

# Environmental and Social Management Plan (ESMP)

CONSTRUCTION TO GRAVEL STANDARD: DR 3662



**PROJECT PROPONENT**



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## 1. INTRODUCTION

The protection of the environment is an idea that has been increasingly being receiving attention as understanding of the consequences of human action on the planet has been growing. Although the concept is enshrined in the Namibian constitution, development of the necessary legislation and regulation needed to catch-up. Non-governmental Organisations played and pivotal role in elevating environmental issues be addressed for locally and internationally funded projects, even before the local legislation was in place. This was certainly instrumental in raising environmental awareness amongst practitioners in the fields of road design and construction.

These development inspired the Roads Authority (RA) in committing to environmental sustainability and thus produced its own manual (Environmental manual, 1st Edition October 2014) that seeks to inform practitioners as to the legal and contractual framework within which roads must be designed and built and to give guidance regarding the requirements of the (RA) in respect of environmental issues. Therefore the RA is fully committed to environmental protection, and complement national legislative framework, while fulfilling its mandate. Which is; "The Roads Authority aspires to manage a sustainable road sector which is ahead of national and regional socio-economic needs in pursuit of Namibia's Vision 2030." The proposed construction of the 28km long DR3662 to gravel standards is just one of the many initiatives for 2021/2022.

The DR3662 is a proclaimed road located in the Omusati Region. The road is situated in the rural areas which are underdeveloped. In terms of the Governments policy to provide rural access roads into regions previously neglected and thereby opening up underdeveloped land for further development and use, the Roads Authority on behalf of the Ministry of Works and Transport has decided to proceed with the design, tender documentation and construction to gravel standards of DR3662 from Tsandi to lipanda.

Presently these farming communities especially those between Tsandi and lipanda have very poor access to the markets in Tsandi, Outapi, Okahao or Oshakati. The construction of this road would provide improved access to the markets to these towns. With a gravel road, linking the above existing settlements to the markets it can be expected that more people will settle along the road thereby increasing the agricultural output.

The proposed works will affect an already proclaimed 28km existing earth track with limited realignment needed. At least 5000 people leaving along the development will experience long-term benefits, and also the many hundreds who will be travelling between the urban centers and rural farming areas. Especially considering that over 70% of the residents in the affected area are unemployed.

## 1.1 Objectives

The Environmental Management Plan (**EMP**) will form the basic tool for reducing the magnitude of impacts and suggesting practical measures to attain this. It is also used to measure compliance by the relevant Authorities. It is this tool that gives guidance during monitoring, auditing and taking corrective actions during its implementation, thereby ensuring continuous monitoring of the environment. It can also be drawn after the authorisation by the Competent Authority, to incorporate the conditions of the authorisation to reach environmental and social sustainability during project implementation and operation.

The objectives of the EMP are to:

- Promote sustainable development by encouraging conservation and mitigation of significant negative impacts to the natural and social environments.
- Inform the various stakeholders of their roles and responsibilities regarding environmental management in the project.
- Identify specific actions to be taken by the various stakeholders in order to prevent or minimise negative significant impacts to the natural and social environments.
- Identify laws, regulations and standards that are applicable to the environmental management of this project.
- Describe monitoring and verification procedures to be employed by the Environmental Manager to ensure that the Contractors comply with all requirements of the EMP.

***This EMP should be read with the Scoping Report, especially with Chapter 5 of the Scoping Reporting.***

## 1.2 Summary of the types of construction work to occur

Application for the Environmental Clearance from the Directorate of Environmental Affairs and Forestry (DEAF) is being made for the upgrading of the 28km DR3662 to gravel standard.

The constructions works envisaged will be as follows:

- The layer works for the entire 28km from Tsandi, via Eendombe to lipanda.
- To mitigate flooding, 28 box culverts will be constructed over depressions and pans/oshanas where rainwater collects seasonally. Please see Appendices B and C of the ESIA Scoping Report for locations of these depressions and pans.
- The widening of the existing earth track to gravel standards.
- Prospecting and mining of suitable road's layer materials will be sourced along the road in one (1) new borrow pit and also from near two (2) existing borrow pits.

- a) Borrow Pit (PB) 1: S -17.699107°, E 15.070957° (existing borrow pit)
- b) Borrow Pit 2: S -17.675794°, E 15.152216° (new borrow pit)
- c) Borrow Pit 3: S -17.742589°, E 14.880934° (existing borrow pit)

Graders, roller compactors, front loaders, excavators, survey equipment, water dozers, tipper trucks and fog spray trucks, are some of the equipment to be used during the 12 months construction period starting next year.

It is anticipated that the existing alignment will be used as far as possible with minor adjustments to comply with the Roads Authority's standards. Properly constructed accesses will be provided to adjacent settlements, villages, schools and at any other locations where it is evident that traffic accesses or leaves the road to be constructed. The positions of the intersections and accesses have to be determined through stakeholder consultations.

## **2. LEGISLATIVE FRAMEWORK**

The environmental impacts associated with the construction to gravel standard DR3662 required to be investigated in compliance with the Environmental Impact Assessment (**EIA**) Regulations published in Government Notice No. 30 of 2012 read with Section 27 of the Environmental Management Act, 2007 (Act No. 7 of 2007).

The required environmental studies encompass the undertaking of a Basic Assessment. This study was undertaken in two phases, an Environmental Scoping Study (**ESS**) Phase and the compilation of an Environmental Management Plan (EMP). The ESS provided a record of all issues identified, evaluation of the significance of identified potential impacts and their mitigation in order to make recommendations regarding the required EMP.

The proposed project is a listed activity in terms of Section 27 (2a&c) of the Environmental Management Act, 2007 (Act No. 7 of 2007) and Government Notice No. 29 of 2012 (Listed Activities, No. 3.1 & 10.1b).

The proponent was therefore required to submit a report detailing the scoping phase (Scoping Report) and an EMP. The competent authority will issue a decision subsequent to their review of the Scoping Report and EMP.

Table 1, summarises the legislation and policy guidelines that are relevant to the proposed project and is not exhaustive.

**Table 1: Relevant Legislation and Policy Guidelines**

Title of legislation, policy or guideline	Implications for proposed project (Please read all Acts with their Regulations)
The Namibian Constitution of 1990	The Constitution clearly indicates that the State shall actively promote and maintain the welfare of the people by adopting policies aimed at management of ecosystems, essential ecological processes and biological diversity of Namibia for the benefit of all Namibians, both present and future.
Water Resources Management Act No. 11 of 2013	This Act protects all water resources in Namibia. The Act also laid down conditions to ensure that proper wastewater treatment is provided, including requirement for wastewater discharge permit from the Directorate of Water Affairs.
Environmental Assessment Policy of Namibia (1995)	The Policy seeks to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.
Environmental Management Act No. 7 of 2007	The Act provides a list of projects requiring an Environmental Assessment. It aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities which may have significant effects on the environment.
Roads Authority Manuals	<p>These are various manuals all contractors are or must be aware of when dealing with road construction works in Namibia. These manuals are on, but not limited to:</p> <ul style="list-style-type: none"> <li>• Procedures Manual (1st Edition, October 2014)</li> <li>• Materials Manual (1st Edition, October 2014)</li> <li>• Structures Manual (1st Edition, October 2014)</li> <li>• Drainage Manual (1st Edition, October 2014)</li> <li>• Survey Manual (1st Edition, October 2014)</li> <li>• Geometrics Manual (1st Edition, October 2014)</li> <li>• Environmental Manual (1st Edition, October 2014)</li> <li>• Construction Manual (1st Edition, October 2014)</li> <li>• Economic Evaluation Manual (1st Edition, October 2014)</li> <li>• Standard Drawings Manual (1st Edition, October 2014)</li> </ul>
Public Health Act, No. 36 of 1919 and Amendments and Regulations	This Act makes provision for the prevention and control of infectious diseases, venereal diseases and epidemics. It also regulates sanitation, food and public water supplies.
Nature Conservation Ordinance Number 4 of 1975 (as amended)	Guide the conservation of nature; the establishment of game parks and nature reserves; the control of problem animals; and to provide for matters incidental thereto.

Labour Act No. 11 of 2007)	Consolidate and amend the labour law; to establish a comprehensive labour law for all employers and employees; to entrench fundamental labour rights and protections; to regulate basic terms and conditions of employment; to ensure the health, safety and welfare of employees; to protect employees from unfair labour practices; to regulate the registration of trade unions and employers' organisations; to regulate collective labour relations; to provide for the systematic prevention and resolution of labour disputes; to establish the Labour Advisory Council, the Labour Court, the Wages Commission and the labour inspectorate; to provide for the appointment of the Labour Commissioner and the Deputy Labour Commissioner; and to provide for incidental matters.
MEFT Policy Document - Community-Based Tourism Development (June 1995)	<p>This document contains the approved Ministry policy for providing support to, and encouraging the development of, community-run tourism activities and enterprises on communal land.</p> <p>This policy document provides a framework for ensuring that local communities have access to opportunities in tourism development and are able to share in the benefits of tourism activities that take place on their land.</p> <p>Support for the involvement of rural communities in tourism enterprises is important:</p> <p>a) to implement the government policy of giving communities access to development opportunities and</p> <p>b) because where tourism is linked to wildlife and wild landscapes, the benefits to local communities can provide important incentives for conservation of these resources.</p>
Act No.5, 1996 Nature Conservation Amendment  ACT, 1996	<p>This amend to the Nature Conservation Ordinance of 1975, provide for an economically based system of sustainable management and utilisation of game in communal areas.</p> <p>This amend allows for the formation of Conservancies in communal areas.</p>
Hazardous Substances Ordinance No. 14 of 1974	<p>The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.</p> <p>Hydrocarbons handled during the construction phase may be hazardous thus careful handling and management is vital to prevent spills, explosions, ill-health or death.</p>
Pollution Control and Waste Management Bill of 1999	The Bill promotes sustainable development and the establishment of the Pollution Control and Waste Management Unit; to prevent and regulate the discharge of pollutants to the air, water and land; to make provision for the establishment of an appropriate framework for integrated pollution prevention and control; to regulate noise, dust and odour pollution; to establish a system of waste planning and management; and to enable Namibia to comply with its obligations under international law in this regard.
Draft Wetlands Policy of 2004	This policy strives to complement existing policy instruments regarding sustainable development and sound natural resource management in Namibia. Its implementation provides a platform for the conservation and wise use of wetlands, thus promoting inter- generational equity regarding wetland resource utilisation. Furthermore, it facilitates the Nation's efforts to meet its commitments as a signatory

	to the International Convention on Wetlands (Ramsar) and other Multinational Environmental Agreements (MEA's).
National Waste Management Policy, 2010	This policy is focusing specifically on Waste Management and use of various technologies waste treatment and disposal to minimize health risks. It is also geared to have a unified waste management system country wide. This policy provides the necessary guidance on the processes related to waste management in the MOHSS, wider Namibia health and social welfare sectors, and other relevant stakeholders. It is taking into consideration the process of integrated waste management from generation to final disposal. This practice also focus on medical, household, mining, agricultural, and construction waste.
Forest Act No. 12 of 2001 and its amendments	The purpose of this Act guides the use and management of forestry and related resources. The aims of the forest management as per the Act, is to achieve manage of forest “for which forest resources are managed and developed, including the planting of trees where necessary, to conserve soil and water resources, maintain biological diversity and to use forest produce in a way which is compatible with the forest's primary role as the protector and enhancer of the natural environment.”
National Heritage Act No. 27 of 2004	The Act provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.



### **3. ROLES AND RESPONSIBILITIES**

The EMP requires the involvement of multiple stakeholders: the Proponent (RA), Resident Engineer (EMCON) and the Contractor. The following are the responsibilities of the different key stakeholders:

#### **3.1 Roads Authority (RA) and Resident Engineer (RE)**

The RA and RE should visit the project site on a regular basis to perform compliance monitoring of the Contractor's operations to this EMP and to other relevant Manuals, Conditions, Standards and Regulations. Any matters of non-compliance are communicated to the Contractor by the RE through the Site Manager.

The following are the responsibilities of the RA and RE:

- RE appoints an Environmental Manager to conduct monthly compliance audits
- Review reports regarding the implementation of the EMP.
- Give warnings and imposes fines and penalties on the Contractor if the Contractor neglects to implement the EMP satisfactorily and other relevant conditions.
- Be familiar with all aspects of the Scoping Report and EMP.
- Responsible for ensuring that the Contractor complies with this EMP throughout the project life cycles.
- Review and approve the Contractor's Management Plan based on guidance provided by this EMP.
- Monitor the Contractor's compliance to the EMP on a regular basis.
- Discuss EMP issues at every monthly site meeting with input provided by the RA, RE, Contractor and other relevant stakeholders.
- Communicate to the Contractor, verbally and in writing, regarding any matters of non-compliance.
- Ensure that land areas are properly designated according to the approved site plans, including sensitive environments and "No-Go" areas.
- Undertake damage assessments where incidents, accidents and serious infringements have occurred.
- Inspect and approve all areas that have been rehabilitated by the Contractor.
- Review complaints received and issue instructions to the Contractor as necessary.
- Maintain a record of complaints from the public and communicate the complaints to the Contractor.
- Enforce temporary work stoppages where serious environmental or health & safety infringements and non-compliances have occurred.

### 3.2 Contractor (including Sub-Contractors)

The following are the responsibilities of the Contractor:

- Fully implement the conditions stipulated in the Authorisation and Record of Decision issued by Environmental Commissioner/Directorate of Environmental Affairs and Forestry (DEAF) and any other competent regulatory body having authority over the project or the activities concerned. Read this EMP with Chapter 5 of the Scoping Report, fully implement the EMP and ensure compliance throughout the project duration.
- Appoints an Environmental Control Officer or appoint such Officer to oversee all aspects of the implementation of the EMP and communicate with the RE on all EMP-related issues.
- Prepare a Management Plan that includes Sub-Plans, Method Statements and drawings as described below in this EMP.
- Prepare and submit a monthly report concerning environmental management and health and safety issues. The report contents will cover: any training performed; status of training received by all staff and sub-contractors; copies of the Contractor's weekly Site Inspection Forms; summary of any issues or incidents concerning environmental management or health & safety, and what the Contractor has done to address the issues and incidents that have been identified by the Contractor or by the RA and RE.
- Ensure that all employees and sub-contractors on site are informed about environmental and health & safety responsibilities, practices and procedures. Perform daily inspections to monitor environmental management and health & safety performance.
- Perform weekly inspections for which Site Inspection Forms must be completed, and submit the completed Forms to the RA and RE on a monthly basis.
- Notify the RE immediately in the event of any accident or infringements of the EMP and ensure appropriate remedial action is taken. Notify the RE at least 10 working days in advance of any activity s/he has reason to believe may have significant adverse environmental impacts (including impacts on the people/community/businesses), so that mitigatory measures may be implemented timeously.
- Maintain a register of environmental management, health & safety and HIV/AIDS training for site staff and sub-contractor's staff for the duration of the contract.
- Identification and enforcement of environmental "No-Go" areas (to be approved by the RE).
- Ensure that stockpiles and construction waste is stored and disposed off according to the relevant laws, policies and guidelines. Undertake rehabilitation of all areas affected by project activities to restore them to an acceptable state, as determined by the RA and RE.
- Develop and conduct training and awareness sessions regarding: environmental management practices and procedures for the project; health & safety issues, practices and procedures for the project, and; HIV/AIDS background, prevention, testing, treatment and counselling.

#### 4. THE CONTRACTOR'S MANAGEMENT PLAN AND TRAINING

The Contractor shall submit a ***Management Plan for all activities that could be potentially harmful to the environment.*** The Management Plan shall consist of Sub-Plans and Method Statements related to: 1) environmental management, 2) waste management, 3) noise and vibration management, 4) health and safety, 5) recruiting and training workers, 6) site layout and management, and 7) site closure.

Please note: The above can be replaced with any industry's recognised standards as approved by the Roads Authority and/or Resident Engineer.

No construction or operational work may commence until the Management Plan has been approved in writing by the RE. Where necessary, changes may be made to the Management Plan, Sub-Plans and Method Statements once construction and operations have commenced. In such instances the proposed changes shall be agreed to in writing by the RE prior to implementing the change.

The Sub-Plan on environmental management shall include a list and location of all petroleum, lubricant, chemical (including concrete and cement), harmful and hazardous substances and materials on site. The Sub-plan shall describe the procedures for storage, handling, servicing and maintenance, disposal, and spillage and control procedures for these materials. The Sub-Plan shall describe how all staff and sub-contractors will be trained and informed about environmental management issues and practices.

**\*PLEASE NOTE: No explosives are allowed to be stored on site.**

The Environmental Management Sub-Plan shall specify:

- Contractor's provision of equipment to clean chemical spills and procedures to be followed in the case of chemical emergencies.
- Contractor's provision of fire suppression equipment (types, locations) and procedures to be followed in case of a fire anywhere on site.
- How the Contractor will perform dust suppression on site and for trucks in transit that transport aggregate materials.
- All emergency telephone numbers and contact persons, and how this information will be kept up to date and posted at relevant locations at all times.

The Waste Management Sub-Plan shall specify:

- How the Contractor’s waste management activities on site shall incorporate reduction, recycling, re-use and disposal of waste where appropriate.
- How the Contractor shall dispose of collected wastewater, including vehicle and equipment wash water.
- How all construction rubble and waste shall be removed from site upon completion of construction and operation activities to a licensed landfill sites.

Note that the Contractor shall supply the RE with a certificate of disposal, if applicable.

The Noise and Vibration Management Sub-Plan shall specify how the Contractor will minimise noise and vibration through:

- Monitoring of noise and vibration levels.
- Working hours restrictions.
- Timing of excavations and drilling.
- Vehicles and crushers having low noise emissions and complying with the National Regulations for noise and vibration level emissions.
- Regularly maintaining vehicles, machinery and equipment used on site
- Altering or enclosing equipment to reduce noise at the source, or to isolate it.

The Occupational Health, Wellness and Safety Sub-Plan on shall identify potential health risks and hazards associated with the construction activities, and set out plans and procedures to minimise those risks, as well as emergency procedures to follow in the event of an accident. The Sub-Plan shall describe how all staff and sub-contractors will be trained and informed about health and safety issues, and HIV/AIDS. The Sub-Plan shall specify:

- That the Contractor shall comply with Namibian health and safety laws, regulations and standards.
- Contractor’s provision of first aid equipment and supplies (types, locations), and procedures to be followed in case of an injury, accident or illness.
- All emergency telephone numbers and contact persons, and how this information will be kept up to date, posted at relevant locations at all times.

The Site Layout, Management and Closure Sub-Plan shall include:

- Site plans and written descriptions that show locations of, and provide details about, land areas to be cleared, fuel supplies, stockpile sites, offices, vehicle parking, access points, delivery points, equipment cleaning areas, lay-down areas, housing areas for personnel (incl. location of services, ablution facilities, eating areas, etc.), “No-Go” areas, etc.

- Details on the expected amount of project-related traffic, as necessary for materials hauling, construction, etc.
- Details of what is to be performed by the Contractor at site closure, such as: closure and rehabilitation of quarry pits, borrow pits, temporary roads, removal of residual stockpiles and building material, removal of all temporary structures and services, etc.

The Contractor must conduct a comprehensive, induction awareness raising and training session. All personnel working on the project, including sub-contractor staff, shall be required to complete this induction session prior to starting work. The Contractor must keep a register with signatures from all who received the training. The induction session shall cover the following topics:

- Contractor's Management Plan.
- Legal and statutory requirements.
- Concepts of due diligence and duty of care.
- Minimising potential impacts such as noise, vibration, air, soil and water quality.
- Location and protection of environmentally sensitive areas, e.g., crop fields, fruit trees, wetlands, wells, boreholes, water channels, power lines, water pipes, homesteads, schools, clinics, etc.
- Waste management and minimization.
- Washing, refuelling and maintenance of vehicles and equipment.
- Safe use of machinery, equipment and materials.
- Communication and stop work procedures.
- Emergency response procedures and contact arrangements in case of an environmental or safety incident.
- Incident reporting procedures for environmental and safety/health incidents.
- HIV/AIDS awareness and prevention: information regarding preventative actions, access to contraceptives, access to testing, access to treatment, and access to counselling services.

The Contractor shall conduct additional training and awareness raising sessions on the topics covered in the induction session for any staff of the Contractor or sub-contractors who did not attend the induction session.

The Contractor shall also conduct HIV/AIDS awareness raising and education sessions for all personnel and sub-contractors every six months for the duration of the project. The Contractor must keep a register with signatures from all who received the training.

The Contractor must demonstrate in each monthly report the status of training received for staff (and sub-contractor) member working on site.

## 5. COMMUNICATION, RECORD KEEPING, DOCUMENT CONTROL AND COMMUNITY RELATIONS

The Contractor will perform the following types of communication and record keeping:

- The Contractor shall ensure that all his/her senior staff and sub-contractors are familiar with the contents of the EMP, Scoping Report and Contractor's Management Plan.
- Keep record of significant incidents (e.g., spills, drillings and blasting impacts, complaints, and legal transgressions, as recorded in the Contractor's weekly Site Inspection Forms) as well as corrective and preventive actions taken, for submission to the RE at the scheduled monthly meetings along with copies of the Site Inspection Forms. The Contractor shall inform the RE immediately about any emergencies (including spillages) on site and along the transport routes. The Contractor shall submit a full report on the handling of the emergency as soon as possible (i.e. within the following hours or days). The following details shall be discussed in the report:
  - Nature and cause of environmental damage.
  - Type of material spilled and volume spilled.
  - Description of clean-up activities, and restoration actions taken and/or to be taken.
- Keep a register of public complaints in which all complaints are recorded, as well as action taken. The Contractor shall notify the RE of any relevant complaints lodged by a third party and provide appropriate information for inclusion in the Contractor's monthly environmental management and health & safety report.
- Keep records with signed attendance lists of all personnel and sub-contractor staff who attend training and awareness raising sessions conducted by the Contractor. This information is to be included in the Contractor's monthly environmental and health & safety report.
- Submit a monthly written report to the RE that provides details on the Contractor's compliance with the EMP and environmental & health & safety performance. The monthly report on environmental management and health & safety shall include:
  - Findings of the weekly Site Inspection Forms.
  - Notice of any major incidents and complaints and follow up actions taken.
  - Documentation of variations to the EMP, non-compliances and corrective action.
  - Confirmation that appropriate environmental and health & safety training of personnel and sub-contractors has been, and is being, undertaken.
  - Confirmation that emergency procedures are in place and have been effectively communicated to all personnel and sub-contractors.

The Contractor shall establish and maintain procedures for controlling all documents required for the EMP that shall be based on a recognised system (e.g., ISO 9000 or similar). These documentation procedures shall ensure that:

- At least one copy of the EMP shall be readily available on site at all times.
- At least one copy of the Contractor's approved Management Plan shall be readily available on site at all times.
- The Contractor shall be responsible for ensuring that documentation is kept up to date and ensure that documentation is reviewed regularly.

The Contractor shall facilitate an ongoing and constructive relationship with local communities and stakeholders adjacent to the project. This will include the following actions:

- Where necessary, the Contractor shall erect and maintain information boards in appropriate locations and positions. Such boards shall also include contact details where members of the public may address any complaints or comments they may have.
- The public shall be kept informed of any activities that may cause a disturbance, such as dust, poor bypass roads, loud and noisy construction activities.
- The Contractor shall maintain a Public Complaints Register in which all complaints are recorded.

## **6. COMPLIANCE WITH EMP**

The Contractor shall ensure that all construction staff, sub-contractors, suppliers, etc. are familiar with, understand, and adhere to this EMP. Failure by any employee of the Contractor, Sub-contractors, or Suppliers to comply with the EMP shall be considered sufficient cause for the RE to instruct the Contractor to have the relevant employee removed from the site. The RE may also order the Contractor to suspend part or all of the works if there is non-compliance with the EMP. Such suspension shall be lifted only when the offending procedure or requirement is corrected and/or if required remedial measures are put in place.

## **7. PROCEDURES REGARDING NON-COMPLIANCE**

The Contractor must fully implement and comply with the EMP on an ongoing basis throughout the duration of project activities. If and when the Contractor fails to do, the RE may impose fines and/or penalties against the Contractor. The procedures that the RE shall follow in matters of non-compliance must be described in the Contract Document between the RA, RE and with the Contractor.

## 8. CONCLUSION

The Environmental Management Plan (EMP) will form basic tool for reducing the magnitude of impacts and suggesting practical measures to attain this. It is also used to measure compliance by the RE. It is this tool that gives guidance during monitoring, auditing and taking corrective actions during its implementation, thereby ensuring continuous monitoring of the environment. This EMP was developed after an environmental assessment. Conditions of the authorisation from the Competent Authority should be incorporated and implemented in complement to his EMP.

Key sustainability principles to be emphasised include:

- Development must not irreversibly degrade the natural, built, socio-economic and governance resources on which it is based.
- Current actions should not cause irreversible damage to natural and other resources, as this potentially prevents the realisation of future sustainable options.
- Where there is uncertainty about the impact of activities on the environment, caution should be in favour of the environment.
- Land use and environmental planning need to be integrated.
- Immediate and long-term actions need to be identified and planned for, so that urgent needs can be met while still progressing towards longer-term sustainable solutions.

This EMP should be implemented throughout the project life-cycle, e.g. during pre-construction, construction, operation and decommissioning, in order to minimize negative impacts and enhance positive ones. This EMP is an effective and a practical working document that sets out the requirements and the goals required in mitigation.



## 9. PROPOSED MITIGATION MEASURES TO BE PERFORMED (Read with Scoping Report)

Table 2: Management of impacts on Biodiversity

Environmental Statement - Biodiversity Conservation					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T1.1	Loss of vegetation and Habitat	<ol style="list-style-type: none"> <li>1. The demarcation of these habitats must be done in consultation with the relevant Authorities</li> <li>2. The relevant must site the actual project footprint.</li> <li>3. Site clearance must be confined only to areas designated for as in the site layout, and unless absolutely necessary, vegetation will not be removed.</li> <li>4. Site clearance will be done mechanically, the use of fire is to be avoided.</li> <li>5. Interference with surrounding vegetation will be minimised, and only vegetation in the way of construction and operational phase will be removed.</li> </ol>	All phases	Daily	Contractor
T1.2	Death and injury of animals	<ol style="list-style-type: none"> <li>1. Avoid injury to or death of animals by reducing speed of construction vehicles.</li> <li>2. Trenches and pits must be inspected daily to monitor for trapped animals.</li> <li>3. Workers to be discouraged from killing animals and birds for food and relish.</li> </ol>	All phases	Daily	Contractor RE
T1.3	Illegal removal of vegetation	<ol style="list-style-type: none"> <li>1. Any evidence of plant theft (especially protected species) must be followed up with prosecution and penalties levied on the construction company.</li> <li>2. Construction teams will not, as a contractual obligation, be allowed to collect firewood or any other plant resources from surrounding vegetation, wetland, outcrops and riparian areas. Any evidence of this must</li> </ol>	Pre-construction and Construction	Daily	Contractor RE

		be followed up with prosecution and penalties levied on the construction company.			
T1.4	Protected species	<ol style="list-style-type: none"> <li>1. Prior to vegetation clearing, the development footprint must be surveyed for plant species of conservation concern.</li> <li>2. Protected plants occurring within the footprint should be relocated in consultation with an approved specialist after obtaining the necessary permits from authorities.</li> <li>3. All protected species occurring within the footprint should be clearly marked for the duration of the construction phase, and should remain intact and undisturbed. If this is unavoidable, the contractor must follow procedures as advised by the RE.</li> <li>4. Important flora that may become apparent at a later stage should be reported to a specialist and the authorities and be relocated or conserved.</li> <li>5. If the relocation of protected plants is impossible, the Contractor should plant 3 more the total plants of the same species to be cut at nearby homesteads and schools as directed by the RE.</li> </ol>	All phases	Continuous	Contractor
T1.5	Spreading of weeds	<ol style="list-style-type: none"> <li>1. Where alien invasive plants occur they must be uprooted, cut and /or chemically treated. (Use only authorised chemicals).</li> </ol>	All phases	Monthly	Contractor
T1.6	Management of fauna	<ol style="list-style-type: none"> <li>1. No wild animal may under any circumstance be handled, removed or be interfered with.</li> <li>2. No wild animal may be fed on site.</li> <li>3. If applicable, regularly undertake checks of the surrounding natural vegetation, in fences and along</li> </ol>	All phases	Daily	Contractor

		<p>game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site.</p> <ol style="list-style-type: none"> <li>Problem animals and vermin need to be removed by an appropriate organization or authority (i.e. such as the Ministry of Environment, Forestry and Tourism, the Police, the SPCA or a registered exterminator).</li> <li>Do not make use of any pesticides, unless approved by the RE and relevant authorities.</li> <li>Important fauna that may become apparent at a later stage should be reported to a specialist and the authorities and be relocated or conserved.</li> </ol>			
T1.7	General Conservation of biodiversity	<ol style="list-style-type: none"> <li>There was only one cultural heritage sites observed during this assessment that requires no further protection. The project engineer and the contractor should regularly communicate with relevant local authorities to identify cultural heritage sites. If such sites are found or excavated, construction should immediately stop and relevant authorities should be informed. Construction works can only resume with written approval from the relevant authorities.</li> <li>Site Management Plans depicting preferred site for construction camps, materials storage, no-go sensitive and protected areas, known borrow pits, etc. need to be developed by the contractor with the assistance of the project engineer. These plans need to be documented, refined, updated, and agreed on prior to the commencement of works at any location.</li> <li>No water should be abstracted from any source without specific written approval from relevant authorities.</li> <li>Staff members are not allowed to engage in illegal activities such poaching, illegal harvesting forest products including timber and non-timber products.</li> </ol>	All phases	Daily	Contractor

5. To minimise land degradation, no off-road driving is allowed except on demarcated access and hauling roads.
6. The confines of the site, especially haul and access roads shall be clearly marked and signposted by the contractor.
7. Access and haul roads should be rehabilitated by ripping them so to facilitated water penetration and seed bank establishment.
8. All necessary measures should be implemented to minimise fauna displacement and flora destruction.
9. No fires are allowed on site at all times, unless dually authorised by the RE.
10. Soils from areas infested with invasive flora should not be hauled from those specific areas. The risk of such species dispersing and displacing natural vegetation is very high, thus the RE should be consulted at all times to ensure that invasive plants are not accidentally dispersed.

Any person or institution or company not complying with these specifications are liable to fines and penalties as indicated in this EMP and other relevant contracts conditions, relevant laws, and regulations.

Table 3: Management of impacts on Soil

Environmental Statement - Protecting Soils					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T2.1	Degrading of soil structure	<ol style="list-style-type: none"> <li>1. Before construction, vegetation and topsoil must be stripped and stockpiled separately to prevent removal and compaction by vehicles. It must be used for future rehabilitation purposes.</li> <li>2. Topsoil shall be stockpiled in heaps not exceeding 2.0m in height and be protected from erosion.</li> <li>3. Re-usable subsoil stripped from construction sites must be stockpiled separately and clearly identified as such.</li> <li>4. Soil must not be stockpiled on drainage lines.</li> <li>5. Deficiency of backfill material will not be made up by excavation within the remainder of the development area. Where backfill material is deficient, it must be made up by importation from an approved borrow pit.</li> </ol>	Pre-construction and Construction	Weekly	Contractor
T2.2	Soil erosion	<ol style="list-style-type: none"> <li>1. No excavation of aggregates will occur within 50 metres of the site boundary.</li> <li>2. Appropriate soil erosion and control procedures must be applied to all embankments that are disturbed and destabilized.</li> <li>3. Movement of equipment and earth-moving machinery to be restricted to designated roads.</li> <li>4. Steep slopes to be avoided during planning and establishment of access roads.</li> <li>5. Surface run-off hump should be made to direct water flow into vegetated surfaces.</li> </ol>	Pre-construction and Construction  Operational	Daily  Weekly	Contractor

		<ol style="list-style-type: none"> <li>6. Disturbed terrains should be tilled and re-seeded with local vegetation or re-vegetated.</li> <li>7. Disturbed steep slopes should be supported with surface rock gladding or vegetation.</li> <li>8. Excavated areas will be backfilled to avoid unnecessary accumulation of surface water and high velocity overflow.</li> <li>9. Occurrence of erosion should also be monitored during operational phase and corrective measures taken if necessary.</li> <li>10. Adequate sedimentation control measures must be instituted at any prominent drainage lines, water crossings and construction trenches.</li> <li>11. Where possible construction activities must be positioned away from drainage lines and steep slopes.</li> <li>12. Occurrence of soil erosion and silt generation has to be monitored during construction and operational phases and corrective measures taken if necessary.</li> <li>13. The storm water from within the site need to be controlled by well-designed concrete drains and energy breakers</li> </ol>			
T2.3	Pollution of soil	<ol style="list-style-type: none"> <li>1. Avoid contamination of soil with oil, diesel, petrol, waste or any other foreign matter, which may impact on the capability of the soil as a growth medium.</li> <li>2. All equipment to be inspected daily for oil or fuel leaks before it is operated. Leakages must be repaired on mobile equipment or containment trays placed underneath immobile equipment until such leakages has been repaired.</li> <li>3. Contaminated soil has to be: <ul style="list-style-type: none"> <li>– Removed up to depth 300mm below the saturation mark and disposed at permitted landfill site.</li> </ul> </li> <li>4. The soil can be regenerated by using bio-remediation methods.</li> </ol>	Pre-construction and Construction  Operational	Daily  Weekly	Contractor

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|--|--|---|--|--|--|
|  |  | <ol style="list-style-type: none"><li>5. Hazardous substances to be stored on lined surfaces and be surrounded by berms or bund walls to prevent pollution.</li><li>6. Divert storm water from stockpiles and other sites sensitive to erosion.</li></ol> |  |  |  |
|--|--|---|--|--|--|

Table 4: Management of construction impacts and general environmental pollution

Environmental Statement - Pollution Control					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T3.1	Air pollution & generation of dust	<ol style="list-style-type: none"> <li>1. Speed limit must be enforced in all areas to reduce the levels of dust pollution.</li> <li>2. Air pollution caused during construction can be limited by using dust suppression methods such as water spraying. Water used for this purpose must be in quantities that will not result in the generation of run-off.</li> <li>3. The contractor's representative or environmental officer must notify all people living within 100 m of the construction site of the proposed activities.</li> <li>4. In the event of serious levels of dust pollution, the implementation of constant dust monitoring by qualified consultants must be undertaken.</li> <li>5. Vehicles used on, or entering the site must be serviced regularly to ensure that they do not emit excessive smoke or fumes.</li> <li>6. No refuse waste is to be burned on the premises or on surrounding premises.</li> </ol>	Pre-construction and Construction	Daily	Contractor
T3.2	Noise pollution	<ol style="list-style-type: none"> <li>1. Noise control measures must be implemented. All noise levels must be controlled at the source.</li> <li>2. All employees must be given the necessary ear protection gear if the noise levels exceed <b>55dB</b>.</li> <li>3. Interested &amp; Affected Parties (I&amp;APs) must be informed about the possibility of impending excessive noise.</li> </ol>	Construction	Daily	Contractor



		<ol style="list-style-type: none"> <li>4. Generators and pumps must be housed in casings to help reduce any noise in operation.</li> <li>5. No loud music or excessive noise generated by employees is allowed on site and in construction camps.</li> <li>6. Loading bins should be rubberised to reduce rattling sound.</li> <li>7. No unnecessary hooting of construction vehicles will be permitted.</li> <li>8. No screaming and whistling at the public, by construction workers as they pass-by residential areas, will be permitted.</li> </ol>			
T3.3	Construction disturbances and waste disposal	<ol style="list-style-type: none"> <li>1. Construction methods must be respectful of the environment; no unnecessary vegetation clearing, excavations or untidiness.</li> <li>2. Concrete mixing will be done on pre-designed slabs underlined by PVC lining, or an area previously disturbed. Alternatively, maintain one mixing site and transport the concrete to the construction site.</li> <li>3. Any concrete spillage must be cleaned immediately.</li> <li>4. Littering on site and the surroundings areas is prohibited. Clearly marked litterbins must be provided on site. The contractor's representative must monitor the presence of litter on the work sites as well as the construction campsite. All bins must be cleaned.</li> <li>5. Waste must be disposed, as soon as possible and not be allowed to stand on to decay, resulting in bad odours and attracting vermin.</li> <li>6. Adequate sanitation and water supply must be installed for the construction personnel (authorization from DWA may be required).</li> <li>7. Stockpiles should be stored and/or disposed in accordance to the relevant policies, guidelines and standards.</li> </ol>	Pre-construction and Construction	Daily	Contractor

		<ol style="list-style-type: none"> <li>8. Ensure that no excavated soil, refuse or building rubble generated on site are placed, dumped or deposited on adjacent/surrounding properties or land.</li> <li>9. Wind and animal proof bins must be provided at demarcated areas.</li> <li>10. Waste must be disposed off at a licensed waste disposal site.</li> <li>11. No waste, even biodegradable waste may can be buried.</li> <li>12. All waste removed from site must be disposed at the municipal/permitted waste disposal site.</li> <li>13. The contractor must ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project.</li> <li>14. The contractor must clean up and restore all disturbed areas and implement rehabilitation measures where required by the RA and RE.</li> </ol>			
T3.4	Noise and dust	<ol style="list-style-type: none"> <li>1. Dust and noise generation should be monitored during operational phase</li> <li>2. Excavation, handling and transporting of gravel must be minimised under high wind conditions. Dust suppression measures may be required, such as sprinkling the construction site with water to suppress the dust.</li> <li>3. Dust protection masks must be provided to all staff members working in dust polluted environment.</li> <li>4. All vehicles speeds should be controlled to reduced dust production, hence appropriate road signs should be placed to control the traffic speed</li> <li>5. Ensure engines of construction machinery are fitted with mufflers.</li> <li>6. Equipment and machinery operators should be equipped with ear protection equipment.</li> </ol>	<p>Pre-construction Construction</p> <p>Operational</p>	<p>Daily</p> <p>Weekly</p>	Contractor

		7. Operations should be strictly between 07H00 to 19H00.			
T3.5	Blasting and vibrations	<ol style="list-style-type: none"> <li>1. Drilling and blasting should be carried out by experience, qualified and licensed personal.</li> <li>2. Calculating the charge size and blast regime to optimize required excavation and fragmentation and thus keep air blast and ground vibration levels below pre-determined acceptable values.</li> <li>3. Monitoring blast, ground vibration and human response to ensure that accepted levels are in fact acceptable and are being adhered to, and to modify the blasting design as required.</li> <li>4. Pre-notification of affected persons of the intention to blast and the time of blast, preferably at the same time of day to remove the element of surprise.</li> <li>5. Correct stemming of blast holes.</li> </ol>	Operational	Continuous	Contractor

Table 5: Management of impacts on surface and groundwater

Environmental Statement - Water Resources Protection					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T4.1	Effect on Water quality	<ol style="list-style-type: none"> <li>1. Adequate sedimentation control measures must be instituted at any prominent drainage lines, water crossings and construction trenches.</li> <li>2. Where possible construction activities must be positioned away from drainage lines and areas with a perched water table.</li> <li>3. All fuel, chemicals, oil, etc. must be confined to areas where the drainage of water can be controlled. Use appropriate structures and methods for storage and handling.</li> <li>4. No washing and or cleaning of clothes, eating utensils, tools or equipment allowed in water bodies.</li> <li>5. Adequate sanitation for all personnel to be supplied on site.</li> <li>6. No permanent stockpiling of any kind allowed within the 1:50 year flood line or within 10m of any water courses.</li> <li>7. Machinery must be inspected and maintained on a daily basis to guard against possible leakages.</li> <li>8. Refuelling of construction vehicles should be done at a designated area paved with concrete slabs to avoid soaking of oils into the ground.</li> <li>9. Fuel storage facilities should be located away from the vicinity of the wetland and any water courses.</li> </ol>	All phases	Daily	Contractor

		<ol style="list-style-type: none"> <li>10. Used and empty drums, for oils, fuel, grease, etc., should be disposed off at a registered and licensed facility to avoid pollution and contamination of soil and water.</li> <li>11. All mechanical equipment shall be serviced in accordance with recommended Service Manuals for the equipment. All on site staff to be trained in vehicle and plant maintenance for the plant for which they are primarily responsible.</li> <li>12. Regular inspection of the fixed above ground container and the portable containers and refuelling areas ensures that the systems are performing as anticipated, and that the risk of the release of contaminants into the surrounding environment is minimised. Inspections and checks of the containers and refuelling area shall be undertaken every three months. Records of the checks and inspections shall be kept and made available to Environment on demand.</li> <li>13. All above ground containers shall be inspected for leaks and general condition. All pipe work that carried diesel fuel oil will also be inspected for leaks and general condition.</li> <li>14. An inventory reconciliation of diesel fuel oil needs to be maintained for the entire site.</li> </ol>			
T4.2	Effect on water course and Mitigation of Flooding	<ol style="list-style-type: none"> <li>1. There are 28 points along the DR3662 where water collects or floods.</li> <li>2. Hence about 28 box culverts need to be positioned and constructed as per Appendix B and Appendix C of the ESIA Scoping Report. The recommended size is B 900mm and D 600mm, with appropriate quantities.</li> <li>3. Occurrence of soil erosion and silt generation has to be monitored during construction and operational phases and corrective measures taken if necessary.</li> </ol>	Construction Operation	Daily Annually	Contractor RA

T4.3	Effect on groundwater	<ol style="list-style-type: none"> <li>1. Prevent spillages of any grease, oils, chemical or fuel product. Use drip trays during maintenance of vehicles and machinery.</li> <li>2. The vehicles maintenance area must be equipped with a concrete floor surface to prevent soil pollution.</li> <li>3. All areas used for storage and cleaning of machinery or equipment and vehicles must be bunded with prescribed height, and covered with an impermeable floor surface.</li> <li>4. Polluted soil should be collected and stored into containers and disposed off at appropriate and licensed dumping sites.</li> <li>5. Collected waste fuels and oils or waste water contaminated with oils must be stored in containers and disposed off to licensed and appropriate dumping sites.</li> </ol>	Pre-construction Construction	Daily	Contractor
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Table 6: Management of heritage sites and socio-economic issues

Environmental Statement - Human Well-being					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T5.1	Heritage sites	1. Work in areas where artefacts are found must cease immediately. The excavation must be examined by an archaeologist as soon as possible.	All phases	Continuous	Contractor
T5.2	Socio-economic	1. Local residents are to benefit from employment opportunities.	All phases	Continuous	Contractor

Table 7: Management of visual impacts

Environmental Statement - Aesthetics					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T6.1	Planning and design	<ol style="list-style-type: none"> <li>1. Alignment of structures should be compatible with the natural contours.</li> <li>2. Built structures should not break the horizon, when possible.</li> <li>3. Make use of existing access roads where possible.</li> </ol>	Planning	Continuous	Contractor
			Construction	Continuous	
T6.2	Construction aspects	<ol style="list-style-type: none"> <li>1. The contractor must ensure that the site is kept tidy at all times, that sufficient refuse bins are provided, and that they are emptied regularly.</li> <li>2. Refuse or building rubble generated on the premises must not be deposited on adjacent properties, road verges or open spaces. It must be contained on site, then removed and disposed of at an approved dumping site at least every two weeks.</li> <li>3. Disturbed and open areas must be rehabilitated and re-vegetated as soon as possible after construction.</li> <li>4. When construction is taking place within 200m of a densely populated area, the construction site must be enclosed by a dark green or black shade cloth of no less than 2m high, to prevent any visual intrusion.</li> <li>5. Rehabilitate all disturbed areas, especially borrow pits.</li> </ol>	Construction	Daily	Contractor

Table 8: Site clean-up and rehabilitation

Environmental Statement - care for nature					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T7.1	Rehabilitation of environmental damage	<ol style="list-style-type: none"> <li>1. Ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project.</li> <li>2. Upon completion of the project, the Contractor will ensure that any/all temporary access roads, quarry pits and borrow pits are returned to a state no worse than prior to construction commencing, where possible.</li> <li>3. Once heavy machinery has cleared the bulk of these material stockpiles, the disturbed areas will be levelled and cleared of any foreign material.</li> <li>4. Fully rehabilitate all disturbed areas, especially borrow pits and protect them from erosion.</li> <li>5. Slopes must be designed according to predefined specifications, aimed at the prevention of soil erosion, of efficient storm water control, of the eventual re-establishment of vegetation and of ultimately achieving aesthetically acceptable landscapes.</li> <li>6. In general, no slopes steeper than 1:3(V: H) must be allowed or as directed by the RA's Manuals.</li> <li>7. Cut slopes must not be steeper than 1:2(V: H) and rounded off on the top edge or as directed by the RA's Manuals.</li> <li>8. Bulk and fine shaping must be executed according to design, aimed at the prevention of soil erosion, of efficient storm water control, of the eventual re-establishment of vegetation and of ultimately achieving aesthetically acceptable landscapes.</li> <li>9. On all man-made slopes, the following rehabilitation methods must be applied or as or as directed by the RA's Manuals:               <ul style="list-style-type: none"> <li>– Replacing and redistribution of stripped topsoil to a minimum depth of 200 mm.</li> <li>– Ripping at 300 mm but not more than 400 mm apart and parallel to contours, through the placed topsoil, to a depth of 100 mm at least, into the sub base soil below.</li> <li>– Sowing of specified grass seed mixture and fertilizer, if required.</li> </ul> </li> </ol>	Post construction	After construction	Contractor
T7.2	Compliance	<ol style="list-style-type: none"> <li>1. RE to audit rehabilitation.</li> <li>2. The Contractor must implement Progressing Rehabilitation of the site and not wait until the end of the project.</li> </ol>	All phases	Continuous	Contractor RE



Table 9: Management of traffic disruption impacts

Environmental Statement - Promoting Road Safety at All Times					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T8.1	Construction aspects	<ol style="list-style-type: none"> <li>1. Traffic management systems must be put in place to control traffic during construction.</li> <li>2. Appropriate danger signs, safe speed limits, and other precautionary measures should be placed at strategic locations along the main bypasses and other roads that will be used during construction and operations.</li> <li>3. During construction, the speed limit will be below 60km/hr for all vehicles. Speed limits must be enforced in all areas, including public roads and private property to avoid potential accidents.</li> <li>4. The contractor will place flagmen at strategic locations, to control traffic along the main by-passes and other roads used during the construction and operations.</li> <li>5. Regular road users of the main by-passes and other roads used during the construction and operations should be notified at least seven (7) days in advance, by placing notifications on the media and erecting proper signage along the Roads, to alert the road users of construction activities that are likely to disrupt traffic.</li> <li>6. Controlled accesses will be constructed to manage the movement of vehicles and public in and out of the development site.</li> </ol>	Construction	Continuous	Contractor
T8.2	Operational aspects	<ol style="list-style-type: none"> <li>1. Traffic management systems must be put in place to control traffic in order to allow a recommended maximum speed safely.</li> </ol>	Operations	Once off	Contractor

2. The maximum speed limit for DR3662 as per RA guidelines be 100km/h.

Table 10: Management of fire hazards, safety and security

Environmental Statement - Safety First					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T9.1	Fire precautions	<ol style="list-style-type: none"> <li>1. Take adequate precautions to ensure that fires are not started as a result of Works on site: the Contractor will be held liable for any damage to property adjoining the Site as a result of any fire caused by one of his employees.</li> <li>2. Establish and maintain fire breaks around the Work Sites if as and when specified by the Project Management Team and as required by applicable legislation and the local authority.</li> <li>3. Do not permit any fires or open flames, especially during the dry season. A minimum requirement for construction in a high fire risk area is a water truck, with a minimum capacity of 5000 litres, equipped with pump and hose (minimum length 30m), which must be permanently on site, where veld fire is at risk.</li> <li>4. Ensure that the Work Site, the contractor's camp and all living quarters are equipped with adequate fire fighting equipment. This includes at least rubber beaters when working in veld areas, and at least one fire extinguisher of the appropriate type irrespective of the site. Take immediate steps to extinguish any fire, which may break out on the construction site.</li> <li>5. No open fires are permitted on site, except in designated cooking area where adequate precautions need to be taken to prevent the spread of fire. Restrict</li> </ol>	Pre-construction and Construction	Daily	Contractor

		<p>contained fires for heating and cooking (i.e. in a fire drum) to designated areas on site.</p> <p>6. Prevent employees from creating fires randomly outside designated areas.</p>			
T9.2	Security	<p>1. The contractor's representative or environmental officer must inform all adjacent land owners of any after-hour construction activities and any other activity that could cause a nuisance. Normal working hours are between 07h00 and 17h00 Monday to Friday. Arrangements are to be made with the Local Authority for after-hours work.</p> <p>2. Staff members residing in the construction camp will not be allowed to cause a nuisance to any neighbouring properties. In the event of a complaint received from the adjacent land owners, the privilege to reside on the property might be cancelled immediately.</p> <p>3. Permanent security services should be provided during operations to maintain law and order on site and surrounding area.</p>	Construction	Daily	Contractor
T9.3	Safety	<p>1. Best practice methods must always be employed and appropriated regulations adhered to.</p> <p>2. The borrow pits and quarries must be fenced off with livestock-proof fence to stop both livestock and people entering the sites without permission.</p> <p>3. No open trenches are permitted without the use of demarcation tape.</p> <p>4. There must be a first aid facility onsite.</p> <p>5. Regular auditing of safety requirements must be undertaken in order to monitor and control the problems before they become unmanageable.</p> <p>6. Workers' rights to refuse work in unsafe condition must be respected.</p> <p>7. A record must be kept of all incidents on site.</p>	Construction	Daily	Contractor

8. Personnel must be trained in basic site safety procedures (safety talks).
9. Secure storage of materials on site particularly hazardous material e.g. chemicals and fuels.
10. Adequate signage on and off the site about potential hazards must be provided.
11. Members of the general public must not be allowed near the construction site.
12. Do not store any fuel or chemicals under trees.
13. Do not permit any smoking within 10m of any fuel or chemical storage area, or refuelling area.
14. The contractor must keep a first aid kit and the telephone numbers of local emergency services in prominent positions at the staff quarters and the site office. All personnel must be made aware of these locations.
15. The contractor on site during the construction phase must provide safety and security arrangements that should ensure that:
  - The handling of equipment and material is supervised.
  - Construction vehicles are maintained and controlled by competent personnel.
  - All excavated areas are clearly marked and that barrier tape is placed around them.

Table 11: Management of site camp and personnel

Environmental Statement - Safe Guarding Workers					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T10.1	Social disturbances	<ol style="list-style-type: none"> <li>1. Prior to establishing the site camp, the contractor shall produce a plan showing the positions of all structures, lay-down yards and other infrastructure for approval by the RE.</li> <li>2. Fires, for the purpose of cooking and smoking, will only be allowed in facilities, equipment or areas specially constructed for this purpose. If required by applicable legislation, a firebreak shall be cleared around the perimeter of the camp and office sites.</li> <li>3. Construction workers should respect community members. They should be warned not to insult the public and also be prohibited to befriend local women, especially those who are married.</li> <li>4. Construction &amp; maintenance activities must be of such a nature as not to disturb the livelihood of adjacent property owners.</li> <li>5. A designated place for food preparation and eating must be established at the construction site.</li> <li>6. Dry chemical toilets (men and women separately) must be made available at a ratio of 1 toilet per 10 staff, within the campsite perimeter and must be cleaned and serviced as requested by the service provider.</li> <li>7. Workers movements must be limited to the construction area only and must be enforced in terms of the contracts of appointment.</li> <li>8. Any complaints must be addressed accordingly with the Contractor and record thereof must be kept and communicated to the RE.</li> <li>9. The RE must ensure that measures are in place to prevent/mitigate disruption of services as result of construction.</li> <li>10. Residents have to be notified 7 days in advance of disruptions to services.</li> <li>11. A resident security guard should be deployed at the campsite for access control, security enforcement and monitoring.</li> </ol>	Construction	Daily	Contractor RE

Table 12: Compliance with the environmental clearance and monitoring

Environmental Statement					
EMP Ref:	Environmental Aspect/Impact	Mitigation	Phase	Monitoring	Responsibility
T11.1	Compliance to EMP and authorisation	1. RE staff to be designated in order to initiate the RE and Contractor as well as personnel on the subject of the EMP and authorisation and compliance thereto.	Pre-construction	RE staff designated	RE
T11.2	Monitoring	1. Monitoring for any environmental impacts during the all phases is recommended until a satisfactory standard of compliance is attained	All phases	Continuous	RE

## 10. SPECIFIC BORROW PITS REHABILITATION MEASURES

There is no “one-type-fits-all” solution. Therefore, despite general rehabilitation options being prescribed below, a careful selection and application of the rehabilitation options, considering the individual circumstances, is required. The RA’s standards for borrow pits rehabilitation should also be implemented.

Implementing the mitigation measures will ensure a safe environment for both wild and domestic animals and inhabitants of the adjacent land, ensuring a stable bio-physical environment, where natural processes can re-establish.

There are various rehabilitation options available for borrow pits according to the material available for rehabilitation and the severity classification. Thus, wherever possible, the following rehabilitation option should be implemented:

1. The borrow pit floor will be levelled and no topographical high points will be present on the floor;
2. No walls or steps will be present in or around the borrow pit;
3. The borrow pit floor will be free of any spoils, large rocks or any form of construction waste – this material shall be deposited at the bottom of high walls and will thus be covered with material when cutting the slopes;
4. The slopes will have a gradient not steeper than 1:3 and will be graded or bladed;
5. Should dead vegetation be available, it will be distributed evenly on the slopes to prevent wind and water erosion;
6. Overburden, top-soil and any other material, which was removed when the borrow pit was opened and stockpiled on the outer sides of the borrow pit, will be distributed on the slopes and floor of the borrow pit with a maximum thickness of 300 mm;
7. Finishing of the slopes should be done in concentric circles, starting from the borrow pit floor and moving upwards towards ground level to prevent initial erosion induced by water and wind;
8. Remaining material (overburden and topsoil) will be shaped as a berm with a maximum slope 1:3, with a distance of at least 3.0 m from the edge of the borrow pit and not closer than 9.0 m to any structures (roads, buildings, etc.) - the berm will not be higher than 1.0 m;

9. All alien vegetation has been removed from the floor, the slopes and berms of the borrow pit – to date the only method of eliminating alien vegetation (excluding the use of toxins) is to burn it; this shall be done within the borrow pit and remaining material shall be deposited at the bottom of high walls and will thus be covered with material when cutting the slopes.
10. When determined to be necessary, the borrow pit will be fenced off:
  - a. with barbed wire and galvanized steel poles, minimum height 1.2 m,
  - b. with one access to the pit, which will be controlled by a gate of the same material as the fence, the gate will be lockable and access granted to the land owner only, if possible,
  - c. with the fence being constructed at least 5.0 m from the edge of the borrow pit, enclosing the entire borrow pit.