flow through the Project Manager (PM). In the environmental matters the PM becomes the Project Environmental Officer (PEO).

3.4 MEASUREMENT AND PAYMENT

It is understood that environmental requirements included in this EMPr will entail costs over and above those of the civil requirements. These include provision for: mitigation and enhancement actions; training and environmental awareness requirements; monitoring; auditing; and corrective actions. The proponent shall recognise this and make provision for it in the tender. Costing for management action should be done with inputs and advice from appropriate technical members of the project team and relevant EAP who have knowledge of the management actions being recommended as well as practical experience in implementing similar measures and techniques.

A lump sum must be allocated for the management of Environmental Specifications where it is not possible to cost requirements of the EMPr.

3.6 GENERAL GUIDELINES

Guidelines as per standardised construction documentation must be used.

3.7 AWARENESS (INDUCTION) TRAINING

3.7.1 Construction Phase

The EO or ESO, or ECO are responsible in ensuring everyone on site is given an environmental awareness induction session which not only clearly defines what the environment is and specifics detailing the local environment but outlines the requirements of the EMPr as a management tool to protect the environment.

Refresher courses must be conducted as and when required. The EO or ESO must ensure daily toolbox talks include alerting the workforce to particular environmental concerns associated with the tasks for that day or the area/habitat in which they are working. Awareness posters and a handout must be produced to create awareness throughout the site.

3.7.2 Operational Phase

The ECO is responsible in ensuring everyone involved in the operation of the development at ground level receives an environmental awareness induction which not only clearly defines what the environment is and specifics detailing the local environment but outlines the requirements of the EMPr as a management tool to protect the environment.

Awareness posters and a handout must be produced to create awareness throughout the site.

3.8 SITE DOCUMENTATION

3.8.1 Construction Phase

The following is a list of documentation that must be held on site and must be made available to the ECO and/or DEA&DP on request.

- Access negotiations and physical access plan
- Site daily diary /instruction book
- Records of all remediation / rehabilitation activities
- Copies of EO reports (management and monitoring)
- Environmental Management Programme (EMPr)
- Complaints register.

3.8.2 Operational Phase

The following is a list of documentation which must be held on sight and must be made available to the ECO and/or DEA&DP on request.

- Environmental monitoring reports (if required)
- Records of all remediation / rehabilitation activities (if required)
- Environmental Management Programme (EMPr)

- Complaints register

3.8.3 Pro forma documentation

3.8.3.1 Prior to the commencement of construction activities

The following attached pro forma documentation is to be filled out and is binding to the EMPr and project contract and includes, but not limited to, the following:

- Declaration of understanding by the Developer
- Declaration of understanding by the Contractor

3.8.3.2 During construction activities

The following attached pro forma documentation is to be filled out and maintained. These are binding to the EMPr and project contract. They include, but are not limited to, the following:

- Environmental incidents
- Records of all remediation / rehabilitation activities

3.8.3.2 During the Operational Phase

The following attached pro forma documentation is to be filled out and is binding to the EMPr and project contract and includes, but not limited to, the following:

- Declaration of understanding by the Proponent
- Environmental incidents

3.9 TOLERANCES AND NON-COMPLIANCE

The independent ECO is responsible for fortnightly audits on compliance to relevant environmental legislation, conditions of the Environmental Authorisation (EA), and the EMPr for the project.

The ECO shall conduct fortnightly independent environmental audits. **Monthly Audit reports** are to verify the projects compliance with the EMPr and conditions of the Environmental Authorisation (EA).

Should the contractor show repeated non-compliance in terms of the audits, a range of fines may be issued to the contractor. These fines are included as part of the Construction EMPr (Table 6).

The Engineer, in conjunction with the ECO, shall be the judge as to what constitutes a transgression in terms of this clause, subject to the General Conditions of Contract.

SECTION 4 - GENERIC CONSTRUCTION PHASE EMPR - IMPLEMENTATION

4.1 PREAMBLE

The point of departure for the maintenance of TR83/1; TR83/2; TR31/5 and MR365. EMPr is to empower a pro-active rather than re-active approach to environmental performance by addressing potential problems before they occur. This will limit corrective measures needed during the construction phase of the project. Therefore, the purpose of this EMPr is to provide management measures that must be implemented by the Western Cape Government: Department of Transport and Public Works and all contractors and sub-contractors alike to ensure that the potential impacts of the proposed development of the proposed maintenance project of the mentioned roads are minimised. It must also be ensured that the EMPr is maintained and upheld as a dynamic document in order for the project team to add or improve on issues that might be considered left out or not relevant to the project. In such instances the DEA&DP may authorise the ECO to make such changes.

The following tables form the core mitigation measures appropriate to the pre-construction and construction phase. The tables present, the objectives to be achieved and the management actions that needs to be implemented in order to mitigate the negative impacts and enhance the benefits of the project. Associated responsibilities, criteria/targets and timeframes are clearly specified.

The ‘**pre-construction**’ section of this generic EMPr, refers to the period of time leading up to and prior to commencement of construction activities, and is included to ensure pro-active environmental management measures with the goal of identifying avoidable environmental damage at the outset and sustain optimal environmental performance throughout the construction phase. Most impacts will occur during the construction phase and must be mitigated through the contingency plans identified in the pre-construction phase.

The bulk of environmental impacts will have immediate effect during the ‘construction’ phase (e.g. noise, dust, and water pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the project team.

The “construction” section refers to all construction and its operation-related activities that will occur within the approved area and access roads, until the project is completed. This “construction” section is divided into three functional areas, namely “materials”; “plant”; and “construction”. Each of these functional areas within the EMPr contains specific generic mitigation requirements and requested contractor method statements stipulated where required.

Many potential environmental impacts will have immediate or long-term effects during the ‘operational’ phase (e.g. noise, waste management, and water pollution). If the development is monitored on a continual basis during operations, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the proponent and management team.

It must be noted that the responsible party for the majority of the mitigation measures is that of the Management body, unless otherwise stipulated. The names of the responsible parties must be made available to DEA&DP for record purposes.

The management body must ensure that a maintenance team is employed with the correct equipment and skill to maintain boardwalks, pathways, fences etc. The following tables will refer to the responsible party as "Management body: 'to be announced' and "maintenance crew".

4.2 STRUCTURE AND CONTENTS OF THE TABLES

The table consists of seven parts as follows:

"Phase of development" - This row will identify either pre-construction (planning) or actual construction phase.

"Impact / issue" - This row will identify the issue being addressed, e.g. Materials, site demarcation, heritage, etc.

Mitigation Measure - This column will include all the necessary mitigation measures for each impact/issue'.

Management objectives - This column will indicate what the management objectives to be achieved for each mitigation measure are.

Measurable targets - This column will indicate what evidence is to be used as an indication to whether or not the 'Management objectives' have been implemented and hence achieved.

Responsible party - This column will provide information as to which role player, e.g. ECO, ER, etc. is responsible for the implementation and or management of each mitigation measure.

Frequency of action - These columns provide time guidelines for the 'Responsible party' by which he/she is to action or manage the required mitigation.

4.2.1 SPECIALIST RECOMMENDATIONS

4.2.1.1 Pre-Construction and Construction Phases

The last part of the table provides space for the EAP to add specialist recommendations that need to be addressed during the pre-construction and construction phases.

4.2.1.2 Operational Phase

Additional requirements may need to be added to the table pending conditions required in the Environmental Authorisation (EA). The last part of the table provides space for such conditions, which must be added before the "declaration of understanding" is signed by the proponent and ECO.

Table 1: PROPOSED PERIODIC MAINTENANCE OF TR83/1; TR83/2; TR31/5; MR365, PRE-CONSTRUCTION (PLANNING) PHASE EMPr

Phase of development	PRE-CONSTRUCTION (PLANNING)			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Project contract and programme The EMPr must be included as part of the tender documentation thereby making it part of the enquiry document to make the recommendations and constraints, as set out in this document, enforceable under the general conditions of contract. A copy of this EMPr must be available on site. The Contractor shall ensure that all the personnel on site, sub-contractors, suppliers, etc. are familiar with and understand the specifications contained in the EMPr. It is imperative that all construction activities to be conducted with the watercourse be undertaken during the drier summer months to limit surface water contamination and the need for any surface water diversion during the construction works.	- Contingencies for minimising negative impacts anticipated to occur during the construction phase. - Ensure environmental awareness and formalise environmental responsibilities and implementation.	- Contract records. - Signed declaration pro forma's.	Project team.	-
Site demarcation and development The surveys for the overall project area and construction footprint as approved in the Environmental Authorisation (EA) must be clearly demarcated before the contractors set up their crew camps or start with construction.	Contingencies for minimising negative impacts anticipated to occur during the construction phase.	- Demarcated areas. - Filled in section of this document.	EAP specialist, Engineer, contractor.	As and when required.
<u>Terrestrial Biodiversity</u> The following mitigation measures were identified by the Terrestrial specialist (STS, 2021):				

Phase of development	PRE-CONSTRUCTION (PLANNING)			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
1. Minimise loss of indigenous vegetation where possible through planning and where necessary by incorporating sensitive habitat such as watercourses as well as any other specialist studies; 2. Prior to the commencement of construction activities; and AIP Management/Control Plan should be complied for implementation: - Removal of alien invasive species should preferably commence during the pre-construction phase and continue throughout the construction and operational phases. AIPs should be cleared within the identified roads before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread spoils contaminated with AIP seeds during the construction phase; and - An AIP Management/Control Plan should be implemented by a qualified professional. No chemical control of AIPs to occur without a certified professional. 3. If the proposed development is authorised, it is advised that a walkthrough of the direct footprint areas of all activities associated with the culvert and road upgrades be conducted before the commencement of any development of construction activities. Should any SCC be encountered within this footprint area it must be rescued and relocated by a suitable qualified specialist either to suitable habitat (outside the development footprint) or moved to registered nurseries such as the Agricultural Research Council (ARC) or the South African National Biodiversity Institute (SANBI). Permits and authorisation must be obtained				

Phase of development	PRE-CONSTRUCTION (PLANNING)			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.				
Emergencies, non-compliance and communication The contractor must provide method statements on the protocols to be followed, and contingencies to be put in place for the following, before construction may begin: • Emergency spills procedures for the contamination of soils from spills and fire. • Handling & storage of oils and chemicals. • Cement and concrete batching, which includes the storage, washing & disposal of cement, packaging, tools and plant. • Diesel tanks and refuelling procedures. • Crew camps and construction lay down areas. • Workshop maintenance and cleaning of plant. Communication in emergencies must follow the suggested lines of communication as stipulated figure 2.	• Contingencies for minimising negative impacts anticipated to occur during the construction phase.	• Method statements.	Contractor, Engineer.	As and when required.

Table 2: ADDITIONAL CONDITIONS FOR THE PROPOSED PERIODIC MAINTENANCE OF TR83/1; TR83/2; TR31/5 AND MR365, EMPr.

Phase of development	PLANNING	EA reference number			
Impact / issue	EA Conditions				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION

Table 3: PROPOSED PERIODIC MAINTENANCE OF TR83/1; TR83/2; TR31/5 AND MR365, CONSTRUCTION PHASE EMPr (Materials)

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Handling					
Stockpiles All stockpiled material must be easily accessible on site without any environmental damage of the surrounding properties. All temporarily stockpiled material must be stockpiled in such a way that the spread of materials are minimised. In the case of strong wind and/or rain all stockpile material must be covered with a tarpaulin in order to prevent erosion. The stockpiles may only be placed within the demarcated areas, the location of which must be approved by the ER, EO or ECO. Stockpiles may not exceed 2 metres in height and their footprint should be kept to a minimum. Stockpiling of removed materials may only be temporary and should be disposed of at a registered waste disposal facility. All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent erosion and sedimentation of the watercourses in close proximity to these stockpiles.		• Minimise scarring of the soil surface and land features. • Minimise disturbance and loss of soil. • Minimise construction footprint. • Minimise contamination of storm water run-off.	• No visible erosion scars once construction is completed. • The footprint has not exceeded the agreed site in terms of EA etc. • Minimal invasive weed and grass growth. • No signs of sedimentation and erosion.	Contractor	Daily

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Stormwater runoff from the stockpile sites and other related areas must be directed into the storm water system. Stockpiles are to be stabilised if signs of erosion are visible.					
Topsoil Management All topsoil must be removed prior to the commencement of any maintenance activities. Topsoil must be stockpiled. Stockpiled topsoil must be regarded as no-go areas. Stockpiled topsoil must be monitored for invasive exotic vegetation growth. Contractors must remediate as and when required in consultation with the EO, ER and ECO. No plant, workforce or any construction related activities may be allowed onto the stockpile topsoil. All topsoil must be replaced during the rehabilitation phase to ensure the re-establishment of natural vegetation. Handling of the topsoil should be minimised and should therefore only be handled before construction (to be stockpiled) and after /construction (topsoil to be replaced).		• Maintain the integrity of topsoil for rehabilitation. • Containment of invasive plant growth by means of topsoil monitoring.	• No loss of topsoil.	Contractor	Daily

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Oil and chemicals The contractor must provide method statements for the “handling & storage of oils and chemicals”, “fire”, and “emergency spills procedures”. These substances must be confined to specific and secured areas within the contractor’s camp, and in a way that does not pose a danger of pollution even during times of high rainfall. Drip trays (minimum of 10cm deep) must be placed under all machinery and vehicles. The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle. Any spills larger than 100ℓ should be reported to all local authorities. Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction		• Prevention of pollution of the environment. • Minimise chances of transgression of the acts controlling pollution.	• No pollution of the environment. • No litigation due to transgression of pollution control acts. • No complaints from I & AP’s. • Method statements.	Contractor.	Daily.

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
site. Spill kits must be made up of material/product that is in line with environmental best practice (sunsorb is a recommended product that is environmentally friendly). All spilled hazardous substances must be contained in impermeable containers for removal to a General & Hazardous Waste Landfill site, (this includes contaminated soils, and drenched spill kit material). Vehicles to be serviced at the contractor laydown area.					
Concrete It is suggested that ready-mix concrete be used as far as possible to minimize the possible impact on the surrounding environment. Cement batching areas must be located in consultation with the ER, EO or ECO to ensure residues are contained and that the proposed location does not fall within sensitive areas such as		- Minimise the possibility of cement residue entering into the surrounding environment. - Minimise pollution of soil, surface and ground water resources.	- No evidence of contaminated soil on the construction site. - No evidence of contaminated water resources. - Method statement.	Contractor.	Monitored daily.

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
drainage lines, storm water channels, etc. The contractors must provide and maintain a method statement for “cement and concrete batching” which includes the storage, washing & disposal of cement, packaging, tools and plant. The mixing of concrete shall only be done at selected sites on mortar boards or similar structures to contain run-off into natural vegetation, soils and streams. Cleaning of cement mixing, and handling equipment shall be done using proper cleaning trays. All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a Licensed Landfill site. All empty cement bags are to be picked up immediately to ensure that cement dust is not blown away. Empty cement bags are to be stored in a weather and scavenger proof bin, in order to prevent					

Phase of development	CONSTRUCTION			
Impact / issue	Materials			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
leaching and groundwater contamination. Cement dust is poisonous and will be detrimental to the environment. Any spillage that may occur must be investigated and immediate remedial action shall be taken. The visible remains of concrete, either solid, or from washings, shall be physically removed immediately and disposed of as waste to a Licensed Landfill site. Washing of the remains into the ground is unacceptable. Should any cement silos be employed on site; they are to be fitted with appropriate air pollution control equipment to control dust during fill-up operations. No mixed concrete may be deposited outside of the designated construction footprint. A batter / dagga board mixing trays and impermeable sumps should be provided, onto which any mixed concrete can be deposited whilst				

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
it awaits placing.					
DANGEROUS AND TOXIC MATERIALS Provision of storage facilities Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in beamed areas or under lock and key, as appropriate, in well-ventilated areas. Storage facilities should be bunded, roofed, secure, rain, wind and tamper proof. Storage areas shall display the required safety signs depicting “no smoking”, “No Naked lights” and “Danger” containers shall be clearly marked to indicate contents as well as safety requirements. Sufficient care must be taken when handling these materials to prevent pollution. Training on the handling of dangerous and toxic materials must be conducted for all staff prior to the commencement of construction. In the case of pollution of any surface or		• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments. • Minimise chances of transgression of the acts controlling pollution.	• No visible signs of pollution. • No litigation due to transgression of pollution control acts.	Contractor.	Monitor daily.

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
groundwater, the Regional Representative of the Breede Gouritz Catchment Management Agency (BGCMA) must be informed immediately. Empty containers shall be removed to a General & Hazardous Waste Landfill site. Material Safety Data Sheets (MSDS) must be prepared for all hazardous substances on site and supplied by the supplier where relevant. MSDS's must be updated as required.					
Bulk storage of fuels and oils The contractors must provide and maintain a method statement for “Diesel tanks and refuelling procedures”. Bulk fuel storage tanks on the site shall be on an impervious surface that is bunded and able to contain at least 110% of the volume of the tanks. A Flammable Liquid License must be obtained for diesel volumes greater than 200 litres. As no application was lodged for this activity, it should be noted that Environmental Authorisation is required for the storage of Diesel and/or Petrol with volumes greater than 30 000 litres. Bulk fuel storage tanks shall be located in a	• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments. • Minimise chances of transgression of the acts controlling pollution.	• No visible signs of pollution. • No litigation due to transgression of pollution control acts. • Method statement.	Contractor.	Once off, as required.	

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
portion of the construction camp where they do not pose a high risk in terms of water pollution. Bulk fuel storage tanks shall be placed so that they are out of the way of traffic, so that the risk of the tanks being ruptured or damaged by vehicles is minimised. Bulk fuel storage should be covered during the rainy season.					
Use of dangerous and toxic materials. The contractor shall keep the necessary materials and equipment on site to deal with spills/ fire of the materials present should they occur. The contractor shall set up a procedure for dealing with spills/ fire, which will include notifying the ECO and the relevant authorities prior to commencing with construction. These procedures must be developed in consultation and approval by the appointed EO. All staff should receive some form of fire training. Fire buckets and hoses shall be in good working order and easily accessible on site. A record must be kept of all spills and the corrective action taken.		• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments. • Minimise chances of transgression of the acts controlling pollution.	• No pollution of the environment. • No litigation due to transgression of pollution control acts.	Contractor.	As required.

Table 4: PROPOSED PERIODIC MAINTENANCE OF TR83/1; TR83/2; TR31/5 AND MR365, CONSTRUCTION PHASE EMPr (Plant)

Phase of development	CONSTRUCTION			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Eating areas and camp followers The contractors must provide and maintain a method statement for “Crew camps and construction lay down areas”. The Contractor shall, in conjunction with the EO, designate the restricted eating area for eating during normal working hours. Two refuse bins with lids must be provided and cleaned on a daily basis. The bins are to be secure, wind, weather and scavenger proof. Designated areas for smoking must be provided. No fires are to be lit outside of a facility designed to contain fires. The adequacy and positioning of these structures must be determined in consultation with the EO and ECO. No animals, domestic or otherwise are allowed on the premises. The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited. Camp followers/informal traders must not be allowed to congregate on pavements or outside the construction site. However, at the contractor's discretion facilities can be made available within the designated eating area. Litter (even if originating outside the camp) and concrete bags etc. must be picked up and put into suitably closed bins.	• Control potential influx of vermin and flies. • Neat workplace and hygienic environment. • Minimise negative social impacts to local businesses and residences.	• No visual sign of vermin and flies. • No complaints from I & AP's.	Contractor, EO.	Once off, monitor daily.

Phase of development	CONSTRUCTION			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Toilets and ablution facilities The contractor will be responsible for providing all sanitary arrangements for his and the sub-contractors team. It is proposed that that one toilet for 15 people will be established on site. Sanitary arrangements shall be to the satisfaction of the ECO and the local authority. The contractor shall keep the toilets in a clean, neat and hygienic condition. The contractor shall supply toilet paper at all toilets at all times. Toilet paper dispensers shall be provided in all toilets. Toilets provided by the contractor must be easily accessible and a maximum of 150m from the works area to ensure they are utilised. All toilets will be located within the contractor's camp. Should toilets be needed elsewhere, their location must first be approved by the ER, EO or ECO. The contractor (who must use reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) shall ensure that all toilets are cleaned and emptied before the builders' or other public holidays. Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times.	• Ensure proper sanitation is achieved which will encourage the workforce to utilise toilets provided and not the surrounding habitat. • Minimise potential of diseases on site. • Minimise potential to pollute soils, water resources and natural habitats.	• Workforce use toilets provided. • No complaints received from I & AP's as well as members of the workforce. • No visible or measurable signs of pollution of the environment (soils, ground and surface water).	Contractor, ER or EO.	As and when required.

Phase of development	CONSTRUCTION			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Waste management Please refer to the waste minimization plan herewith attached.	• Sustainable management of waste by recycling. • To keep the site neat and tidy. • Minimise litigation and complaints by I&AP's. • Reduce visual impact. • Control potential influx of vermin and flies thereby minimising the potential of diseases on site and the surrounding environment. • Minimise potential to pollute soils, water resources and natural habitats.	• Disposal of rubble and refuse in an appropriate manner with no rubble and refuse lying on site. • Site is neat and tidy. • No complaints from surrounding industries and businesses. • Sufficient containers available on site. • No visible or measurable signs of pollution of the environment (soils, ground and surface water).	Contractor, EO	Daily

Phase of development	CONSTRUCTION			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Dust It is imperative that method statements regarding dust control be supplied to the ECO by the contractor prior to the commencement of any construction activities. Dust management and dust suppression during the construction phase is deemed very important. The method statement must provide information on the proposed source of water to be utilised and the details of the licenses acquired for such usage. Potable water may not be used as a means of dust suppression, alternative measures must be sourced. The use of 'grey' water must be investigated as an alternative. The contractor will be responsible to source this water and obtain the required approvals. Dust mitigation measures to include the use of chemical dust suppressants, such as Lignosulphonates; and the use of soil stabilisers such as straw for large open ground areas. The construction camp shall be treated with dust suppression during dry and windy conditions to control dust fallout. Dust production must be controlled by regular dust suppression of roads and works area, should the need arise. (NB: Concrete dust is toxic and damages soil properties. Therefore, dust suppression to prevent dust spread must not be done where concrete dust has fallen, or it will infiltrate into the soil. Concrete bags must not be allowed to blow around the site and spread cement dust.)	• Reduce dust fall out. • Reduce visual impact. • Minimise loss of valuable soil material.	• No visible signs of dust. • No complaints from Interested and Affected parties. • No incidences reported to ECO. • No visible evidence of dust contamination on the surrounding environment. • Method statement. • Baseline targets not exceeded during regular monitoring of dust counts.	ER, Contractor, EO	Monitored daily

Phase of development	CONSTRUCTION			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
At the end of construction, the site camp must be fully rehabilitated by removing the temporary surface, ripping the area to loosen the soil. All vehicles transporting material that can be blown off (e.g. soil, rubble etc.) must be covered with a tarpaulin, and speed limits of 20 km/h must be adhered to.				

Phase of development	CONSTRUCTION			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Workshop equipment, maintenance and storage The contractors must provide and maintain a method statement for “workshop maintenance and cleaning of plant”. All maintenance and washing of vehicles and equipment shall be done off-site as far as possible. During servicing of vehicles or equipment, a suitable drip tray shall be used to prevent spills onto the soil. Leaking equipment shall be repaired immediately or be removed from site to facilitate repair. Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediate to the satisfaction of the EO or ER. Cleaning and remediation must be done with products or similar approved products that are in line with best environmental practice i.e. Sunsob, or similarly approved. The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site. The Contractor must ensure that senior and the other relevant members of the workforce are trained in dealing with spills by using emergency spill kits. All spills of hazardous substances must be reported to the ESO, EO, ER or ECO. The contractor must comply with the regulations of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) as well as specific specifications set forth by the health and safety agent.	• Prevent pollution of the environment. • Minimise chance of transgression of the acts controlling pollution. • Disposal of hazardous substances to a General & Hazardous Waste Landfill site.	• No pollution of the environment. • No litigation due to transgression of pollution control acts. • Method statement.	ER, Contractor, EO.	Monitor daily.

Phase of development	CONSTRUCTION			
Impact / issue	GENERAL			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Noise Noise reduction is essential, and Contractors shall endeavour to limit unnecessary noise, especially loud talking, shouting or whistling, radios, sirens or hooters, motor revving, etc. The use of silent compressors is a specific requirement. All machinery to be muffled where possible. Noisy activities shall take place only during working hours. The EO must inform the residents of houses and businesses adjacent to the development in writing 24 hours prior to any planned activities that will be unusually noisy or any other activities that could reasonably have an impact on the adjacent sites. These activities could include, but are not limited to use of pneumatic jack-hammers and compressors etc. No noise louder than 70dB from the ambient noise level. Machinery and equipment on site must be maintained so as to avoid any unnecessary noises.	• Maintain noise levels below “disturbing” as defined in the National Noise Regulations. • Minimise the nuisance factor of the development.	• No complaints from surrounding landowners or I&APs.	Contractor, EO.	As and when required.

Table 5: PROPOSED PERIODIC MAINTENANCE OF TR83/1; TR83/2; TR31/5 AND MR365, CONSTRUCTION PHASE EMPr (Construction)

Phase of development	CONSTRUCTION			
Impact / issue	CONSTRUCTION			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Crew camps Accommodation for members of the workforce will not be permitted on site unless authorisation has been given in terms of the Environmental Authorisation issued for the site. If accommodation is to be provided for workers, details need to be provided as to the location and facilities to be provided for the workers. The contractor's camp shall be monitored for dust fallout and dust suppression applied as required. This may include the laying of gravel; the use of grey water can be considered as an option if the required permits have been acquired. The contractor's camp, offices and storage facilities shall be located within the site boundaries. If this is not feasible an alternative should be designated in consultation with the ECO. The contractor shall provide labourers to clean up the contractor's camp and construction site on a daily basis. These areas shall then be inspected by the contractor or his/her ESO to ensure compliance with this requirement. Crew camps must be established outside of the delineated watercourse. The contractor shall be responsible for cleaning the contractor's camp and construction site of all structures, equipment, residual litter and building materials at the end of the construction period and, the topsoil restored in areas where landscaping is to take place.	• Minimise water pollution. • Minimise dust fallout. • Minimise unwarranted environmental damage outside the footprint. • Maintain a clean and healthy working environment. • Minimise visual impact to surrounding environment.	• No signs of water or soil pollution. • No complaints from surrounding landowners or I&APs. • No visible signs of litter. • Method statements.	Contractor, EO, ESO.	Monitor daily.

Visual Impact The site must be kept tidy at all times. Building material stockpiles must be protected from dispersion into the surrounding area by wind or water.	Minimise visual impact.	No unacceptable visual impacts.	Contractor, EO, ESO.	Monitor, daily
Fires The contractors must provide and maintain a method statement for “fires”, clearly indicating where and for what fires will be utilised plus details on the fuel to be utilised in creating the fire. Fire training and equipment to be nearby to put fires out. No wood is to be collected from private or public property. Fires must be within designated areas and must be in small scale. Absolutely no burning of waste is permitted. Fires will only be allowed in facilities especially constructed for this purpose within fenced Contractor’s camps. Wood and/or charcoal are the only fuels permitted to be used for fires. The contractor must provide sufficient wood (fuel) for this purpose. Fires in the designated areas must be small in scale so as to prevent excessive smoke being released into the atmosphere. Heavy smoke may not be released into the air. No felling of trees or wood collection is allowed from private or public property. The Contractor shall ensure that there is appropriate fire-fighting equipment available on site at all times.	- Minimise risk of veldt fires. - Minimise destruction of natural fauna and flora. - Maintain safety on site.	- No veldt fires started by the contractor’s workforce. - No claims from landowners for damages due to veldt fires. - Method statement.	Contractor, EO, ESO.	Monitor daily.

Erosion and sedimentation To reduce the loss of material by erosion, the contractor shall ensure that disturbance on site is kept to a minimum. The disturbance especially includes the movement of heavy vehicles. In the case of strong wind and/or rain all stockpile material must be covered with a tarpaulin in order to prevent erosion.	• Minimise erosion damage. • Minimise scarring of the soil surface and land features. • Minimise disturbance and loss of topsoil. • Re-growth of disturbed areas.	• No erosion scars. • No loss of topsoil. • No interference with the natural flow of water. • No visible erosion scars once construction is completed. • The footprint has not exceeded the agreed boundaries.	Contractor, EO, ESO.	As and when required.
Fauna & Flora <u>The following mitigation measures were identified by the Terrestrial specialist (STS, 2021):</u> • The upgrade and maintenance footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management). • Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved footprint. No clearing of vegetation is allowed on the road reserve where resurfacing will take place. Should this be the case, a walkdown must be done to identify and relocate any floral SCC.	• Minimise disturbance to animals. • Minimise destruction of habitat.	• No complaints from Nature Conservation. • No litigation concerning applicable animal protection acts. • No measurable or visible signs of habitat destruction.	ER, Contractor, EO, ESO.	Monitor daily.

• Smaller species that are not as readily able to move out of an area ahead of ground clearing activities such as scorpions and reptiles will be less mobile during rainfall events and cold days (winter). As such should any be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and instructed not to kill them. Smaller scorpion species and harmless reptiles (that are likely present within the identified roads) should be carefully relocated by a suitably nominated construction person. For larger venomous snakes, a suitably trained specialist, or on-site personnel, should be contacted to carry out the relocation of the species, should it not move off on its own. • Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal. • No collection of floral SCC must be allowed by construction personnel. • No hunting or trapping of faunal species is to be allowed by construction personnel.				
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• Informal fires by construction personnel should be prohibited, and no uncontrolled fires whatsoever should be allowed. • Care should be taken during the construction and operation of the proposed maintenance to limit edge effects to surrounding natural habitat. This can be achieved by: - Demarcating all footprint areas during construction activities; - No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility; - All soils compacted as a result of construction activities should be ripped and profiled and reseeded; and - Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. • Appropriate sanitary facilities must be provided during the maintenance and must be removed to an appropriate waste disposal site. • No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed because of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in areas with natural				
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vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility; • If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil; and • Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area. • Edge effects arising from the proposed maintenance, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2014); and • Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility that				
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complies with legal standards. • The relocation success of floral SCC (if found) should be monitored during the construction phase to ensure immediate actions can be taken if it becomes evident that relocation is not successful; • No collection of floral SCC or medicinal floral species must be allowed by construction personnel; • Edge effect control needs to be implemented to prevent further degradation and potential loss of floral and faunal SCC outside of the proposed development footprint area; • No trapping or hunting of fauna whatsoever must be allowed. • Should the presence of any faunal SCC be noted, or their breeding sites be located within the development footprint, a suitably qualified specialist should be consulted on the best way to proceed. <u>All activities on site must comply with:</u> The regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962); and Marine Living Resources Act, 1998 (Act No. 18 of 1998). All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake a				
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specialist must be called in to safely relocate the animal if the EO or ECO is not able to.				
Heritage In terms of the National Heritage Act, 1999 (Act No. 25 of 1999), should any archaeological artefacts be exposed during construction activities, work on the area where the artefacts were found shall cease immediately and the ECO as well as the Local Council shall be notified within 24 hours. Finds of human remains must be treated as a crime scene. Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist.	- Limit the destruction of the country's heritage resources. - The preservation and appropriate management of new archaeological finds should these be discovered during construction.	No destruction of or damage to known archaeological sites.	Contractor, EO, ER, ESO.	Monitor Daily.
No-go / sensitive areas Stockpiled topsoil should be demarcated with danger tape and seen as no-go areas. All construction activities must remain within the boundaries of the development area, as demarcated at the start of the construction phase. The construction footprint must be kept to a minimum by constructing boundaries and demarcation around areas not to be disturbed. These No-go areas must be demarcated with fencing / warning tape and signs before any construction activities commence. The EO and ECO must be on site in order to make sure the correct areas are fully demarcated.	Minimise the potential for the spread of the construction footprint.	Containment of footprint.	ER, Contractor, ESO, EO.	Monitor daily.
Access route/haul roads Any authorised clearing for access roads must be done under the supervision of the ECO. Access roads for earthmoving-equipment must be clearly designated and be positioned as close as possible to the proposed development site. No driving off from the marked roads is permitted and designated	- Minimise loss of topsoil and enhancement of erosion. - Minimise fauna displacement by destruction of natural	- No erosion on access roads after completion of construction. - No loss of topsoil due to runoff water on access roads.	Contractor, ER or EO.	As required, monitor daily.

parking areas must be identified and demarcated with applicable signage. Neither the site nor its access roads must be allowed to be utilised for recreational activities, this includes but is not limited to quad bikes, 4x4's and dirt bikes. Security personnel ensure that this is enforced. No unauthorised access is permitted.	habitats.			
Crime, safety and security No site staff, other than security personnel and skeleton staff shall be housed on site unless otherwise stipulated in the Environmental authorisation. Security personnel and skeleton staff shall be supplied with adequate protective clothing, ablution facilities, water and refuse collection facilities. A boundary fence will serve to prevent public access to the site office, for public safety and security reasons. The access to the site must be controlled so as to restrict unauthorised personnel from entering the site. The workers on site must retain some means of identification. The ESO and the contractor are responsible for ensuring that only authorised personnel are on site at all times. The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations. Site specific conditions and regulations as set forth by the health and safety agent should also be adhered to. The contractor shall ensure that all emergency procedures are in place prior to commencing work. Emergency procedures shall include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc. The contractor shall ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site.	• Reduce the risk of potential incidences. • Minimise the potential impact on the environment. • Reduce the risk of possibly fatal incidents occurring on site.	• No incidences reported.	ER, Contractor, ESO, EO.	Monitor daily.

The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of this emergency centre, as well as the police and ambulance services must be available at prominent locations around the construction site and the construction crew camps.				
Visual impact Shade cloth must be utilised to conceal and minimise the visual impact of contractor camps, lay down and storage areas. Rubble and litter must be removed every two weeks or more often as the need arises and be disposed of at a registered landfill site as designated by the Hessequa and Kannaland Municipalities Solid Waste removal department.	Minimise visual impact.	No complaints from I & AP's.	Contractor, landscape contractor, ESO.	Monitor daily.
Hydrology <u>The following mitigation measures were identified by FEN Ecological Consulting (FEN) (2021):</u> 1. It is considered imperative that the proposed maintenance activities occur during the drier summer periods, to minimise any impact on the hydrological functioning of the watercourses. 2. Contractor laydown areas (if applicable) are to be established outside of the delineated watercourses, and only for a short duration (approximately 1 month), in consultation with the appropriate authority. 3. All maintenance footprint areas to remain as small as possible and vegetation clearing to be limited to what is essential and may not extend beyond the road reserve. 4. The watercourses should be demarcated with danger tape by an ECO and marked as a "no-go" area where no vegetation	- Minimise pollution of soil, surface and ground water resources in the immediate and surrounding environments. - Minimise impeding the natural flow of water. - Minimise the impact on natural water flow dynamics. - Minimise scarring of the soil surface and land features.	- No visible signs of pollution. - No signs of siltation of water courses. - No visible erosion scarring once construction is completed. - Minimum loss of topsoil.	ER, Contractor, EO.	As and when required, monitor daily.

clearing activities are planned.				
5. All alien and invasive vegetation species, debris and litter removed from the crossing must be removed from site (no stockpiling allowed).				
6. Any sediment or silt removed from the watercourses may be temporarily stockpiled in the road reserve but outside the watercourse, for the duration of the day's work. These stockpiles may not exceed 2m in height, and their footprint should be kept to a minimum. Stockpiling of removed materials may only be temporary (may only be stockpiled during the period of clearing at a certain crossing point) and should be disposed of at a registered waste disposal facility.				
7. The clearing activities should be limited to only what is necessary.				
8. Only authorised maintenance personnel may be permitted to enter the watercourse as part of the clearing activities to prevent excessive compaction of the soils within the watercourse.				
9. It is preferred that no machinery be used as part of the clearing activities. All vegetation and sediment removal should be undertaken by hand or with the used of handheld equipment.				
10. Limit construction equipment within the watercourses to what is essential.				
11. Excavated materials should not be contaminated (with hydrocarbons, fuel), and it should be ensured that the minimum surface area is taken up. Stockpiles may not exceed 2m in height.				
12. The soil surrounding the headwalls must be suitably loosened on completion of construction activities and revegetated to prevent erosion.				
13. All exposed soil must be protected for the duration of the				

construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) to prevent erosion and sedimentation of the watercourses near these stockpiles. 14. Ensure alien and invasive plant species are managed port construction until suitable basal cover is achieved. 15. Avoid unnecessary trampling of vegetation irrespective of the vegetation being associated with the watercourses or the surrounding terrestrial area. 16. Control measures specific to concrete works: Concrete and cement-related mortars can be toxic to aquatic life. Proper handling and disposal should minimise or eliminate discharges into the watercourses. High alkalinity associated with cement, can dramatically affect and contaminate both soil and ground water. The following measures must be adhered to: - Fresh concrete and cement mortar should not be mixed near the watercourses. Mixing of cement may be done within the construction camp, however may not be mixed on bare soil, and must be within a lined, bound or banded portable mixer. Consideration must be taken to use ready mix concrete; - No mixed concrete shall be deposited directly onto the ground within the watercourses (outside of the designated area) or associated riparian habitat. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; - A washout area should be designated outside of the watercourses, and wash water should be treated on-site or discharged to a suitable sanitation system; - Cement bags must be disposed of in the demarcated hazardous waste receptacles and the used bags must be				
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disposed of through the hazardous substance waste stream; and - Spilled or excess concrete must be disposed of at a suitable landfill site. Chain of custody documentation must be provided. 17. The clearing of vegetation within the footprint area must be kept to a minimum to avoid unnecessary disturbance within the active channel. 18. Material used as a rip rap or to fill the gabion baskets should be in situ material preferably originating from the surrounding area, however, it must be sustainably sourced. Alternatively, any imported material must be weed free and not be contaminated by any potential pollutants. 19. Once gabions are constructed and/or the rip rap installed, the surrounding natural embankments should be reprofiled and revegetated with indigenous species as soon as possible. 20. Stabilisation of the banks and side slopes are required, by employing techniques, such as: - Resloping of banks to maximum of a 1:3 slope or tied in with the upstream existing embankments. - Revegetation of re-profiled slopes with suitable indigenous vegetation on consultation with a suitably qualified botanist. - Temporary stabilisation of slopes using geotextiles. 21. The gabion structures (where applicable) should be monitored for erosion and structural integrity after each rainfall event (especially during the rainy winter season) until suitable basal vegetation cover has re-established. 22. Use of biodegradable hessian sheeting must be made to prevent sedimentation of downstream resources. 23. The movement in the river must be kept to a minimum to avoid				
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unnecessary disturbance within the active channel. 24. River rock/boulder removal activities may only be undertaken when no surface water is present within the specific reach of the river (during the dry summer periods) to limit any impacts to the aquatic habitat and prevent any residual downstream impacts from occurring. 25. Removal of boulders must be only done to ensure that the natural riverbed topography is attained, and that no excessive material are removed that can impact on the velocity of flow during high flow events. No other material may be removed. 26. Removed boulders may be temporarily stockpiled outside the delineated extent of the river but must be removed/reused in other areas (not within watercourses) and may not be left on site. 27. Construction personnel must be limited to the existing road reserve only, and no movement within the delineated watercourses may be permitted. 28. During resurfacing/painting, it must be ensured that no foreign materials (i.e. tar from the resurfacing activities) enter the watercourses. 29. Care must be taken while painting and all personnel must receive training on the risks of chemical contamination of all watercourses. 30. If any solid materials do enter the watercourses, they should be immediately removed and disposed at a registered waste disposal facility. Paint spills on soils within and surrounding the riparian habitat should be immediately remediated. Contractor laydown areas and equipment storage are to remain outside of the 32 m NEMA ZoR associated with the watercourses. In the event of pollution caused as a result of construction activities, the contractor, according to section 20 of the National Water Act, 1998 (Act No. 36 of 1998) shall be responsible for all costs incurred by				
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organisations called to assist in pollution control and/or to clean up polluted areas and water courses. The contractor shall ensure that excessive quantities of sand, silt and silt-laden water do not enter the storm water system. All wastes are to be removed from the site and disposed of at a registered facility.				
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Soil Topsoil must be stripped from all areas that are to be utilized during the construction period and where permanent structures and access is required. These areas will include comprising the permanent works, pipeline trenches, stockpiles, access roads, construction camps and lay down areas. Topsoil must be deemed to be the top layer of soil containing organic material, nutrients and plant grass seed. For this reason it is an extremely valuable resource for the rehabilitation and vegetation of disturbed areas. At the beginning of the construction phase, topsoil removed for vegetation clearance must be stripped to a minimum depth of 300 mm and windrowed. All topsoil must be removed and stockpiled on the site. However, the use of topsoil for rehabilitation contaminated by the seed of alien vegetation must not be permitted unless a programme to germinate the seed and eradicate the seedlings is drawn up and approved, or some other mitigatory feature is found. This must be approved by the ECO. Single handling is recommended. Stockpiles must not be higher than 2m to avoid compaction. The soils surrounding the wingwalls and concrete aprons must be suitable loosened on completion of construction activities. Dust suppression is necessary for stockpiles older than a month – with either water or a biodegradable chemical binding agent. Backfill will require contouring to ensure that it blends in with the surrounding environment.	• Minimise scaring of the soil surface and land features. • Minimise disturbance and loss of soil. • Minimise construction footprint. • Maintain the integrity of topsoil's for future rehabilitation. • Containment of invasive plant growth.	• No visible erosion scars once construction is completed. • The footprint has not exceeded the agreed site in terms of EA etc. • Minimal invasive weed growth. • No signs of sedimentation and erosion. • Method statement.	Contractor.	Daily.
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Phase of development	CONSTRUCTION		
Impact / issue	TOLERANCES		
MITIGATION MEASURE		RESPONSIBLE PARTY	FREQUENCY OF ACTION
Fines Environmental management is concerned not only with the final results of the Contractor's operations, but also to the standard of the day-to-day operations required to complete the works. Penalties may be instituted for non-compliance. The penalty is over and above the cost of rectifying the problem and / or damage. Penalties will vary on a sliding scale from <u>R 1 000 to R 5 000</u> for non-serious issues as determined by the Engineer / RE / ECO. For each subsequent similar offence, the fine shall be doubled in value to a maximum value of <u>R 20 000</u>. The Engineer together with the ECO will decide how the penalties, if any, are to be spent on measures improving the environment. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications. The Engineer will inform the Contractor of the contravention and the amount of the fine, the amount will be deducted from the monies due in payment certificates issued under the Contract. Maximum fines for the following contraventions by either the Contractor and / or his subcontractors may be imposed by the Engineer / ECO, as follows: a) Any persons, vehicles, plant, or material related to the Contractors operation within the designated boundaries of a "no-go" area. <u>R 5 000</u> b) Persistent failure to demarcate "no-go" areas. <u>R 2 000</u> c) Damage to trees not specified to be removed. <u>R 3 000</u> d) Persistent and unrepaired oil leaks from machinery / not using a drip tray to collect waste oil and other lubricants / not using specified absorbent material to encapsulate hydrocarbon spillage / using inappropriate methods of refuelling. <u>R 3 000</u> e) Litter on site associated with construction activities. <u>R 2 000</u> f) Deliberate lighting of illegal fires on site. <u>R 1 000</u> g) Burning of waste without a permit. <u>R 2 000</u> h) Any employee eating meals on site, outside of defined eating area. <u>R 500</u> i) Employees not making use of the site ablution facilities. <u>R 2 000</u> j) Failure to implement specified noise controls. <u>R 1 000</u>		Engineer	Monitor Daily

k) Failure to empty waste bins/skips/litter structures on a regular basis. <u>R 2 000</u> l) Inadequate dust control or failure to apply dust suppression. <u>R 2 000</u> m) Any water abstraction activities from a watercourse without approval. <u>R 5 000</u> n) Inadequate handling of bitumen. <u>R 3 000</u> o) Inadequate handling of concrete. <u>R 2 000</u> Any activity, that in the reasonable opinion of the Engineer, RE and ECO, constitutes a deliberate contravention of the requirements of the specifications relating to environmental matters. <u>R 4 000</u>	Engineer	Monitor daily
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Table 6: PROPOSED PERIODIC MAINTENANCE OF TR83/1; TR83/2; TR31/5 AND MR365, OPERATIONAL PHASE EMPr (General)

Phase development of	OPERATIONAL				
Impact / issue	General				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Waste management Please refer to the waste Minimization Plan Herewith attached.		• Sustainable management of waste by recycling. • To keep the development neat and tidy. • Minimise litigation and complaints by I&AP's. • Reduce visual impact. • Control potential influx of vermin and flies thereby minimising the potential of diseases at the site and the surrounding environment.	• Disposal of refuse in an appropriate manner with no refuse polluting the development. • Development is neat and tidy. • No complaints from surrounding industries and businesses. • Sufficient containers available on site. • No visible or measurable signs of pollution of the environment (soils, ground and surface	ECO.	6 Monthly.

Phase of development	OPERATIONAL				
Impact / issue	General				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
		water).			
Stormwater Management Storm water, wherever possible, must be allowed to soak into the land in the area on which the water has been discharged. The storm water system and the discharge points must be inspected, and damaged areas must be repaired if required. Discharge points should further be inspected for blockages of any kind; these must be removed timeously to ensure the efficient operation of the storm water management system. No waste or refuse must be allowed to access the storm water infrastructure. In the event that silt runoff occurs off the development site, the cause of this must be investigated and suitable mitigation measures employed. This may include the vegetation of bare areas, installing flow diversion channels in consultation with an engineer, installing velocity reducing structures etc. For all maintenance undertaken reference must be made to recommendations in the engineer's reports. All maintenance activities must be monitored to ensure that no environmental damage occurs. All damage must be mitigated immediately.	• Minimise pollution of soil, surface and ground water resources. • Minimise the potential loss of topsoil. • Minimise the potential of flooding of the development, or its neighbouring properties.	• No evidence of pollution at the discharge points. • No evidence of silt build-up at the discharge points. • No complaints from I & AP's.	ECO.	As and when required. Monitor seasonally.	

Phase of development	OPERATIONAL				
Impact / issue	General				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
Dust Surface dust should be minimized during the operational phase of the development in order to prevent the dust from being blown to adjacent properties.	No dust blown from the development to adjacent properties.	No complaints from I&AP's.			
Atmospheric pollution Air pollution All forms of dust/air pollution must be managed in terms of the Air Quality Act No. 39 of 2004 and Dust Regulations of 2013, this includes the control of noxious and offensive gases, smoke, dust and vehicular emissions. Under no circumstances may heavy smoke be released into the air.	- Reduce visual impact. - Minimise chances of transgression of the acts controlling pollution.	- No visible signs of pollution. - No litigation due to transgression of pollution control acts. - No complaints from surrounding residents and businesses.	ECO.	Monitor daily.	
Noise pollution Noise levels shall be kept within acceptable limits, these are determined in terms of the relevant local by laws. Operation activities will remain within normal working hours (07:00am – 18:00pm).					

Phase of development	OPERATIONAL				
Impact / issue	General				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Traffic management All traffic management must be done in accordance with the National Road Traffic Act No. 93 of 1996 .		- Minimise chances of transgression of the acts controlling traffic. - Minimise traffic backlog.	- No litigation due to transgression of traffic control acts. - No complaints from surrounding industries and businesses.	ECO.	Monitored continually.
Flora & Fauna The following mitigation measures were identified by the Terrestrial specialist (STS, 2021): - Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2014). - Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards. - Monitoring of relocation success should continue for at least					

Phase development of	OPERATIONAL				
Impact / issue	General				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
one year after completion of the construction phase or until it is evident that the species have established self-sustaining populations.					
Freshwater Ecology The following mitigation measures were identified by the freshwater specialist (Freshwater Ecological Network (FEN) Consulting (Pty) Ltd., 2021): 1. All watercourses are to be considered “off-limits” to any vehicular activity. 2. Disturbances to the watercourses should be limited to that is essential for long-term maintenance in line with the mitigation measures presented herein. 3. Existing access roads must be used for monitoring purposes to minimise the compaction of soils and loss of riparian and instream habitat. 4. Hot spots for the build-up debris and excess sediment must be identified and when necessary, debris/excess sediment must be removed by hand to prevent future flooding and potential damage to infrastructure. In this					

Phase development of	OPERATIONAL				
Impact / issue	General				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
regard, special mention is made of periods following high rainfall and subsequent high instream water volumes. Removal of debris must be undertaken in line with the above listed construction mitigation measures. 5. The watercourses must be monitored for alien vegetation encroachment and all alien vegetation/weeds must be removed according to a suitable alien vegetation control plan. 6. Any erosion or gully formation must be identified on an ongoing basis and re-profiled and revegetated accordingly.					
Rehabilitation and Alien Clearing Management Plan Please refer to Addendum H for the Rehabilitation and Alien Clearing Management Plan.					

Table 7: PROPOSED PERIODIC MAINTENANCE OF TR83/1; TR83/2; TR31/5 AND MR365, OPERATIONAL PHASE EMPr (EA conditions)

Phase of development: Construction and Operational
Impact / issue
EA CONDITIONS
1.This Environmental Authorisation is granted for the period from date of issue until 29 August 2027: 2. The non-operational component of the Environmental Authorisation is subject to the following: 2.1 The holder must commence with all the listed activities and conclude the development activities (construction phase) by 29 August 2026. 2.2 The holder must finalise the post construction rehabilitation and monitoring requirements within a period of 6-months from the date the development activities (construction phase) is concluded. 3.The Maintenance Management Plan dated 11 May 2022 prepared by Guillaume Nel (GNEC) is adopted for a period of 10 years (until 29 August 2032) during which period all maintenance activities, monitoring requirements and reporting must be finalised. Failing which, this Environmental Authorisation shall lapse, unless the environmental authorisation is

Phase of development: Construction and Operational

Impact / issue

EA CONDITIONS

amended in accordance with the relevant process contemplated in the Environmental Impact Assessment Regulations promulgated under the National Environmental Management Act, 1998 (Act no. 107 of 1998).

4.The Holder is authorised to undertake the listed activities specified in Section B above in accordance with the Preferred Alternative described in the FBAR dated 11 May 2022 on the site as described in Section C above.

5.This Environmental Authorisation may only be implemented in accordance with an approved Environmental Management Programme (“EMPr”). A final design plan as well as specific maintenance method statements must be submitted to this Directorate as part of the EMPr.

6.The Holder shall be responsible for ensuring compliance with the conditions by any person acting on his/her behalf, including an agent, sub-contractor, employee or any person rendering a service to the Holder.

7.Any changes to, or deviations from the scope of the alternative described in section B above must be accepted or approved, in writing, by the Competent Authority before such changes or deviations may be implemented. In assessing whether to grant such acceptance/approval or not, the Competent Authority may request information in order to evaluate

Phase of development: Construction and Operational
Impact / issue

EA CONDITIONS
the significance and impacts of such changes or deviations, and it may be necessary for the Holder to apply for further authorisation in terms of the applicable legislation. 8.The Holder must in writing, within 14 (fourteen) calendar days of the date of this decision– 8.1. notify all registered Interested and Affected Parties (“I&APs”) of – 8.1.1. the decision reached on the application; 8.1.2. the reasons for the decision as included in Annexure 3; 8.1.3. the date of the decision; and 8.1.4. the date when the decision was issued. 8.2. draw the attention of all registered I&APs to the fact that an appeal may be lodged against the decision in terms of the National Appeal Regulations, 2014 (as amended) detailed in Section G below; 8.3. draw the attention of all registered I&APs to the manner in which they may access the decision; 8.4. provide the registered I&APs with the: 8.4.1. name of the Holder (entity) of this Environmental Authorisation, 8.4.2. name of the responsible person for this Environmental Authorisation, 8.4.3. postal address of the Holder,

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8.4.4. telephonic and fax details of the Holder,
8.4.5. e-mail address, if any, of the Holder,
8.4.6. contact details (postal and/or physical address, contact number, facsimile and e-mail address) of the decision-maker and all registered I&APs in the event that an appeal is lodged in terms of the 2014 National Appeals Regulations (as amended).

8.5. The listed activities, including site preparation, must not commence within 20 (twenty) calendar days from the date the applicant notified the registered I&APs of this decision.

8.6. In the event that an appeal is lodged with the Appeal Authority, the effect of this Environmental Authorisation is suspended until the appeal is decided i.e. the listed activities, including site preparation, must not commence until the appeal is decided.

9. Seven calendar days' notice, in writing, must be given to the Competent Authority before commencement of any activities. 9.1. The notice must make clear reference to the site details and EIA Reference number given above.

9.2. The notice must also include proof of compliance with the following conditions described herein: Conditions: 8, 11, 13

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and 21 9.3. Seven calendar days' notice, in writing, must be given to the Competent Authority on the commencement of any maintenance activities to be undertaken during the period that the environmental authorisation is valid. 10. Seven calendar days' written notice must be given to the Competent Authority on completion of the construction activities. 11. The draft or Environmental Management Programme ("EMPr") submitted as part of the application for Environmental Authorisation must be amended to incorporate the following — 11.1 All ECO monthly compliance monitoring reports must be submitted to this Directorate on a monthly basis. 11.2 Incorporate all the conditions of this Environmental Authorisation; 11.3 Include the final design and specific maintenance method statements. 11.4 The amended EMPr must be submitted to the Competent Authority prior to the construction activities commencing on site.

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EA CONDITIONS
12. The EMPr must be included in all contract documentation for all phases of implementation. 13. The Holder must appoint a suitably experienced Environmental Control Officer (“ECO”), for the duration of the construction and rehabilitation phases of implementation contained herein. 14. The ECO must– 14.1. be appointed prior to commencement of any works (i.e. removal and movement of soil; 14.2. ensure compliance with the provisions contained in the EMPr and conditions of the EA; 14.3. keep record of all activities on the site; problems identified; transgressions noted and a task schedule of tasks undertaken by the ECO; 14.4. remain employed until all development activities are concluded, and the post construction rehabilitation and monitoring requirements are finalised.

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15. A copy of the Environmental Authorisation, EMPr, any independent assessments of financial provision for rehabilitation and environmental liability, closure plans, audit reports and compliance monitoring reports must be kept at the site of the authorised activities and be made available to anyone on request, and where the Holder has website, such documents must be made available on such publicly accessible website.

16. Access to the site referred to in Section C must be granted, and the environmental reports mentioned above must be produced, to any authorised official representing the Competent Authority who requests to see it for the purposes of assessing and/or monitoring compliance with the conditions contained herein.

17. The Holder must, for the period during which the environmental authorisation; and EMPr remain valid ensure that compliance with the conditions of the environmental authorisation and the EMPr, is audited.

18. The frequency of auditing of compliance with the conditions of the environmental authorisation and provisions of the EMPr, must adhere to the following programme:

18.1. Auditing during the non-operational phase (construction activities):

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18.1.1. During the period which the activities have been commenced with on site until the construction of the major culvert and post construction rehabilitation and monitoring requirements have been completed, the Holder must ensure annual environmental audit(s) are undertaken and the Environmental Audit Report(s) submitted annually to the Competent Authority. 18.1.2. A final Environmental Audit Report for the construction phase (non-operational component) must be submitted to the Competent Authority within six (6) months of completion of the post construction rehabilitation and monitoring requirements. 19. The Environmental Audit Report(s), must – 19.1. be prepared and submitted to the Competent Authority, by an independent person with the relevant environmental auditing expertise. Such person may not be the ECO or EAP who conducted the EIA process; 19.2. provide verifiable findings, in a structured and systematic manner, on– 19.2.1. the level of compliance with the conditions of the environmental authorisation and the EMPr and whether this is sufficient or not; and

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19.2.2. the ability of the measures contained in the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity. 19.3. identify and assess any new impacts and risks as a result of undertaking the activity; 19.4. evaluate the effectiveness of the EMPr; 19.5. identify shortcomings in the EMPr; 19.6. identify the need for any changes to the avoidance, management and mitigation measures provided for in the EMPr; 19.7. indicate the date on which the construction work was commenced with and completed or in the case where the development is incomplete, the progress of the development and rehabilitation; 19.8. indicate the date on which the maintenance/ rehabilitation was commenced with and the progress of the rehabilitation; 19.9. include a photographic record of the site applicable to the audit; and 19.10. be informed by the ECO reports.

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20. The Holder must, within 7 calendar days of the submission of the audit report to the Competent Authority, notify all potential and registered I&APs of the submission and make the report available to anyone on request and on a publicly accessible website (if applicable).

21. The No-Go areas must be physically and clearly demarcated prior to any earthworks commencing. This area may not be used to store any materials. All construction related activities such as storage of materials and site camp establishment must occur within an identified demarcated area approved by the ECO.

22. Species of Conservation Concern must be rescued and translocated to an appropriately suitable habitat identified as identified in the EMPr.

23. Maintenance and construction activities must be undertaken during the drier summer months in order to mitigate the impact of the proposed development on the hydrological and geomorphological receiving environment.

24. Concrete works must be carefully controlled, and no concrete may be spilled within the watercourses.

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EA CONDITIONS
25. All footprint areas must immediately be revegetated after the maintenance activities are completed to expedite the recovery of the watercourse crossings post maintenance activities. 26. A final design plan of the structures and the specific method statements for the maintenance works must be submitted to the Competent Authority prior to the commencement of the maintenance activities. This final design plan and detailed method statements for maintenance must be included in the amended EMPr that must be submitted to the competent authority. 27. Should any heritage remains be exposed during excavations or any other actions on the site, these must immediately be reported to the Provincial Heritage Resources Authority of the Western Cape, Heritage Western Cape. Heritage remains uncovered or disturbed during earthworks must not be further disturbed until the necessary approval has been obtained from Heritage Western Cape. Heritage remains may only be disturbed by a suitably qualified heritage specialist working under a directive from the relevant Heritage Resources Authority. Heritage remains include: meteorites, archaeological and/or paleontological remains (including fossil shells and trace

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fossils); coins; indigenous and/or colonial ceramics; any articles of value or antiquity; marine shell heaps; stone artefacts and bone remains; structures and other built features with heritage significance; rock art and rock engravings; shipwrecks; and/or graves or unmarked human burials including grave goods and/or associated burial material.

**PROPOSED PERIODIC MAINTENANCE OF TRUNK ROAD
83/1; TRUNK ROAD; 83/2; TRUNK ROAD 31/5 AND MAIN
ROAD 365, BETWEEN LADISMITH AND RIVERSDALE,
WESTERN CAPE.**

DEA&DP Ref: 16/3/3/1/D5/16/0005/22

**(INCLUDING THE WASTE, WATER USE AND ELECTRICITY CONSUMPTION
MINIMIZATION AND MANAGEMENT PLAN)**

Prepared for:

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environmental consultants



REFERENCES

DEA&DP, 2003. A Waste Minimization Guideline Document for Environmental Impact Assessments (2003) by Common Ground in association with deVilliers Brownlie Associates.

National Environmental Management Act 107 of 1998 (NEMA)

Stellendale Village DRAFT Green Building Guidelines by Steadfast Greening, 2008

SUB SECTION 1 - INTRODUCTION

1.1 INTRODUCTION

The Western Cape Government: Department of Transport and Public Works, proponent of the proposed maintenance, will use this WASTE, WATER USE AND ELECTRICITY CONSUMPTION MINIMIZATION AND MANAGEMENT PLAN to minimize and manage waste and wastage, electricity consumption and water use in the design, construction and operational phase of the proposed development as a tool in managing the impacts of the proposed development after environmental approval from the Department of Environmental Affairs and Development Planning (DEA&DP) in terms of the NEW Environmental Impact Assessment Regulations (GN R. No. 983, GN R. No. 984 and GN R. No. 985 [4 December 2014], as amended 07 April 2017) under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), is obtained.

This document is based on the Waste Minimization Guideline Document on the DEA&DP website (by Common Ground in association with deVilliers Brownlie Associates) and the Stellendale Village DRAFT Green Building Guidelines by Steadfast Greening.

The regulation of activities that have a significant impact on the environment as well as the protection of the environment itself, have improved significantly in the last decade and a half with the promulgation of the Constitution, and general environmental legislation, such as the National Environmental Management Act (NEMA) and the National Water Act. One of the main impacts of human activities on the environment is that of waste disposal (Common Ground & deVilliers Brownlie Associates, 2003).

Waste may be in solid, liquid or gaseous form. It may be benign, toxic, or hazardous. The management of hazardous waste, with associated negative impacts on the environment, is generally covered by legislation. The longer term, cumulative impacts of relatively benign waste disposal is poorly addressed by our laws (DEA&DP Waste Minimization Guideline, 2003).

“Waste” in this document is primarily interpreted as solid waste. Waste minimization per se is not specifically legislated in South Africa at present. Similarly, there are no legal instruments that can be used to enforce reduction in wastage of electricity and water although the National Water Act No 36 of 1998 prohibits wastage of water without specifying what wastage means and how this section will be enforced. However, there are a number of laws and overarching policies that are aimed at sustainable development and

sound environmental management, and which are relevant to waste and wastage minimisation.

Wastage is defined in the Oxford Dictionary as “expend or employ to no purpose or for inadequate result, use extravagantly or ineffectually, squander”. Part of the obligation to protect the environment would be to limit wastage of resources. Thus, limiting wastage of water would fall within this obligation. So too would be limiting the wastage of electricity that results in pollution at the site of electricity generation (Common Ground & deVilliers Brownlie Associates, 2003).

SUB SECTION 2 - WASTE REDUCTION

2.1 BACKGROUND TO WASTE REDUCTION

A key element of environmentally friendly buildings is to promote awareness and change behaviour around all aspects of waste management.

Waste minimisation can therefore be assessed as a component of waste management that aims to reduce the amount of waste, which has to be disposed of. In this regard waste minimisation is aimed at tackling the causes and sources of waste rather than just trying to address and mitigate the symptoms (e.g. through treatment). Waste management can be depicted as a hierarchy, as shown in Figure 5 below. In the hierarchy, source reduction options are considered as a priority, followed by re-use and recycling options. Treatment options are considered only when acceptable waste minimisation techniques have been investigated. As a “last resort” disposal should be considered.

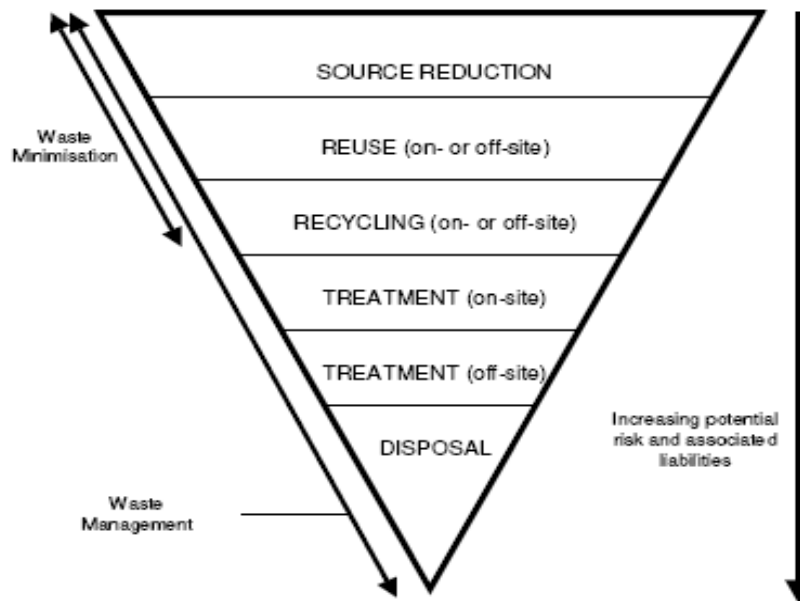


Figure 5 Waste Management Hierarchy (Common Ground & deVilliers Brownlie Associates, 2003).

Waste Management, therefore, involves interventions to minimize waste generation in the planning, operation, management and maintenance of the built environment, and includes waste prevention, waste reduction, waste re-use, and recycling.

A further aspect is minimizing the environmental and health impacts by reducing toxicity and ensuring environmentally sound treatment and disposal of remaining waste. The ultimate is however to promote a zero-waste concept where all the related materials can be used again over the longer term with life-cycle assessments, cradle to cradle.

Zero Waste is a goal, a process, a way of thinking that is different to the way we think about products and processes. Not only is Zero Waste about recycling and avoiding waste going to landfill, it also changes production and distribution systems to prevent waste from being manufactured in the first place. It is a way of changing how materials flow through society in such a way that, as in nature, they flow in a closed loop – resulting in efficient use of material and other resources, such as energy and water (Steadfast Greening, 2008).

Zero Waste therefore aims to:

- Prevent rather than manage waste.
- Turn resource that would normally be thrown away into economic value instead of loss.
- Support sustainable development.
- Follows natural processes where everything is recycled.
- Promote the efficient flow of energy and materials.

It is thus essential to ensure that waste avoidance is built into the process at a design phase, referring to the construction and maintenance of the building. This will be done through selection of the appropriate building materials and managing the construction process in a responsible manner.

Opportunities for the separation of waste at source must also be built into the design of the building to encourage people to recycle their waste.

2.2 BENEFITS OF WASTE REDUCTION

The benefits of waste reduction as described in the DEA&DP Waste Minimization Guideline (Common Ground & deVilliers Brownlie Associates, 2003) include the following benefits.

2.2.1 Financial benefits

- Reduced transportation costs for waste materials (less transportation because of less material wasted). This includes transportation to and from the site and disposal.

- Reduced disposal costs of waste materials (disposal costs are likely to rise significantly in the near future)
- Reduced purchase quantity and price of raw materials by waste minimisation.
- Reduced purchase price of new materials when considering reuse and recycling (depending on materials).
- Increased returns can be achieved by selling waste materials to be reused.

2.2.2 Environmental benefits

Some of the environmental benefits are:

- Reduced quantity of waste generated.
- Efficient use of waste generated.
- Minimised amounts of waste disposed of at landfills, which therefore extend the lifespan of landfills.
- Reduced environmental effects as a result of disposal, e.g. noise, pollution.
- Reduced transportation of waste to be disposed of (hence less noise, vehicle emission pollution, and energy used).

2.2.3 Social benefits

- Increased site safety.
- Increased work efficiency.
- Enhanced company image.
- Job creation through recycling initiatives.

2.3 GENERATED WASTE

2.3.1 Examples of waste generated during construction:

- Waste wood from cutting structural elements, broken structural elements and damaged elements from incorrect storage
- Damaged or off-cut steel components
- Off-cut electrical wiring and cabling
- Broken or off-cut tiles
- Packaging
- Off-cut and broken bricks
- Surplus material from cut and fill activities
- Spoil from cut and fill activities

- Off-cut, or broken conduit and plumbing
- Off-cut or damaged insulation elements
- Surplus paint and paint containers
- Broken or redundant plant and equipment
- Surplus concrete, cement and grouting
- General waste

SUB SECTION 3 - WASTE MINIMIZATION PLAN

3.1 WASTE MINIMIZATION DURING CONSTRUCTION

Issue	Minimization Plan
General Considerations	
Standardization of dimensions	The developer will for as far as it is economically feasible design the buildings to maximise the use of standard dimensions in order to minimize the amount of cutting waste during construction. They include but are not limited to: • The size of rooms and roofs to ensure minimal cutting of tiles; • The size of roofs to make use of standard roof trusses.
Material Selection	The developer will, for as far as it is economically feasible select: • materials for least waste generation during preparation and use during construction, • materials used in the construction which are durable in order to minimise maintenance or replacement, • standard materials to increase re-use/ recycling potential, • materials which are sourced locally.
Pre-Fabrication	The developer will, for as far as it is economically feasible make use of prefabricated components in order to minimise waste on site and permit re-use by the manufacturers of any waste generated during construction of the units.
Hazardous Substances	The developer will, for as far as it is economically feasible make use of non-hazardous substances to replace hazardous substances such as replacing asbestos with fibre glass etc.
Maintenance	The developer will, for as far as it is economically feasible design the structure of buildings in such a way that it minimizes but facilitates maintenance, in order to prolong the life-span of the structure and reduce the amount of waste resulting from demolition. The developer will, for as far as it is economically feasible design the structure of buildings in such a way that maintenance does not require the use of hazardous or toxic substances. This will ensure that minimal waste will be un-recyclable due to contamination.

Ordering	The developer will strive to order materials “just-in-time” to avoid deterioration/ breakage during storage The developer will strive to (as far as reasonably possible) order materials only from suppliers which will take back any unused/ off-spec or broken materials favoured. The developer will strive to (as far as reasonably and economically possible) order materials in bulk to reduce packaging but without over-ordering resulting in waste generation. Suppliers which take back the packaging will be favoured by the developer.
Load and unloading of materials	The construction site staff will be trained to load and unload materials correctly to avoid breakage and wastage.
Storing of materials	Care will be taken to ensure that materials are stored appropriately according to supplier specifications to reduce the risk of damage or deterioration.
The use of temporary structures	The developer will attempt to keep temporary structures on site to a minimum. Where unavoidable the temporary structures used on this site, will be re-used on other sites.
General	The contractors must provide and maintain a method statement for “solid waste management”. The method statement must provide information on the proposed licensed facility to be utilised and details of proposed record keeping for auditing purposes. For the disposal of clean building rubble, a General & Hazardous Waste Landfill sites can be utilized. • Waste shall be separated into recyclable and non-recyclable waste, and shall be separated as follows: Hazardous waste: including (but not limited to) old oil, paint,etc, • General waste: including (but not limited to) construction rubble, • Reusable construction material. Recyclable waste shall preferably be deposited in separate bins. The contractor is advised that “Collect-a-Can” collect tins, including paint tins, chemical tins, etc. and “Consol” collect glass for recycling. Any illegal dumping of waste will not be tolerated. Proof of legal dumping must be able to be produced on request. Bins must be clearly marked for ease of management. All refuse bins must have a lid secured so that animals cannot

	gain access. Under no circumstances may any waste be burnt. All waste must be managed in accordance with the Minimum Requirements for waste disposal by landfill 2nd ed 1998. The minimum requirements for easy access by waste disposal service trucks will be met in order for vehicles to effectively access the waste. All waste must be disposed of at a registered site. It is the management bodies' responsibility to ensure that the contracted party responsible for waste disposal disposes of the waste at the correct facility. This facility refers to a General & Hazardous Waste Landfill site as referred to by both the Hessequa and Kannaland Municipality Solid Waste Management Department. These landfill sites are permitted by Department Water and Forestry with operating numbers in place.
	The use of building materials which result in least amount of waste generated (e.g. pre-fabrication as opposed to on-site construction/ fabrication) will be favoured by the developer as far as economically feasible. Materials will be re-used on site wherever possible. Off-cuts and equipment will be re-used on other jobs wherever possible.

3.2 WASTE MINIMIZATION DURING OPERATION

Issue	Minimization Plan
General Considerations	
General	Owners of properties will be encouraged to separate waste into recyclable and non-recyclable waste, and shall be separated as follows: • Hazardous waste: including (but not limited to) old oil, paint, etc, • General waste: including (but not limited to) domestic refuse, non- recyclable waste; • Recyclable waste shall preferably be deposited in separate bins. The owners will be advised that "Collect-a-Can" collect tins, including paint tins, chemical tins, etc. and "Consol" collect glass for recycling. Bins must be clearly marked for ease of management. All refuse bins must have a lid secured so that animals cannot

	gain access. Sufficient closed containers must be strategically located around the development to handle the amount of litter, wastes, rubbish, debris generated by the development. Under no circumstances must any waste be burnt. All waste must be managed in accordance with the Minimum Requirements for waste disposal by landfill 2nd ed 1998. The minimum requirements for easy access by waste disposal services must also be met in order for vehicles to effectively access the waste. All waste must be disposed of at a registered site. It is the management bodies' responsibility to ensure that the contracted party responsible for waste disposal disposes of the waste at the correct facility. This facility refers to a General & Hazardous Waste Landfill site as referred to by both the Hessequa and Kannaland Municipality Solid Waste Management Department. These landfill sites are permitted by Department Water and Sanitation with operating numbers in place.
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SUB SECTION 4 – WATER USE AND MANAGEMENT PLAN

4.1- WATER USE MINIMIZATION AND MANAGEMENT DURING CONSTRUCTION AND OPERATION

CONSTRUCTION PHASE	
Issue	Management Plan
General Considerations	
DUST SUPPRESSION	Potable water cannot (as far as possible) be used as a means of dust suppression, alternative measures must be sourced. The use of 'grey' water must be investigated as an alternative. The contractor will be responsible to source this water and obtain the required approvals.
ABLUTIONS	The developer will reuse as much of the water from wash basins on site as possible.
CONCRETE AND CEMENT PREPARATION	The developer/contractor will order concrete and cement from supplier for as far as possible. The mixing area should contain any liquids to prevent contamination of soil and storm water
GENERAL CLEANSING OPERATIONS	All hoses will be fitted with trigger gun spray nozzles to limit wastage. Dry sweeping will be used (for as far as possible) in preference to washing of areas and equipment. Wherever possible biodegradable and non-toxic detergents, soaps and degreasers will be used. Regular Maintenance of equipment will be conducted in order to prevent wastage.

OPERATIONAL PHASE	
WATER WISE LANDSCAPING	The developer will focus on the use of indigenous water wise planting and irrigation methods (if necessary), such as drip irrigation, which can drastically reduce garden water consumption. If biodegradable, non-toxic soaps, shampoos and detergents are used exclusively in the structure, these wastewater streams can

	be directed to catch ponds for re-use as irrigation.
WATER SOURCES	The capture and use of rainwater from gutters and roofs will be promoted amongst owners of the new erven
ABLUTIONS	Washbasin taps should be fitted with flow reduction devices or aerators. Toilets will be fitted with dual flush systems.

SUB SECTION 5 – ELECTRICITY MANAGEMENT PLAN

5.1 ELECTRICITY CONSUMPTION REDUCTION OPERATION

Using energy efficient electrical installations is one of the cheapest and easiest ways to reduce energy costs and thus improve the economic and environmental performance of existing developments. Newer equipment is often more energy efficient than old equipment.

Choosing appliances such as energy efficient Geysers, stoves, Zero CFC based refrigerators; may initially be more expensive, although in the longer term it would reduce electrical costs and thus has a positive effect on the environment.

OPERATIONAL PHASE	
General Considerations	
AIRCONDITIONING	The buildings will as far as possible be positioned or orientated to optimise use of ambient weather and climate conditions for heating and cooling. Solar glazing or energy efficient windows to reduce need for air-conditioning will be promoted. Insulation to reduce the need for air-conditioning will be promoted. Natural air flow must be used in preference to air-conditioning wherever possible.
LIGHTING	Natural light will be used wherever possible during the day in preference to artificial light (trade-off between using large windows for use of sunlight but this may require additional air-conditioning) Low voltage or compact fluorescent and/or High-Pressure Sodium lights will be used in place of incandescent globes.
REFRIGERATION	Should it be used on the premises, consideration must be given to fit cold rooms and freezers with counter-weight doors to ensure that they cannot be left open unnecessarily.
HEATING	The use of solar heating will be investigated and utilized as far as economically feasible.

ANNEXURE 1 DECLARATION OF UNDERSTANDING BY THE DEVELOPER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

ANNEXURE 2 DECLARATION OF UNDERSTANDING BY THE ENGINEER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

ANNEXURE 3 DECLARATION OF UNDERSTANDING BY THE CONTRACTOR

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

ANNEXURE 4 INCIDENT AND ENVIRONMENTAL LOG

ENVIRONMENTAL INCIDENT LOG				
Date	Env. Condition	Comments <i>(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)</i>	Corrective Action Taken <i>(Give details and attach documentation as far as possible)</i>	<u>Signature</u>

ANNEXURE 5 METHOD STATEMENTS

Method Statements for the proposed maintenance activities according to the Freshwater Specialist Study conducted by FEN Consulting (2021).

Construction Phase:

<u>Proposed Maintenance Activity</u>	Clearing of vegetation and litter (where applicable) in the crossing (culverts) structure and the watercourse (applicable to most of the crossing assessed).
<u>Actions</u>	• Compaction of riparian soil and disturbance of vegetation due to maintenance personnel in the active channel of the watercourse. • Potential proliferation of alien and invasive vegetation species due to disturbance.
<u>Impacts</u>	• Exposure of soil, leading to increased runoff and erosion, and thus increased sedimentation of the watercourses. • Loss of freshwater habitat and ecological structure resulting in impacts on biota;
<u>Severity of the impacts according to the DWS Risk Assessment conducted by Freshwater Specialist</u>	The result of the DWS Risk Assessment was a Low Risk
<u>Mitigation measures</u>	• It is considered imperative that the proposed maintenance activities occur during the drier summer periods, to minimize any impact on the hydrological functioning of the watercourses. • Contractor laydown areas (if applicable) are to be established outside the delineated watercourses, and only for a short duration (approximately 1 month), in consultation with the appropriate authority.

- All maintenance footprint areas to remain as small as possible and vegetation clearing to be limited to what is essential and may not extend beyond the road reserve.
- The watercourses should be demarcated with danger type by an ECO and marked as a 'nogo' area where no vegetation clearing activities area planned.
- All alien and invasive vegetation species, debris and litter removed from the crossing must be removed from site (no stockpiling allowed).
- Any sediment or silt removed from the watercourses may be temporarily stockpiled in the road reserve but outside the watercourse, for the duration of the day's work. These stockpiles may not exceed 2 m in height, and their footprint should be kept to a minimum. Stockpiling of removed materials may only be temporary (may only be stockpiled during the period of clearing at a certain crossing point) and should be disposed of at a registered waste disposal facility.
- The clearing activities should be limited to only what is necessary.
- Only authorised maintenance personnel may be permitted to enter the watercourse as part of the clearing activities to prevent excessive compaction of the soils within the watercourse.
- It is preferred that no machinery be used as part of the clearing activities. All vegetation and sediment removal should be undertaken by hand or with the use of handheld equipment.

<u>Proposed Maintenance Activity</u>	Concrete activities in the watercourses, with focus on new concrete structures or major repairs; construction of new headwalls, apron slab and wingwalls, replacement of headwalls and recasting of abutment and wingwalls. Concrete activities within the delineated watercourses, with focus on minor repairs, such as the filling of cracks: Repair activities with cementation mortar associated with large rivers and EDLs; and replacing the Amco barrel with precast barrel and fill remaining space with self-compacting concrete.
<u>Actions</u>	• Disturbances to soil of the watercourses. • Removal of topsoil and creation of stockpiles. • Uncontrolled trampling of vegetation by personnel within the watercourses.
<u>Impacts</u>	• Disturbance to soil leading to increased alien vegetation proliferation, and in turn to further altered watercourse habitat. • Potential erosion and gully formation as a result of disturbed as a result of disturbed soil and inappropriate slopes resulting in sedimentation of the watercourses. • Potential contamination of soil and surface water as a result of concrete works, leading to further reduced ability to support biodiversity. • Compaction of soil, disrupting the growth medium of the watercourse vegetation. • Disruption to the embankment of the watercourses, potentially causing sedimentation.
<u>Severity of the impacts according to the DWS Risk Assessment</u>	The result of the DWS Risk Assessment was a Low Risk

<u>conducted by Freshwater Specialist</u>	
<u>Mitigation measures</u>	• It is considered imperative that all works be undertaken during the drier summer months to limit surface water contamination and the need for any surface water diversion during the construction works (diverting the flow of water through a pipe or an excavated channel was not included as part of this risk assessment). • Limit construction equipment within the watercourses to what is essential. • Excavated materials should not be contaminated (with hydrocarbons, fuel), and should be ensured that the minimum surface area is taken up. Stockpiles may not exceed 2m in height. • The soil surrounding the headwalls must be suitably loosened on completion of construction activities and revegetated to prevent erosion. • All exposed soil must be protected for the duration of construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) to prevent erosion and sedimentation of the watercourse near these stockpiles. • Ensure alien and invasive plant species are managed post construction until suitable basal cover is achieved. • Avoid unnecessary trampling of vegetation irrespective of the vegetation being associated with the watercourses or the surrounding terrestrial area. • Fresh concrete and cement mortar should not be mixed near the watercourses. Mixing of cement may be done within the construction camp, however, may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer. Consideration must be taken to

	use ready mix concrete. • No mixed concrete shall be deposited directly onto the ground within the watercourses (outside of the designated area) or associated riparia habitat. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; • A washout area should be designated outside of the watercourses, and wash water should be treated on-site or discharged to a suitable sanitation system; • Cement bags must be disposed of in the demarcated hazardous waste receptacles and the used bags must be disposed of through the hazardous substance waste stream; and • Spilled or excess concrete must be disposed of at a suitable landfill site. Chain of custody documentation must be provided.
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<u>Proposed Maintenance Activity</u>	Installation of ripraps, a gabion mattress.
<u>Actions</u>	• Disturbance to soil. • Removal of vegetation.
<u>Impacts</u>	• Increased sedimentation as a result of disturbances. • Potential loss of indigenous vegetation (if present) and the proliferation of alien floral species due to disturbances.
<u>Severity of the impacts according to the DWS Risk Assessment</u>	The result of the DWS Risk Assessment was a Low Risk

<u>conducted by Freshwater Specialist</u>	
<u>Mitigation measures</u>	• The clearing of vegetation within the footprint area must be kept to a minimum to avoid unnecessary disturbance within the active channel. • Material used as rip rap or to fill the gabion basket should be in situ material preferably originating from the surrounding area, however it must be sustainably sourced. Alternatively, any imported material must be weed free and not be contaminated by any potential pollutants. • Once gabions are constructed and/or the rip rap installed, the surrounding natural embankments should be reprofiled and revegetated with indigenous species as soon as possible. • Stabilisation of the banks and side slopes are required, by employing techniques, such as: - Resloping of banks to a maximum of a 1:3 slope or tied in with the upstream existing embankments. - Revegetation of re-profiled slopes with suitable indigenous vegetation, on consultation with a suitably qualified botanist. - Temporary stabilisation of slopes using geotextiles. • The gabion structures (where applicable) should be monitored for erosion and structural integrity after each rainfall event (especially during the rainy winter season) until suitable basal vegetation cover has re-established. • Use of biodegradable hessian sheeting must be made to prevent sedimentation of

downstream resources.

<u>Proposed Maintenance Activity</u>	Reshaping of the river bed to reinstate flow through bridge structure.
<u>Actions</u>	• Disturbances to soils and sediment. • Removal of vegetation.
<u>Impacts</u>	• Decreasing the habitat availability to aquatic species. • Sedimentation of downstream river reach.
<u>Severity of the impacts according to the DWS Risk Assessment conducted by Freshwater Specialist</u>	The result of the DWS Risk Assessment was a Low Risk
<u>Mitigation measures</u>	• The movement in the river must be kept to a minimum to avoid unnecessary disturbance within the active channel. • River rock/boulder removal activities may only be undertaken when no surface water is present within the specific reach of the river (during the dry summer periods) to limit any impacts to the aquatic habitat and prevent any residual downstream impacts from occurring. • Removal of boulders must be only done to ensure that the natural riverbed topography is attained, and that no excessive material are removed that can impact on the velocity of flow during high flow events. No other material may be removed. • Removed boulders may be temporarily stockpiled outside the delineated extent of the river

	but must be removed/reused in other areas (not within watercourses) and may not be left on site.
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<u>Proposed Maintenance Activity</u>	Resurfacing of the road surface (asphalt) and using of sealands
<u>Actions</u>	• Potential indiscriminate movement of construction personnel within the watercourses; • Potential of asphalt/paint to enter the watercourses; • Potential proliferation of alien and invasive species due to disturbances in the road reserve
<u>Impacts</u>	• Loss of the vegetation within the natural buffer surrounding the watercourses, potentially decreasing the habitat provisioning of the watercourses; • Potential degradation of the surface water of the watercourses, due to contaminated material entering the systems.
<u>Severity of the impacts according to the DWS Risk Assessment conducted by Freshwater Specialist</u>	The result of the DWS Risk Assessment was a Low Risk
<u>Mitigation measures</u>	• Construction personnel must be limited to the existing road reserve only, and no movement within the delineated watercourses may be permitted. • During resurfacing/painting, it must be ensured that no foreign materials (e.e. tar from the resurfacing activities) enter the watercourses.

	• Care must be taken while painting and all personnel must receive training on the risk of chemical contamination of the watercourses. • If any solid materials do enter the watercourses, they should be immediately removed and disposed at a registered water disposal facility. Paint spills on soils within and surrounding the riparian habitat should be immediately remediated.
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Operational Phase:

<u>Proposed Maintenance Activity</u>	Monitoring of the structural integrity of the major and minor structures in the watercourses.
<u>Actions</u>	• Proactive monitoring to ensure structural integrity is maintained and to identify early signs of erosion around the crossing structures. • Proactive monitoring to ensure that any litter or debris which may accumulate on and around the crossing structures is cleared to maintain the flow of water.
<u>Impacts</u>	• No direct impacted perceived.
<u>Severity of the impacts according to the DWS Risk Assessment conducted by Freshwater Specialist</u>	The result of the DWS Risk Assessment was a Low Risk
<u>Mitigation measures</u>	• All watercourses are to be considered “off limits” to any vehicular activity. • Disturbances to the watercourses should be limited to what is essential for long-term

	maintenance in line with the mitigation measures presented herein. - Existing access roads must be used for monitoring purposes to minimise the compaction of soils and loss of riparian and instream habitat. - Hot spots for the build-up of debris and excess sediment must be identified and when necessary, debris/excess sediment must be removed by hand to prevent future flooding and potential damage to infrastructure. In this regard, special mention is made of periods following high rainfall and subsequent high instream water volumes. Removal of debris must be undertaken in line with the above listed construction mitigation measures. - The watercourses must be monitored for alien vegetation encroachment and all alien vegetation/weeds must be removed according to a suitable alien vegetation control plan. Annual follow up should be undertaken to all watercourses for at least 3 years post construction. - Any erosion or gully formation must be identified on an ongoing basis and re-profiled and revegetated accordingly.
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Operational Phase:

<u>Proposed Maintenance Activity</u>	Monitoring of the structural integrity of the major and minor structures in the watercourses.
<u>Actions</u>	- Proactive monitoring to ensure structural integrity is maintained and to identify early signs of erosion around the crossing structures. - Proactive monitoring to ensure that any litter or debris which may accumulate on and around the crossing structures is cleared to maintain the flow of water.

<u>Impacts</u>	No direct impacted perceived.
<u>Severity of the impacts according to the DWS Risk Assessment conducted by Freshwater Specialist</u>	The result of the DWS Risk Assessment was a Low Risk
<u>Mitigation measures</u>	- All watercourses are to be considered “off limits” to any vehicular activity. - Disturbances to the watercourses should be limited to what is essential for long-term maintenance in line with the mitigation measures presented herein. - Existing access roads must be used for monitoring purposes to minimise the compaction of soils and loss of riparian and instream habitat. - Hot spots for the build-up of debris and excess sediment must be identified and when necessary, debris/excess sediment must be removed by hand to prevent future flooding and potential damage to infrastructure. In this regard, special mention is made of periods following high rainfall and subsequent high instream water volumes. Removal of debris must be undertaken in line with the above listed construction mitigation measures. - The watercourses must be monitored for alien vegetation encroachment and all alien vegetation/weeds must be removed according to a suitable alien vegetation control plan. Annual follow up should be undertaken to all watercourses for at least 3 years post construction. - Any erosion or gully formation must be identified on an ongoing basis and re-profiled and revegetated accordingly.

<u>Proposed Maintenance Activity</u>	Future maintenance of the crossing (including their headwalls, wingwalls, apron slabs and erosion protection (where applicable))
<u>Actions</u>	• Disturbance to or removal of vegetation while accessing culverts to carry out maintenance activities. • Disturbances to soils.
<u>Impacts</u>	• Potential loss of indigenous vegetation and further proliferation of alien floral species due to disturbances.
<u>Severity of the impacts according to the DWS Risk Assessment conducted by Freshwater Specialist</u>	The result of the DWS Risk Assessment was a Low Risk
<u>Mitigation measures</u>	• All watercourses are to be considered “off limits” to any vehicular activity. • Disturbances to the watercourses should be limited to what is essential for long-term maintenance in line with the mitigation measures presented herein. • Existing access roads must be used for monitoring purposes to minimise the compaction of soils and loss of riparian and instream habitat. • Hot spots for the build-up of debris and excess sediment must be identified and when necessary, debris/excess sediment must be removed by hand to prevent future flooding and potential damage to infrastructure. In this regard, special mention is made of periods following high rainfall and subsequent high instream water volumes. Removal of debris must

	be undertaken in line with the above listed construction mitigation measures. • The watercourses must be monitored for alien vegetation encroachment and all alien vegetation/weeds must be removed according to a suitable alien vegetation control plan. Annual follow up should be undertaken to all watercourses for at least 3 years post construction. • Any erosion or gully formation must be identified on an ongoing basis and re-profiled and revegetated accordingly.
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<u>Proposed Maintenance Activity</u>	Ongoing alien vegetation removal (if required).
<u>Actions</u>	• Proactive monitoring to ensure structural integrity is maintained and to identify early signs of erosion, incision and alien vegetation encroachment.
<u>Impacts</u>	• Compaction of soils and loss of habitat as a result of ongoing disturbance from vehicles and equipment. • Impact to water quality as a result of the application of herbicides; and • Disturbances of soils and resulting in erosion and sedimentation.
<u>Severity of the impacts according to the DWS Risk Assessment conducted by Freshwater Specialist</u>	The result of the DWS Risk Assessment was a Low Risk
<u>Mitigation measures</u>	Please refer to Addendum H for the Rehabilitation and Alien Clearing Management Plan compiled

	by GNEC for the proposed upgrade activities at the storm water infrastructures associated with watercourses.
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Method Statements for the proposed mitigatory requirements for the biodiversity according to the Terrestrial, Plant and Animal Sensitivity Verification and Impact Assessment conducted by Scientific Terrestrial Services (STS, 2021).

Pre-construction Phase:

<u>Proposed Project phase</u>	Pre-construction Phase
<u>Impact Summary</u>	• Loss of floral and faunal habitat, species, and SCC
<u>Mitigation Measures:</u> Floral and Faunal Habitat and Diversity	• Minimise loss of indigenous vegetation where possible through planning and where necessary by incorporating sensitive habitat such as watercourses as well as any other specialist studies; • Prior to the commencement of construction activities, an AIP Management/Control Plan should be compiled for implementation: - Removal of alien invasive species should preferably commence during the pre-construction phase and continue throughout the construction and operational phases. AIPs should be cleared within the identified roads before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread or soils contaminated with AIP seeds during the construction phase; and - An AIP Management/Control Plan should be implemented by a qualified professional. No chemical control of AIPs to occur without a certified professional.

<u>Mitigation Measures: Floral SCC</u>	• If the proposed development is authorised, it is advised that a walkthrough of the direct footprint areas of all activities associated with the culvert and road upgrades and road upgrades be conducted before the commencement of any development of construction activities. Should any SCC be encountered within this footprint area it must be rescued and relocated by a suitably qualified specialist either to suitable habitat (outside the development footprint) or moved to registered nurseries such as the Agricultural Research Council (ARC) or the South African National Biodiversity Institute (SANBI), Permits and authorisation must be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.
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Construction Phase:

<u>Proposed Project Phase</u>	Construction Phase
<u>Impact Summary</u>	Loss of floral and faunal habitat, species, and SCC
<u>Development Footprint</u>	• The upgrade and maintenance footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management); • Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved footprint. No clearing of vegetation is allowed on the road reserve where resurfacing will take place. Should this be the case, a walkdown must be done to identify and relocate any floral SCC; • Smaller species that are not as readily able to move out of an area ahead of ground clearing

activities such as scorpions and reptiles will be less mobile during rainfall events and cold days (winter). As such should any be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be education about these species and instructed not to kill them. Smaller scorpion species and harmless reptiles (that are likely present within the identified roads) should be carefully relocated by a suitably nominated construction person. For langer venomous snakes, a suitably trained specialist, or on-site personnel, should be contracted to carry out the relocation of the species, should it not move off on its own;

- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;
- No collection of floral SCC must be allowed by construction personnel;
- No hunting or trapping of faunal species is to be allowed by construction personnel;
- Informal fires by construction personnel should be prohibited, and no uncontrolled fires whatsoever should be allowed;
- Care should be taken during the construction operation of the proposed development to limit edge effects to surrounding natural habitat. This can be achieved by:
 - Demarcating all footprint areas during construction activities;
 - No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility;
 - All soils compacted as a result of construction activities should be ripped and profiled and

	reseeded; and - Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. • Appropriate sanitary facilities must be provided during the construction of the development and must be removed to an appropriate waste disposal site; • No dumping of litter, rubble or cleared vegetation on site should be allowed, infrastructure and rubble removed because of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility; • If any spills, occur, the should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practices, preventing the ingress of hydrocarbons into the topsoil; and • Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.
<u>Alien Vegetation</u>	• Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien

	species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2014); and • Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility that complies with legal standards.
<u>Floral and Faunal SCC</u>	• The relocation of floral SCC (if found) should be monitored during the construction phase to ensure immediate actions can be taken if it becomes evident that relocation is not successful; • No collection of floral SCC or medicinal floral species must be allowed by construction personnel; • Edge effect control needs to be implemented to prevent further degradation and potential loss of floral and faunal SCC outside of the proposed development footprint area; • No trapping or hunting of fauna whatsoever must be allowed; and • Should the presence of any faunal SCC be noted, or their breeding sites be located within the development footprint, a suitably qualified specialist should be consulted on the best way to proceed.

Operational and Maintenance Phase:

<u>Proposed Project Phase</u>	Operational and Maintenance Phase
<u>Impact Summary</u>	Loss of floral and faunal habitat, species, and SCC

<u>Alien Vegetation</u>	• Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2014); and • Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards.
<u>Floral and Faunal SCC</u>	• Monitoring of relocation success should continue for at least one year after the completion of the construction phase or until it is evident that the species have established self-sustaining populations.

ANNEXURE 6 FINAL DESIGNS

[C1125 Construction Drawings to be Printed](#)