THE ROAD UPGRADE AND MAINTENANCE OF DR1688 AND DR1699 BETWEEN CALITZDORP AND OUDTSHOORN, WESTERN CAPE.

AMENDED ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

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

DEA&DP Ref: 16/3/1/1/D3/4/0008/13

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REPORT AMENDMENTS	
AMENDMENT	**DATE**
Final EMP as part of Basic Assessment process	13 June 2014
1st Amendment of EMP	11 March 2020
2nd Amendment of EMP (now EMPr)	5 October 2020

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ABBREVIATIONS

BAR ..... Basic Assessment Report

BGCMA ..... Breede-Gouritz Catchment Management Agency

CA ..... Competent Authority

CBA ..... Critical Biodiversity Area

CEMP ..... Construction Environmental Management Programme

CKDM ..... Central Karoo District Municipality

DEA&DP ..... Department of Environmental Affairs and Development Planning

DEFF ..... Department of Environment, Forestry and Fisheries

DRE ..... District Roads Engineer (Oudtshoorn)

DWS ..... Department of Water Affairs and Sanitation

EA ..... Environmental Authorisation

EAP ..... Environmental Assessment Practitioner

ECO ..... Environmental Control Officer

EIA ..... Environmental Impact Assessment

EIR ..... Environmental Impact Report

EMPr ..... Environmental Management Programme

EO ..... Environmental Officer

ESO ..... Environmental Site Officer

GA ..... General Authorisation

GNEC ..... Guillaume Nel Environmental Consultants

HWC ..... Heritage Western Cape

I&AP ..... Interested and Affected Parties

IAPS ..... Invasive Alien Plant Species

NEMA ..... National Environmental Management Act

NEM:BA ..... National Environmental Management: Biodiversity Act

NEM:WA ..... National Environmental Management: Waste Act

NWA ..... National Water Act

RDB ..... Red Data Book

RE ..... Resident Engineer

RMMP ..... River Maintenance Management Plan

WULA ..... Water Use License Application

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.

Client - Entity which applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the environmental authorisatoin and requirements of the EMPr.

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

Construction Activity - Any activity taken by the appointed construction company, including subcontractors, suppliers and personnel.

Construction Area – All areas used by the Contractor in furtherance of the implementation of the approved activity. This includes all associated areas required to complete the implementation of the activity.

Contamination - Polluting or making something impure.

Corrective (or remedial) action - Response required addressing 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.

Endangered species - A species or plant of animal which are included in the Red Data List as likely to become extinct.

Endemic species – A plant or animal that only exists in one geographic region.

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 Authorisation – Authorisation granted by the Department of Environmental Affairs, or any of the provincial departments, for an activity listed according to the NEMA Regulations, 2014 (as amended) or earlier regulations.

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".

Invasive Alien Species – plants, animals and other organisms that are non-native to a geographic region, which may cause environmental and economic harm or adversely affect human health.

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.

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.

Recycling - Collecting, cleaning, and re-using materials.

Rehabilitation – The process of returning the land in a given area, that has been disturbed to a state which approximates the state prior to any disturbance or the aforementioned activity / development.

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

Record of Decision – Authorisation granted in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999).

Significant Impact – an impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with the accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.

Specialist – a person that is generally recognised within the scientific community as having the capability of undertaking in conformance with generally recognised scientific principles, specialist studies or preparing specialist reports, including due diligence studies and socio-economic studies;

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 Client, 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.

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

REFERENCES

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

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

National Environmental Management Act 107 of 1998 (NEMA)

National Environmental Management Act, EIA Regulations, 2014 GN No. 982 (as amended)

1. INTRODUCTION AND BACKGROUND

All other approvals must be used in conjunction with this EMPr.

Guillaume Nel Environmental Consultants (GNEC), as independent environmental consultants and impact assessors, was appointed by Western Cape Government: Department of Transport and Public Works, hereafter referred to as the Client, to facilitate the Environmental Impact Assessment (EIA) process for the upgrade of DR1699 and DR1688 between Calitzdorp and Oudtshoorn in the Western Cape. The Environmental Authorisation (EA) was issued on the 13th of October 2014. Phase 1 of the road is currently under construction with Phase 2 proposed to start soon. This Environmental Management Programme (EMPr) will also be used during the maintenance of the road and associated infrastructure as part of the Operational Phase of the upgraded roads. The Client will use this Planning, Construction, and Operational Phase EMPr as a tool in managing the impacts of the proposed activities.

This document is based on the EMPr Guideline provided by the Department of Environmental Affairs and Development Planning (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 Client's) be outweighed by the 'social benefits' (benefits to society as a results of the actions of the Client's);
- 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 National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and is focussed primarily on co-operative governance, public participation and sustainable development. The Environmental Impact Assessment Regulations GN No. R. 982, R. 983, R. 984, and R. 985 (as amended), are to regulate the procedures and criteria for the submission, processing, consideration and decision on applications for environmental authorisation of listed activities.

This EMPr contains management requirements and recommendations made by GNEC, participating specialists, and stakeholders, as well as in terms of best practice. This EMPr should be reviewed an updated to include any additional recommendations that arise from the Regulation 34 Independent Audits. After the EA is granted and the Competent Authority accepts this EMPr; the Client will be legally obligated to comply with the specifications of the EMPr and conditions of the EA.

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 Client (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 Client, Engineer, the Onsite Engineer (RE), Contractor, and sub-contractor (would be appointed by 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 RE, EO and ECO on a regular basis in this regard.

2. PROPOSED ACTIVITY AND LOCAL CONTEXT

The Western Cape Department of Transport & Public Works are currently busy with Phase 1 of the upgrading of Divisional Road 1688 (Old Concrete Road) and surface of Divisional Road 1699 (Station Road) near Calitzdorp.

Divisional Road 1688 start at the intersection with Trunk Road 31/6 in Caltitzdorp and continues for 43.07 km in a South Easterly direction toward Oudtshoorn where it again ties in with Trunk Road 31/6, better known as Route 62. Divisional Road 1699 start at the intersection with Divisional Road 1688 and continues for 1.20km to where it intersects with Divisional Road 1661 near the Calitzdorp Station.

DR1688

DR1688 Existing Road Pavement Design

Description	Details
Initial Construction Date	Circa 1952
Initial surfacing	100mm thick Unreinforced Concrete (3*6m blocks)
Sub Base Course	150mm Gravel Material varying from G5-G10
Foundation	In Situ Gravel Material varying from G5-G10
Surfaced Lane Width (Km 0.00-Km25.80)	2x3.0m + 0.1m = 6.10m
Surfaced Lane Width (Km 25.80-Km43.07)	2x2.7m + 0.1m = 5.50m
Shoulders	2x2.5m Gravel

DR 1688 is a level 4, tertiary residential access collector and it serves various access roads, farms, as well as the well-known Calitzdorp Spa. The road is approximately 60 years old and is one of the first concrete roads constructed in South Africa. The total length of DR1688 is 43.07km. Due to the age and current conditions of the road it was identified as a rehabilitation project. The area investigated for rehabilitation start on the outskirts of Caltizdorp at km 1.07 and continues to the intersection with Trunk Road 31/6 at km 43.07.

Upgrading of DR1688 will entail:

DR1688 consist of a severely degraded concrete block road. This road was identified to be upgraded to a surfaced road.

Section 1 of DR1688 from km 1.07 to km 4.68 will be rehabilitated to a Class 3 road with 2 x3.4m surfaced lanes, 2 x 0.9m surfaced shoulders and 2 x 0,6m gravel shoulder using. Existing degraded culverts will be widened to tie in with the new cross section. **It is important to note that** approximately 2.5m wide, compacted gravel shoulders already exists on both sides of the road. These compacted gravel shoulders are graded on a yearly basis as part of

the maintenance procedure of the District Roads Engineer. Widening will therefore take place within this already disturbed and compacted shoulder.

Section 2 of DR1688 from km 4.68 to km 15.18 will be rehabilitated to a Class 4 road with 2 x 3.4m surfaced lanes and 2 x 0.9m gravel shoulders using.

Section 3 of DR1688 from km 15.18 to km 43.07 will be rehabilitated to a Class 4 road with 2 x 3.4m surfaced lanes and 2x 0.9 gravel shoulders using.

- A Minimum design speed of 80km/h
- 100km/h Maximum speed signage.

DR 1688 will be rehabilitated and minor adjustments will be made to the alignment to provide a roadway with an 80km/h design speed where economically feasible. The existing compacted and degraded road verges/shoulders are large enough for the proposed upgrade and widening without entering the adjacent areas containing some natural vegetation. The upgrade and widening activities of DR1688 will remain within the existing compacted road verges/shoulders. No significant vegetation will be impacted upon.

Figure 1: View taken of the compacted road verge/shoulder. This picture indicates more than 2m wide compacted gravel shoulder. The road upgrade activities will remain within the compacted degraded road verge/shoulder. The adjacent plant species towards the fence

Figure 2: This photograph clearly shows a berm that indicates that the road verge/shoulder is scraped of all vegetation during road maintenance activities on a regular basis.

DR1688 Horizontal Alignment

The current horizontal alignment was checked from the survey and the minimum curve radii were evaluated to determine the original design speed. The curves at km 1.20 and km 2.00 comply with a 60km/h and 70km/h design speed respectively. These two curves will not be altered due to lateral space constraints and as it is still close to the town of Calitzdorp it will only be signed at a lower speed limit that the rest of the roadway. The rest of the horizontal alignment allows for an 80km/h and in most cases 100km/h design speeds to be used with minimal adjustments. An 80km/h design speed will be used to evaluate and adjust the current horizontal alignment where necessary.

DR1688 Vertical Alignment

Vertically, the 43km roadway will need substantial adjustment. The foremost problem in this regard is the flat longitudinal grades that are prevalent on long sections of road. A minimum grade of 0.35% is prescribed by the PGWC Geometric Design Manual. To improve drainage along the route this value will be observed as an absolute minimum. It must be noted that it was necessary to deviate from the existing vertical alignment in certain areas to correct curves and straighten wave like features of the roadway. However, approximately 85% of the roadway is within 150mm from the original levels. The localised areas where corrections are need are tabled below.

Areas of Substantial Deviation from Original Vertical Alignment.

Kilometre Stake Value	Distance	Comments

Km 2.100 to km 4.800	2.7km	Grade created to comply with 0.35% minimum
Km 27.500 to km 29.400	1.9km	Fit and correct Vertical Alignment to comply with design speed.
Km 37.600 to km 38.800	1.2km	Fit curves to correct tie-in with bridges and comply with design speed.
Km 42.600 to km 43.100	0.5km	Fit and correct Vertical Alignment to comply with design speed

Another improvement to the vertical alignment will be to fit vertical curves inside a coinciding horizontal curve, if any. This will only be done where economically feasible. Again when considering the K-values and curve lengths for each crest or sag, consideration will be given to the validity of a design speed criteria. The effect will be to rather use desirable K-values instead of minimum K-values for the 80km/h deign speed.

DR1699

DR1699 Existing Road Pavement Design

Description	**Details**
Gravel Wearing Course	**100-150mm G6-G8 Gravel Wearing Course**
Sub Base Course	**150mm Gravel Material varying from G6-G9**
In Situ	**In Situ Gravel Material varying from G6-G9**
Road Width	**Varies between 6.0m-7.0m with localised sections of 8.0m wide**
Shoulders	**None**

DR 1699 is 1.20 km in length and was identified to be upgrade from a gravel road to a surfaced standard road. DR 1699 from km 0.00 to km 1.20 will be upgrade to a Class 4 road with 2 x 3,1m surfaced lanes and 2 x 0.9m gravel shoulders

- A Minimum design speed of 50km/h
- 60km/h Maximum speed signage.

DR 1699 will be upgraded, but very little changes will be made to the alignment and a design speed of 50km/h will be used. The existing compacted road verges/shoulders is large enough for the proposed upgrade without entering the adjacent areas which contains natural vegetation. The upgrade and widening activities of DR1699 will remain within the existing compacted/degraded road verges/shoulders.

SUMMARY OF IMPACTS ASSOCIATED WITH THE PROPOSED ACTIVITIES

Noise pollution:

There may be some temporary noise impacts during the upgrade phase; although this will not be significant seeing that the proposed upgrade of DR1699 and DR1688 extends mostly through a farming environment. During the operational phase no additional noise impacts are foreseen due to the fact that DR1699 and DR1688 are existing roads that will only be upgraded.

Heritage impact:

Since the road and road verges/shoulders has been severely disturbed and eroded in the past due to erosion, road construction, road maintenance and agricultural activities, and is covered in mostly compacted bare soil and few grasses, it is not expected that any artefacts of historical or archaeological significance will be found along the proposed roads to be widened and upgraded.

It is not foreseen that the proposed road upgrade is of any heritage significance or that the proposed road upgrade will have any significant impact on any heritage resources in the area.

Visual impact:

No significant visual impacts are expected during the construction phase, due to the fact that the proposed upgrade is situated mostly in a farming environment. During the operational phase the visual aspects will be improved due to the upgrade of the degraded road surface, the upgrade of the degraded road verges/shoulders and the upgrade and rehabilitation of the degraded culverts and bridges found along the road (DR1699 and DR1688).

Impact on fauna and flora:

The road area and road verges/shoulders (within the construction footprint) to be upgraded have been severely disturbed in the past due to erosion, road construction, road maintenance and agricultural activities. The original character of the road verges/shoulders has been permanently changed to these activities. The road verges/shoulders are disturbed and consist mostly of compacted soil and bare soil patches. No species of conservational value was detected during the site visit within the construction footprint of the road verges/shoulders. A Botanist will be appointed to conduct a Botanical Assessment and search and rescue during Spring before construction activities commences.

The non-perennial watercourse will be clearly demarcated and clearly be seen as No-Go areas. No wetland plant species will be negatively impacted upon. The areas disturbed during the culvert and pipeline upgrade will be rehabilitated by means hydro seeding these areas with indigenous seeds as per the specification list of the Botanist A freshwater assessment has been conducted.

No impacts are expected on any fauna species either.

CLIENT'S ENVIRONMENTAL MANAGEMENT POLICY AND COMMITMENTS

The Client 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.

INTERPRETATIONS

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

Further on the Client is to ensure that through the tender process, the EMPr forms part of the no contract document to be incorporated and complied with.

The Client is also to ensure that through the appointment process, the 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 upgrading will be audited for compliance to the EMPr and EA. 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 entire EMPr should be implemented during the construction and maintenance activities.

3. 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 Competent Authority (CA), Holder of the EA (HoEA), Engineer (E), Implementing Agent / Employer's Representative (ER), Onsite (Resident) Engineer (RE), Environmental Control Officer (ECO), 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.

Typical Environmental Communication Channels

The diagram below is an indication of the typical communication channels followed during the various stages of the project life cycle.

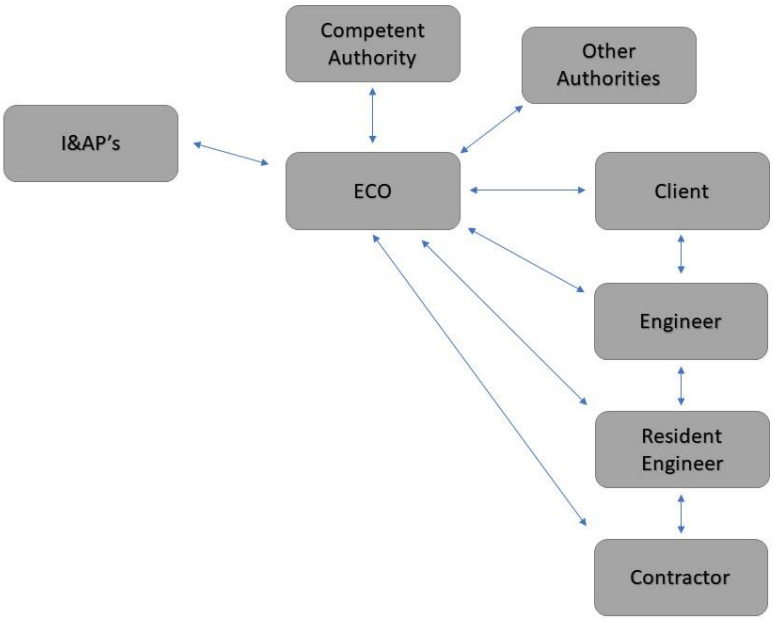

Figure 3: Reporting Structure and Role Players involved in the Implementation of the EMPr

The implementation of this EMPr requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the construction phase. The following stakeholders will be involved with the EMPr either during the construction phase, operational phase or both. The following section describes the roles and responsibilities of the various parties involved during the life cycle of the project.

The Competent Authority

The Department of Environmental Affairs and Development Planning (DEA&DP) is the competent authority responsible for issuing EAs in terms of NEMA. The DEA&DP has total authority over ensuring that the Client / Applicant complies with the conditions of the EA as well as this EMPr.

The competent authority will have the following roles to play during the construction and operational phases of the EMPr:

- Scrutinise the ECO audit reports and take the necessary action;
- DEA&DP will aid in the interpretation and implementation of the specified requirements;
- Conduct compliance inspections (frequency determined by the department) and ensure compliance with the EA and EMPr.

Other Commenting Authorities

Other commenting authorities (such as CapeNature, BGCMA, Municipal Environmental Directorates, etc.) are the commenting authorities responsible for assisting in compliance with the EA and EMPr.

The commenting authority will have the following roles to play during the construction and operational phases of the EMPr:

- Conduct Ad Hoc compliance inspections;
- Scrutinise the ECO audit reports and provide the necessary assistance / feedback.

Holder of the EA

This EMPr is to be implemented by the Holder of the EA (HoEA). The HoEA will be directly responsible for the Planning Phase of the EMPr and will have the responsibility to appoint a contractor and an ECO. The contractor must implement the Construction Phase EMPr (CEMPr) whilst the ECO will audit compliance throughout the construction period. Although the contractor is responsible for implementing the CEMPr, the holder of the EA is ultimately responsible for compliance with the conditions contained therein. The Operational Phase EMP (OEMPr) must also be implemented by the holder of the EA.

The HoEA is responsible for the impacts resulting from the actions that are undertaken and is responsible for managing these impacts during all phases. The HoEA takes full responsibility for ensuring that the EA and the EMPr, and other relevant environmental legislations are implemented and complied with.

The HoEA is responsible for:

- Obtaining the relevant authorisations/permits/wayleaves before construction commences;
- The appointment of an Environmental Control Officer (ECO) prior to the commencement of construction activities;
- Appointing an independent external auditor to conduct audits in terms of Regulation 34 of the EIA Regulations, 2014 (as amended) (where relevant) as per the frequency stipulated in the EA;
- Taking the necessary mitigatory actions to prevent and/or address any non-compliances.
- Notifying the competent authority at least seven (7) days prior to the commencement of construction (or as stipulated in the EA);
- The timeous application for any changes/amendments to the project description, conditions of the EA is communicated to the competent authority.

The Implementing Agent / Employer's Representative

The Employer's Representative (ER) has the responsibility to ensure that the HoEA responsibilities are implemented and adhered to in compliance with relevant legislation and the EA.

The ER is ultimately responsible for all on-site environmental related decisions.

The ER has the following responsibilities in terms of the implementation of the Construction phase of this EMPr and assisting the HoEA in ensuring compliance with the EA, EMPr and any other environmental related legislation:

- The ER is responsible for ensuring the HoEA has obtained the relevant authorisations/permits/wayleaves before construction commences;
- Ensuring that all conditions of the relevant authorisations/permits/wayleaves has been met;
- Ensuring that a suitably qualified ECO is appointed;
- Notify the HoEA of any non-compliance during the implementation phase of the development;
- Workshop and rectify the findings of the ECO's audit reports when needed;
- Ensuring that ECO is made aware of any changes in terms of the project;

- Approving the Contractor's method statements in conjunction with the RE (if applicable);
- Issuing fines for non-compliance in terms of the EMPr as recommended by the ECO.

The Contractor

The Contractor has the following responsibilities:

- Ensure that a copy of the EA and EMPr is available on site;
- Abidance by the contents, specifications, conditions and mitigation measures contained in this EMPr, EA and other approvals;
- Ensure that all sub-contractors and staff working on site abide by the contents, specifications, conditions and mitigation measures contained in this EMPr and specialist studies;
- Ensure that the contents of the EMPr is available and known to all parties working on site;
- Ensure that all staff and sub-contractors undergo the environmental induction training as per the Environmental Awareness Manual included in the EMPr;
- Read and take action as per the contents of the ECO audit reports.

The Environmental Control Officer

Point 11.9 of Environmental Authorisation

The independent ECO is responsible for monthly audits during construction on compliance to relevant environmental legislation, conditions of the EA, and the EMPr for the project.

The ECO shall at the request of the CA forward audit reports to the CA at a frequency determined by the CA which may be stipulated in the EA.

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

- Non-compliances with the EA, EMPr, specialist studies and other environmental legislation;
- Complaints received from landowners (I&APs) and actions taken;
- Environmental incidents, such as oil spills, concrete spills, etc. and actions taken;
- Environmental damage that needs rehabilitation measures to be taken.

The Environmental Control Officer (ECO) will be an independent environmental consultant appointed by the HoEA. The role of the ECO is to assist with the monitoring and where possible to provide guidance in terms of environmental matters. The ECO will regularly monitor and review the on-site environmental management and implementation of the construction phase of this EMPr.

The ECO is not responsible for ensuring or enforcing compliance with the EA, EMPr or any other environmental and water related legislation. This is the responsibility of the HoEA/Client and authorities. The role of the ECO is that of a monitoring and supportive function and advising the HoEA/Client of noncompliance with respect to the conditions of the EA.

PROJECT PHASE

PRE-CONSTRUCTION AND CONSTRUCTION PHASE

The Client must appoint, at his own cost, an ECO who will oversee the implementation of the EMPr and EA.

DEA&DP must be informed of the appointment of the ECO prior to construction activities (if requested by them). 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 DEA&DP must be notified of this appointment again.

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.

Point 11.8 of Environmental Authorisation

Appropriate qualified ECO

Elana Mostert

MSc Botany

Enviroworks (Pty) Ltd.

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OPERATIONAL PHASE

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

The suitable qualified independent person shall at the request of the DEA&DP forward audit reports to the Competent Authority at a frequency determined by the Competent Authority which may be stipulated in the EA.

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

- Complaints received from landowners and actions taken (should any complaints be received);
- 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.

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 Client 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.

GENERAL GUIDELINES

Guidelines as per standardised construction documentation must be used.

AWARENESS (INDUCTION) TRAINING

CONSTRUCTION PHASE

The ECO is 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 contractor site agent must ensure regular 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.

OPERATIONAL PHASE

The ECO is responsible in ensuring everyone involved in the operation of the remedial works 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.

SITE DOCUMENTATION

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 Authorisation (EA)
- Environmental Management Programme (EMPr)
- Complaints register
- Toilet cleaning slips
- Waste removal slips
- Method Statements

OPERATIONAL PHASE

The following is a list of documentation must be held on site 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 Authorisation (EA)
- Environmental Management Plan (EMPr)
- Complaints register

TOLERANCES AND NON-COMPLIANCE

The independent ECO is responsible for monthly audits on compliance to relevant environmental legislation, conditions of the EA, and the EMPr for the project.

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 at the end of this document. The Engineer, in conjunction with the ECO, shall be the judge as to what constitutes a transgression in terms of this clause.

4. GENERIC CONSTRUCTION PHASE EMPr - IMPLEMENTATION

PREAMBLE

The point of departure for the 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 all contractors and sub-contractors alike to ensure that the potential impacts of the proposed project 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 Client 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 DRE 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".

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, RE, 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.

SPECIALIST RECOMMENDATIONS

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.

Operational Phase

Additional requirements may need to be added to the table pending conditions required in the Environmental Authorisation. The last part of the table provides space for such conditions.

TABLE 1: 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
Appointments and duties of project team The contact details for the ECO, RE, Contractor, shall be completed and a copy kept on site. This document must be made available to the Competent Authority on request. Before construction activities commence, role players must have a clear indication of their role in the implementation of this EMPr. Subcontractor(s) contracts with the principle contractor must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved disposal site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMPr.	• Contingencies for minimising negative impacts anticipated to occur during the construction phase • Ensure environmental awareness and formalise environmental responsibilities and implementation	• Contract records	Project team	Prior to commencement
Public Liaison All public information boards to be erected must comply with the Municipalities Outdoor Advertising and Signage By Law, and written approval prior to the erection may be required.	• To advise the public of the construction activities to be undertaken, and to advise of the prohibition of entering demarcated "No-Go" areas	• Erection of info boards	Contractor	During Site Establishment

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
The content of the boards will essentially be to advise the public of the construction activities to be undertaken, or being undertaken. The Contractor shall make allowance for the supply, erection, maintenance, and removal of the information boards. Information boards shall also provide the name and contact number of the ECO, to ensure that the public has access to the ECO to request information and/or to lodge any complaints.				
Project contract and programme The EMPr must be included as part of the contractor appointment 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 the appointment. 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.	• Contingencies for minimising negative impacts anticipated to occur during the construction phase • Ensure environmental awareness and formalise environmental responsibilities and implementation	• Contract records	Project team	Prior to construction

Phase of development	PRE-CONSTRUCTION (PLANNING)
Impact / issue	GENERAL

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Site demarcation and development The surveys for the overall project area and construction footprint as approved in the Environmental Authorisation must be complete and clearly set out before the contractors set up their crew camps or begin construction. The ECO must be on site (contractor to inform ECO) in order to make sure the correct areas are fully demarcated, prior to construction works. Where construction in watercourses are required (with specific reference to work to be done on culverts), no construction activities are allowed outside of the demarcated road reserves. All the watercourses (excluding the irrigation system) are seasonal. Construction is therefore preferred in the drier months, however taking the dry area into account, this can be extended to whenever the riverbed is dry. Minimisation of the disturbance footprint within the road reserve: All efforts should be made to protect any remaining natural vegetation were possible between the road shoulder and the boundary fence.	• Contingencies for minimising negative impacts anticipated to occur during the construction phase	• Demarcated area's • Submission of method statements	EAP, Specialist (if required), Engineer & Contractor	As and when required

Phase of development	PRE-CONSTRUCTION (PLANNING)
Impact / issue	GENERAL

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
All areas with significant remaining natural veld should be marked on the construction maps, which must be used between the Engineers and the ECO to decide on the best construction method for that specific area. Where disturbance is unavoidable (e.g. construction of by-pass roads) the by-pass road should be placed along one side of the road, whilst protecting the road reserve on the other side of the road (which should be demarcated as No-Go areas). Ideally the side that is protected should contain the better general vegetation. **Point 11.2 of Environmental Authorisation** All existing degraded road verges will be disturbed along DR1699 and DR1688 as per approved Basic Assessment Report due to the fact that the road will be widened. The widening of the road will only expand on the existing degraded road reserves. The surrounding natural areas are seen as no go areas.				
Emergencies, non-compliance and communication The contractor **must provide method statements** on the protocols to be followed, and contingencies to be	• Contingencies for minimising negative impacts anticipated to occur during the construction phase	• Method statements	Contractor, Engineer	As and when required

Phase of development	PRE-CONSTRUCTION (PLANNING)
Impact / issue	GENERAL

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
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 location, 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 • Topsoil Management and handling • Demarcation of No-Go areas • Works to be done within watercourse • Toilet placement and manner of securing • Dust control • Bitumen handling and pre-coating Communication in emergencies must follow the suggested lines of communication as stipulated in the Typical Environmental Communication Channels as seen above.				

Phase of development	PRE-CONSTRUCTION (PLANNING)
Impact / issue	GENERAL

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
River Maintenance Guidelines • The required authorisation must be obtained from the relevant environmental authorities (DEADP) & (BGCMA) • Proper information to and training of machine operators and site personnel • The watercourses (outside the construction footprint) must be clearly cordoned off as a no go area • The construction footprint at the degraded culverts, bridges and pipelines within watercourses should be kept to a minimum • The upgraded culverts need to be rehabilitated by means of effective topsoil management where topsoil was present prior to the upgrading • Construction activities at the culverts, bridges and pipelines is preferred to be during the dry season, but taking the dry area into account, this can be extended to whenever the riverbed is dry	• Contingencies for minimising negative impacts anticipated to occur during the construction phase • Ensure environmental awareness and formalise environmental responsibilities and implementation	• Contract records • Submission of method statements	Project team	

Phase of development	PRE-CONSTRUCTION (PLANNING)
Impact / issue	GENERAL

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
• Any crossings such as bridges, pipelines or culverts should explore suitably means to allow for wild animals to move freely and safely under the road • Every possible consideration should be given to the provision of silt-trapping devices or ponds on the upstream side of the road. • The contractor needs to provide method statements of the upgrade of the culverts, bridge and pipelines at the watercourses, before any construction activities will be allowed. • According to the freshwater assessment conducted; The proposed upgrades to the existing road, needs to be undertaken in accordance with standard road building techniques and drainage management as per, for example SANRAL guidelines, and duly supervised by an Environmental Control Officer • Contractor needs to ensure that no spills, sediment laden or otherwise, occur into the irrigation system • All works on the approaches to and across the bridges must be subject to Method Statements providing protection to the riverine environments				

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Fauna and Flora **Point 11.5 of Environmental Authorisation** A Botanist has been appointed and the necessary botanical assessment and scan has been conducted: • No Red-List or species of conservation concern (SCC) or endemic species were encountered during the survey. It is thought to be highly unlikely that species of conservation concern would be impacted by the proposed road upgrade. • It must be emphasized that despite threatened status of the ecosystems through which the roads are aligned, the overall impression is that the vegetation within the road reserves is in poor, transformed condition and has low botanical sensitivity. It does not make any meaningful contribution to the conservation of the various vegetation or ecosystem types. • The present generally poor condition of the vegetation in the road reserve of the DR1699 and DR1688 means that there is nothing of concern from a botanical perspective and that proposed road-building activities would have low negative impacts.	• To protect possible fauna and flora species on the site from being exterminated	• Should sensitive species be present on the site, the correct re-establishment of these species	Contractor, Client and ECO	As and when required

Phase of development	PRE-CONSTRUCTION (PLANNING)
Impact / issue	GENERAL

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
• The road reserve is however, despite its poor condition, an important zone of natural or semi-natural habitat that should be managed to encourage a diversity of plant species. Road building activities must therefore be approached with caution to ensure that there is no further degradation of the habitat. • Should any species of conservation concern be found the Eco needs to be informed. The Eco will ensure that this species be taken to GNEC rehabilitation nursery until the end of the construction period and then planted back. **Point 11.11 of Environmental Authorisation** Should any plants of geophytes of significant value be found along the road verges/shoulders it needs to be temporarily re-located to the GNEC rehabilitation nursery. Consult the appropriate qualified ECO in this regard. The plants will be temporarily stored within the rehabilitation nursery until the end of the construction period where these plants will be planted back in the natural areas. Fauna species found during the construction activities along the road verges to be disturbed needs to be relocated to a suitable receptor site. Consult the ECO.				

Phase of development	PRE-CONSTRUCTION (PLANNING)
Impact / issue	GENERAL

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Any crossings such as bridges, pipelines or culverts should explore suitable means to allow for wild animals to move freely and safely under the road.				
Traffic Impact Comply with road rules and signs. Possible traffic disturbances as a result of the activity should be minimized as far possible. Efficient road markings must be available to inform motorists should they prefer to travel a different route. Roads must be swept on a daily basis.	• To reduce possible traffic impact to expectable standards	• The existing level of traffic	Project team	Design and implementation
Fauna and Flora All possible sensitive faunal species present on the site (if applicable) must be rescued and relocated to another suitable location prior to the commencement of construction activities. Consult the ECO.	• To protect possible fauna and flora species on the site from being exterminated.	• Should sensitive species be present on the site, the correct re-establishment of these species	Contractor and Client	Before construction commences
Topsoil The topsoil needs to be properly stored on the construction site, if applicable. Windrowing of topsoil is the preferred method to ensure the topsoil is situated where it was stripped.	• Minimise scarring of the soil surface and land features • Minimise disturbance and loss of soil • Minimise construction footprint	• No visible erosion scars once construction is completed • The footprint has not exceeded the	Contractor	Daily

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Stored topsoil must not be higher than 2m to prevent crushing of seeds. The stored topsoil must be seen as a no go area.	• Maintain the integrity of topsoil's for landscaping and rehabilitation • Containment of invasive plant growth by means of topsoil monitoring	approved site in terms of EA • Minimal invasive weed and grass growth • No signs of sedimentation and erosion		

TABLE 2: ADDITIONAL CONDITIONS CONTAINED IN THE EA

Phase of development	**PLANNING**	**EA reference number**	
Impact / issue	**EA Conditions**		**……**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
	•	•		
	•	•		

TABLE 3: 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 is 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 RE or ECO. Storm water runoff from the stockpile sites and other related areas must be filtered before entering stormwater system. Stockpiles are to be stabilised if signs of erosion are visible.	• Minimise scarring of the soil surface and land features • Minimise disturbance and loss of soil • Minimise construction footprint • Maintain the integrity of topsoil's for landscaping and rehabilitation • Containment of invasive plant growth by means of topsoil monitoring • 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 • 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
Soils from different horizons must be stockpiled such that topsoil stockpiles do not get contaminated by sub-soil material. Topsoil stockpiles must be monitored for invasive exotic vegetation growth. Contractors must remediate as and when required in consultation with the EO, RE and ECO. The Contractor shall ensure that subsoil and topsoil are not mixed during stripping, reinstatement, and rehabilitation. No plant, workforce, or any construction related activities may be allowed onto the topsoil stockpiles. **Topsoil stockpiles must be clearly demarcated as No-Go areas**. Topsoil stockpiles may not be higher than 2m to avoid compaction thereby maintaining the soil integrity and chemical composition. Stockpiling of road-building material must be confined to strictly demarcated areas such as at existing lay-bys to limit the distribution of this material in the road reserve. No topsoil stockpiles may be stored within the extent of the watercourse.				

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. These areas must be imperviously bunded with adequate containment (at least 1.1 times the volume of the fuel) for potential spills or leaks 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.	• 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
Any spills larger than 100ℓ should be reported to all relevant authorities. Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction 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 Hazardous Waste Landfill site, (this includes contaminated soils, and drenched spill kit material). No refuelling or placement of generators etc. may be done or placed within the extent of the watercourse.				
Cement **It is suggested that ready-mix cement 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 RE or ECO to ensure residues are contained and that the proposed location does not fall within sensitive	• 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
areas such as 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 mortarboards 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. No cement wash water may enter stormwater systems or watercourses. 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. All empty cement bags must be stored in a weather and scavenger proof bin. Cement dust is poisonous and will be detrimental to the environment and especially to the river.				

Phase of development	CONSTRUCTION
Impact / issue	Materials

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
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. No washing of concrete truck chutes will be allowed on site without the proper impermeable area as approved by the RE and ECO.				
DANGEROUS AND TOXIC MATERIALS **Provision of storage facilities** Materials such as fuel, oil, paint, herbicide, and insecticides must be sealed and stored in bermed 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	• 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
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 groundwater, the Regional Representative of the Breede Gouritz Catchment Management Agency (BGCMA) must be informed immediately as well as DEA&DP. Empty containers shall be removed to a 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.	• 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
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 portion of the construction camp where they do not pose a high risk in terms of water. 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.	• 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

Phase of development	**CONSTRUCTION**
Impact / issue	**Materials**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
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.				

TABLE 4: CONSTRUCTION PHASE EMPR (PERSONNEL & PLANT)

Phase of development	**CONSTRUCTION**			
Impact / issue	**PERSONNEL & PLANT**			
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 regularly. The bins are to be secure, wind, weather, and scavenger proof. Designated areas for smoking must be provided. No fires will be allowed on site. No animals, domestic or otherwise are allowed on the premises. The feeding, or leaving of food, for stray or other animals in the area are strictly prohibited. Camp followers/informal traders must not be allowed to congregate on pavements or outside the construction site. However, at the contractors 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 work place 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	PERSONNEL & PLANT			
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. **A minimum of one chemical toilet shall be provided per 15 persons.** 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 always supply toilet paper at all toilets.** 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. Should toilets be needed elsewhere, their location must first be approved by the RE 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' holidays. Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times. If workforce is found not using toilet facilities or for an insufficient number of toilets on site a penalty will be issued.	• 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, RE or EO	As and when required

Phase of development	CONSTRUCTION			
Impact / issue	PERSONNEL & PLANT			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
Waste management **Please refer to the waste minimization plan as part of this EMPr** Any illegal disposal of waste will not be tolerated. Proof of legal disposal must be able to be produced on request. All refuse bins must have a lid secured so that animals cannot gain access. Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builders' wastes generated on the site. Subcontractor(s) must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved landfill site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMPr. Proof of this undertaking must be issued to the ECO. All solid and chemical wastes that are generated must be removed and disposed of at a licensed waste disposal site. The contractor is to provide proof of such to the EO and ECO. Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site.	• 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 residents and businesses • Sufficient containers available on site • No visible or measurable signs of pollution of the environment (soils, ground and surface water) • Method statement	Contractor, EO	Daily

Phase of development	CONSTRUCTION			
Impact / issue	PERSONNEL & PLANT			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
A skip, with a cover, must be used to contain refuse from campsite bins, rubble, and other construction material. **No rubble (concrete, bricks, asphalt etc.) may be spoiled on site. Concrete rubble must be disposed at a Registered General Waste Facility and bitumen rubble must be disposed at a Registered Hazardous Waste Facility.**				
Dust The contractors must **provide and maintain a method statement for "dust control".** 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 cannot be used as a means of dust suppression, alternative measures must be sourced. The contractor will be responsible to source this water and obtain the required approvals. The construction camp shall be watered during dry and windy conditions to control dust fallout. At the end of construction, the site camp must be fully rehabilitated by removing the temporary surface, ripping the area to loosen the soil and the area must be covered with windrowed or stockpiled topsoil.	• 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	RE, Contractor, EO	Monitored daily

Phase of development	CONSTRUCTION			
Impact / issue	PERSONNEL & PLANT			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
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. Excessive dust conditions shall be reported to the ECO.				
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 ECO or RE. Cleaning and remediation must be done with products that are in line with best environmental practice i.e. Sunsorb. 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.	• 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	RE, Contractor, EO	Monitor daily

Phase of development	CONSTRUCTION			
Impact / issue	PERSONNEL & PLANT			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
All spills of hazardous substances must be reported to the RE and 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.				
Noise All construction vehicles must be in a good working order to reduce possible noise pollution. Work hours during the construction phase shall be strictly enforced unless permission is given. Permission shall not be granted without consultation with the local industries and businesses by the EO. No work to be done on Sundays. 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	• 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

Phase of development	CONSTRUCTION			
Impact / issue	PERSONNEL & PLANT			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
could reasonably have an impact on the adjacent sites. These activities could include, but are not limited to use of pneumatic jackhammers 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.				

TABLE 5: CONSTRUCTION PHASE EMPR (CONSTRUCTION)

Phase of development	**CONSTRUCTION**
Impact / issue	**GENERAL 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 EA 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. Dedicated wash areas must be situated away from any surface water sources and natural areas. 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.	• 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

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. 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.				
Fires No fires will be allowed on site. **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 contractor shall be responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed. After construction all disturbed areas needs to be shaped, ripped and spread with windrowed or stockpiled topsoil.	• 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 • All damaged areas successfully rehabilitated	Contractor, EO, ESO	As and when required
Fauna <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 specialist	• 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	RE, Contractor, EO, ESO	Monitor daily

must be called in to safely relocate the animal if the EO or ECO is not able to. All possible sensitive faunal species present on the site must be rescued and relocated to another suitable location prior to the commencement of construction activities. (Consult the ECO in this regard)				
Flora Once road rehabilitation is complete, rehabilitation of the disturbed areas must be undertaken in order to restore the aesthetic & ecological value of the area. Windrowed and/ or stockpiled topsoil must be used as far as possible to rehabilitate disturbed areas. Should there be a need for further rehabilitation in the form of hydroseeding, it is recommended that a qualified Botanist/Horticulturist, and the ECO be consulted with regard to the most appropriate rehabilitation vegetation and structures. Active re-vegetation must take place with locally indigenous seeds under the supervision of the ECO. Locally indigenous seeds need to be used during the hydro seeding of the disturbed areas/road verges/shoulders. The seed mix to be used during the rehabilitation phase should be according to the specification of a Botanist with knowledge of the specific area.	• Encourage natural habitat fauna • Minimise scarring of the soil surface and land features • Minimise disturbance and loss of topsoil • Minimise risk of veldt fires • Minimise risk of fauna and flora destruction	• No exotic plants used for landscaping • No visible erosion scars once construction is completed • The footprint has not exceeded the agreed boundaries • All damaged areas successfully rehabilitated • No veldt fires started by contractors work force • No claims from landowners for damages due to veldt fires	Contractor, EO, ESO, ECO	As and when required

All the disturbed areas at the upgraded culverts need to be rehabilitated. Windrowed and/ or stockpiled topsoil must be used as far as possible to rehabilitate disturbed areas. Should there be a need for further rehabilitation in the form of hydroseeding, it is recommended that a qualified Botanist/Horticulturist, and the ECO be consulted with regard to the most appropriate rehabilitation vegetation Rehabilitation will prevent erosion and enhance the stabilization of the embankments. The seed mix to be used during the rehabilitation phase should be according to the specification of a Botanist with knowledge of the specific area. **Point 11.5 of Environmental Authorisation** A Botanist has been appointed and the necessary botanical assessment and scan has been conducted: • No Red-List or species of conservation concern (SCC) or endemic species were encountered during the survey. It is thought to be highly unlikely that species of conservation concern would be impacted by the proposed road upgrade. • It must be emphasized that despite threatened status of the ecosystems through which the roads are aligned, the overall impression is that the vegetation within the road reserves is in poor, transformed condition and has low botanical sensitivity. It does not make any meaningful				

contribution to the conservation of the various vegetation or ecosystem types. • The present generally poor condition of the vegetation in the road reserve of the DR1699 and DR1688 means that there is nothing of concern from a botanical perspective and that proposed road-building activities would have low negative impacts. • The road reserve is however, despite its poor condition, an important zone of natural or semi-natural habitat that should be managed to encourage a diversity of plant species. Road building activities must therefore be approached with caution to ensure that there is no further degradation of the habitat. • Should any species of conservation concern be found the Eco needs to be informed. The Eco will ensure that this species be taken to GNEC rehabilitation nursery until the end of the construction period and then planted back. **Point 11.11 of Environmental Authorisation** Should any plants of geophytes of significant value be found along the road verges/shoulders it needs to be temporarily re-located to the GNEC rehabilitation nursery. Consult the appropriate qualified ECO in this regard. The plants will be temporarily stored within the rehabilitation nursery until the end of the construction				

period where these plants will be planted back in the natural areas. Plants that are proclaimed as problem plants or noxious weeds must be excluded from the landscaping plan and these must be removed immediately, should they occur on site. The contractor must rehabilitate the construction camp and any other disturbed areas once construction activities have terminated, if required. Compacted areas will be ripped and windrowed and/ or stockpiled topsoil be placed back on the disturbed areas. Topsoil need to be placed back in such a way that it blends in with the natural contour and surrounding of the natural environment. Once construction is complete, rehabilitation of un-built areas must be undertaken in order to restore the aesthetic & ecological value of the area. 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. After construction all disturbed areas needs to be landscaped with indigenous species or the topsoil stripped prior to construction.				

The management of the road reserve should not include uniform mowing of vegetation.				
Heritage No archaeological or historical material of any significance was noted on site. 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. Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist. Under no circumstances shall archaeological artefacts be removed, destroyed or interfered with. Any archaeological sites exposed during demolition or construction activities must not be disturbed prior to authorisation by the Heritage Western Cape and/or the South African Heritage Resources Agency on the appropriate provincial heritage resource agency.	• 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, RE, ESO	Monitor Daily
No-Go / sensitive areas	• Minimise the potential for the spread of the construction footprint	• No sign of movement through "no go" areas	RE, Contractor, ESO, EO	Monitor daily

Topsoil stockpiles are to 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 demarcated around areas not to be disturbed. These **No-Go areas must be demarcated with fencing / demarcation netting and signs** before any construction activities commence. These areas and the type of fencing/demarcation must be approved by the relevant specialist involved in the EIA process. The ECO must be on site (contractor to inform ECO) in order to make sure the correct areas are fully demarcated, prior to construction works. Watercourses outside the approved development footprint found along DR1699 and DR1688 are No-Go areas. No construction activities, machinery or workforce will be allowed within the watercourses outside the development footprint.	• Reduce loss of fauna and flora habitat • Minimise the potential for loss of protected and or endangered fauna and flora species	• Containment of footprint		
Access routes/haul roads Access roads for earthmoving-equipment must be clearly designated and be positioned as close as possible to the proposed development site. No driving	• Minimise loss of topsoil and enhancement of erosion • Minimise fauna and flora displacement by	• No erosion on access roads after completion of construction	Contractor, RE or EO	As required, monitor daily

off from the marked roads is permitted and designated parking areas must be identified and demarcated with applicable signage. Neither the site nor its access roads must be utilised for recreational activities, this includes but is not limited to quad bikes, 4x4's and dirt bikes. Security personnel must be informed and ensure that this is enforced. Existing access roads and paths must be utilized as far as practically possible to reach structures within watercourses. Should new accesses be required, the RE and ECO must be consulted prior to commencement. The newly created accesses must be closed and rehabilitated after the usage thereof.	destruction of natural habitats	• No loss of topsoil due to runoff water on access roads		
Crime, safety and security No site staff, other than security personnel and skeleton staff shall be housed on site unless otherwise stipulated in the Emergency Directive. 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, 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	• 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	RE, Contractor, ESO, EO	Monitor daily

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. 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 The contractor must rehabilitate the construction camp and any other disturbed areas once construction activities have terminated. Compacted areas will be ripped and windrowed and/ or stockpiled topsoil be placed back on the disturbed areas. Topsoil need to be placed back in such a way that it blends in with the natural contour and surrounding of the natural environment. Once construction is complete, rehabilitation of un-built areas must be undertaken in order to restore the aesthetic & ecological value of the area. 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. After construction all disturbed areas needs to be landscaped with indigenous species or the topsoil stripped prior to construction.	• Minimise visual impact	• No complaints from I & AP's	Contractor, landscape contractor, ESO	Monitor daily
Hydrology Increased run-off during construction must be managed using berm and other suitable structures as required to ensure flow velocities are reduced; this must be done in consultation with the RE as well as the	• Minimise pollution of soil, surface and ground water resources in the immediate and surrounding environments	• No visible signs of pollution • No signs of siltation of watercourses • No visible erosion scaring once	RE, Contractor, EO	As and when required, monitor daily

ECO. The Contractor shall take reasonable measures to control the erosive effects of storm water runoff. Storm water, wherever possible, should be allowed to soak into the land in the area on which the water fell. The contractor shall ensure that excessive quantities of sand, silt and silt-laden water do not enter the storm water system or watercourses.	• Minimise impeding the natural flow of water • Minimise the impact on natural water flow dynamics • Minimise scarring of the soil surface and land features	construction is completed • Minimum loss of topsoil		
Soil and Ground water 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 of disturbed areas. At the beginning of the construction phase, topsoil for vegetation clearance must be stripped to a minimum depth of 300 mm and stockpiled/windrowed. All topsoil must be windrowed or stockpiled on the site and protected to be reused for rehabilitation. However, the use of topsoil for rehabilitation contaminated by the seed of alien vegetation (e.g. Port Jackson, etc.) 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.	• Minimise scaring of the soil surface and land features • Minimise disturbance and loss of soil • Minimise construction footprint • Minimise sedimentation of nearby drainage lines • Maintain the integrity of topsoil's for future landscaping and 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 • Minimal invasive weed growth • No signs of sedimentation and erosion • Method statement	Contractor	Daily

Single handling is recommended. Stockpiles must not be higher than 2m to avoid compaction. Dust suppression is necessary for stockpiles older than a month – with either water or a biodegradable chemical binding agent. No driving or placement of construction material is allowed on the topsoil.				

TABLE 6: OPERATIONAL PHASE EMPR (GENERAL)

Phase of development	**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 water)	Applicant	
Rehabilitation **Point 11.6 of Environmental Authorisation** **Mitigation Measures as per Specialist Reports.** The most important mitigation measure would be to avoid causing any further disturbance of the vegetation within the road reserve. It is acknowledged that the verge of the road (a strip of 2-3 m wide) would, in future,	• Minimise scaring of the soil surface and land features • Minimise disturbance and loss of vegetation • Minimise construction footprint	• No visible erosion scars once construction is completed • Minimal invasive weed growth • No signs of sedimentation and erosion	ECO / Rehabilitation Specialist	Post construction

Phase of development	OPERATIONAL
Impact / issue	General

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
be kept clear of vegetation for safety and visibility purposes. However, there is no need to disturb the vegetation in the zone between the verge and the boundary fences. Although the latter zone is generally in poor condition, this condition can be improved by minimising disturbance which would allow the shrubs to regenerate, create greater cover and enhance species diversity and the functioning of ecological processes in the roadside vegetation. Where disturbance is unavoidable, areas that are disturbed must be monitored by an ECO and once construction is completed, such areas must be treated appropriately to enhance regeneration of the roadside vegetation. Proper topsoil management will be sufficient, where hydroseeding is proposed must a seed mix be used according to the specification of a Botanist with knowledge of the specific area. Weedy species such as Galenia africnana (kraalbos), Atriplex semibaccata, Atriplex lindleyi subsp. Inflate (blasiebrak), Prosopis glandulosa (mesquite) and most importantly Salsola kali (Russian tumbleweed; rolbos) should be selectively removed prior to construction to inhibit further spread of these species along the road by construction activities. After construction these species should be actively controlled to prevent competition with more desirable species.	• Maintain the integrity of topsoil for future rehabilitation • Containment of invasive plant growth • Reduce visual impact			

Phase of development	**OPERATIONAL**
Impact / issue	**General**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
It is recommended that the management of the road reserve should **not** include uniform mowing of vegetation and should be appropriate to the persistence of the remaining fragment of natural vegetation. All the disturbed areas at the upgraded culverts and bridges need to be rehabilitated. This can be done through seeding or through proper topsoil management and shaping of steep embankments post construction to prevent erosion. Disturbed areas around the upgraded culverts should be monitored regularly. Should erosion be found or continue these areas should be targeted for active measures such as further soil stabilisation or revegetation. All alien invasive plant species must be monitored and removed for disposal at a registered organic waste transfer facility. **Point 11.4 and 11.10 of Environmental Authorisation** Please refer to Table 2 as per Botanical Assessment Report. • No Red-List or species of conservation concern (SCC) or endemic species were encountered during the survey. It is thought to be highly unlikely that species of conservation concern would be impacted by the proposed road upgrade.				

Phase of development	OPERATIONAL
Impact / issue	General

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
• It must be emphasized that despite threatened status of the ecosystems through which the roads are aligned, the overall impression is that the vegetation within the road reserves is in poor, transformed condition and has low botanical sensitivity. It does not make any meaningful contribution to the conservation of the various vegetation or ecosystem types. • The present generally poor condition of the vegetation in the road reserve of the DR1699 and DR1688 means that there is nothing of concern from a botanical perspective and that proposed road-building activities would have low negative impacts. • The road reserve is however, despite its poor condition, an important zone of natural or semi-natural habitat that should be managed to encourage a diversity of plant species. Road building activities must therefore be approached with caution to ensure that there is no further degradation of the habitat. **Mitigation Measures as per Specialist Reports.** The most important mitigation measure would be to avoid causing any further disturbance of the vegetation				

Phase of development	**OPERATIONAL**
Impact / issue	**General**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
within the road reserve. It is acknowledged that the verge of the road (a strip of 2-3 m wide) would, in future, be kept clear of vegetation for safety and visibility purposes. However, there is no need to disturb the vegetation in the zone between the verge and the boundary fences. Although the latter zone is generally in poor condition, this condition can be improved by minimising disturbance which would allow the shrubs to regenerate, create greater cover and enhance species diversity and the functioning of ecological processes in the roadside vegetation. Where disturbance is unavoidable (as with the by-pass construction), areas that are disturbed must be monitored by an ECO and once construction is completed, such areas must be treated appropriately to enhance regeneration of the roadside vegetation. Proper topsoil management will be sufficient, where hydroseeding is proposed must a seed mix be used according to the specification of a Botanist with knowledge of the specific area. Weedy species such as Galenia africnana (kraalbos), Atriplex semibaccata, Atriplex lindleyi subsp. Inflate (blasiebrak), Prosopis glandulosa (mesquite) and most importantly Salsola kali (Russian tumbleweed; rolbos) should be selectively removed prior to construction to inhibit further spread of these species along the road by				

Phase of development	OPERATIONAL
Impact / issue	General

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
construction activities. After construction these species should be actively controlled to prevent competition with more desirable species. It is recommended that the management of the road reserve should **not** include uniform mowing of vegetation, and should be appropriate to the persistence of the remaining fragment of natural vegetation. All the disturbed areas at the upgraded culverts and bridges need to be rehabilitated. This can be done through seeding or through proper topsoil management and shaping of steep embankments post construction to prevent erosion. Disturbed areas around the upgraded culverts should be monitored regularly. Should erosion be found or continue these areas should be targeted for active measures such as further soil stabilisation or revegetation. All alien invasive plant species must be monitored and removed for disposal at a registered organic waste transfer facility.				
Storm water Management	• Minimise pollution of soil, surface and ground water resources • Minimise the potential loss of topsoil	• No evidence of pollution at the discharge points • No evidence of silt build-up at the discharge points	Road Maintenance team	As and when required Monitor seasonally

Phase of development	**OPERATIONAL**
Impact / issue	**General**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Storm water, wherever possible, must be allowed to soak into the land in the area on which the water has been discharged. No waste or refuse must be allowed to access the storm water infrastructure. In the event that silt runoff occurs, 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. All maintenance activities must be monitored to ensure that no environmental damage occurs. All damage must be mitigated immediately.	• Minimise the potential of flooding of the development, or its neighbouring properties	• No complaints from I&AP's		
Maintenance of road surface and associated infrastructure The proposed maintenance activities include, but are not limited to the activities mentioned below. • Repairs to existing headwalls • Repairs to existing wingwalls • Repairs to existing gabion and reno-mattresses	• To reduce environmental impacts during maintenance activities	• No disturbance outside the approved development footprint	Road maintenance team	As and when required

Phase of development	**OPERATIONAL**
Impact / issue	**General**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
• Removal of sediment accumulation at culvert and bridge inlets and outlets • Repairs to existing concrete apron slabs and culvert floors • Clearing encroaching vegetation at watercourse crossings, inlets and outlets • Installation of new erosion protection measures below the listed activities thresholds • Clearing of side drains				

TABLE 7: OPERATIONAL PHASE EMPR (EA CONDITIONS)

Phase of development	OPERATIONAL	GNEC	
Impact / issue	EA Conditions	Developer	.....

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
	•	•		
	•	•		

EMPr NON-COMPLIANCE PENALTIES

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 **R 300 to R 5 000** for non-serious to 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 **R 20 000.**

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:

- Any persons, vehicles, plant, or materials related to the Contractors operations within the designated boundaries of a "No-Go" area **R 5 000**
- Persistent failure to demarcate "No-Go" areas **R 2 000**
- Damage to trees not specified to be removed **R 3 000**
- 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 **R 3 000**
- Litter on site associated with construction activities **R 2 000**
- Deliberate lighting of illegal fires on site **R 3 000**
- Burning of waste without a permit **R 3 000**
- Insufficient amount of ablution facilities on site **R 1 000**
- Employees not making use of the site ablution facilities **R 300**
- Failure to implement specified noise controls **R 1 000**
- Failure to empty waste bins/ skips/ litter structures on a regular basis **R 2 000**
- Inadequate dust control or failure to apply dust suppression **R 2 000**
- Any water abstraction activities from a watercourse without approval **R 5 000**
- Inadequate handling of bitumen **R 3 000**
- Inadequate handling of concrete **R 2 000**
- The spoiling of materials outside the approved areas **R 5 000**

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 **R 4 000**

THE ROAD UPGRADE AND MAINTENANCE OF DR1688 AND DR1699 BETWEEN CALITZDORP AND OUDTSHOORN, WESTERN CAPE.

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

DEA&DP Ref: 16/3/1/1/D3/4/0008/13

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5 October 2020

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)

National Environmental Management: Waste Act 59 of 2008 (NEM:WA)

National Environmental Management Laws Amendment Act 25 of 2014

National Environmental Management: Waste Amendment Act 26 of 2014

1. INTRODUCTION

The Client, Western Cape Government: Department of Transport and Public Works, 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 activities as a tool in managing the impacts of the proposed remedial works after the Environmental Authorisation from the Competent Authority.

This document is based on the Waste Minimization Guideline Document on the DEA&DP website (by Common Ground in association with de Villiers Brownlie Associates).

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).

2. WASTE REDUCTION

2.1 BACKGROUND TO WASTE REDUCTION

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 1 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.

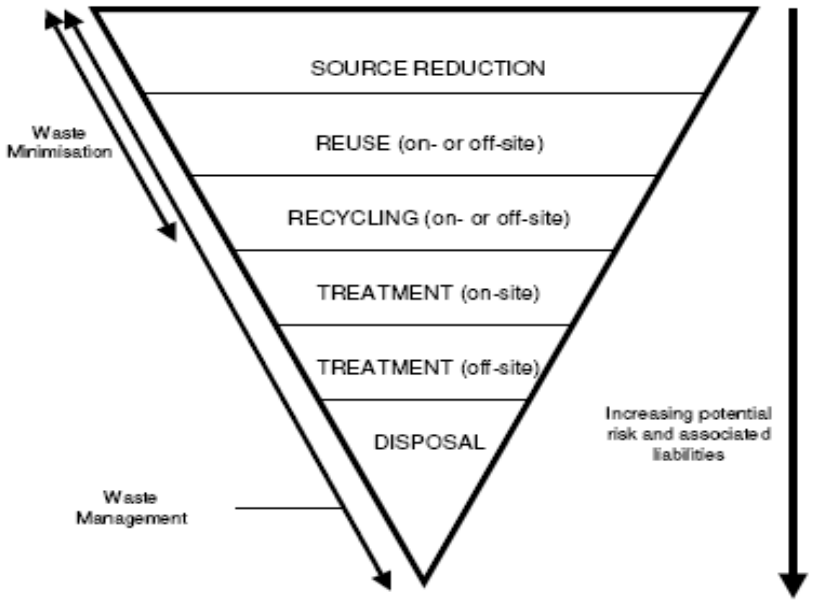

Figure 4: Waste Management Hierarchy (Common Ground & deVilliers Brownlie Associates, 2003).

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

3. WASTE MINIMIZATION PLAN

3.1 WASTE MINIMIZATION DURING CONSTRUCTION

Issue	Minimization Plan
General Considerations	
Material Selection	The Client 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 Client will, for as far as it is economically feasible make use of pre-fabricated 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 Client 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.
Ordering	The Client will strive to order materials "just-in-time" to avoid deterioration/ breakage during storage The Client 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 Client 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 Client.

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 Client 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, General 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 disposal of waste will not be tolerated. Proof of legal disposal 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 Norms and Standards in terms of NEM:WA.
	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 Client 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.

4. WATER USE AND MANAGEMENT PLAN

4.1- WATER USE MINIMIZATION AND MANAGEMENT DURING CONSTRUCTION AND OPERATION

CONSTRUCTION PHASE	
Issue	Management Plan
General Considerations	
Ablutions	The Client will re-use as much of the water from wash basins on site as possible.
Concrete and cement preparation	The Client /contractor will order concrete and cement from supplier for as far as possible. The mixing area should not allow any surface runoff, to prevent contamination of soil, storm water and/or watercourses.
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.

ANNEXURE 1 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 2 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 3 INCIDENT AND ENVIRONMENTAL LOG

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