

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

PROPOSED CONSTRUCTION AND OPERATION OF MOBILE EXPLOSIVE STORAGE MAGAZINES AND EXPLOSIVE MANUFACTURING PLANT IN OTJIWARONGO

- OTJOZONDJUPA REGION -



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1. INTRODUCTION AND BACKGROUND

An Environmental Management Plan (EMP) has been commissioned by Beifang Mining Technologies Services Ltd (BMTS). for the proposed construction and operation of mobile explosive storage magazines and explosive manufacturing plant in Otjiwarongo, Otjozondjupa Region. This EMP serves as a managing tool for the proposed construction and operational activities at the site.

The EMP is developed to outline measures to be implemented in order to minimise adverse environmental degradation associated with this development. The document serves as a guiding tool for the contractors and workforce on their roles and responsibilities concerning environmental management on site, and also provides an environmental monitoring framework for all project phases of the development. This environmental management plan aims to take a pro-active route by addressing potential problems before they occur. The EMP acts as a stand-alone document, which can be used during the various phases of the development.

In this report,

- a) the **Contractor** (its sub-contractors) refers to construction personnel responsible for the *construction and/or maintenance activities* of the development.
- b) the **Project Personnel** refers to the employees, staff and suppliers responsible for the *operational activities* of the development.

The purpose of the EMP is to:

- ✓ Train employees and contractors with regard to environmental obligations.
- ✓ Promote and encourage good environmental management practices.
- ✓ Outline responsibilities and roles of the proponent and the contractor in managing the environment.
- ✓ Describe all monitoring procedures required to identify environmental impacts.
- ✓ Minimise disturbance of the natural environment.
- ✓ Develop waste management practices.
- ✓ Prevent all forms of pollution.
- ✓ Protect the natural environment.
- ✓ Prevent soil and water erosion.
- ✓ Comply with all applicable laws, regulations and standards for environmental protection.

2. LEGISLATIVE FRAMEWORK

I. The Namibian Constitution

The Namibian Constitution has a section on principles of state policy. These principles cannot be enforced by the courts in the same way as other sections of the Constitution. But they are intended to guide the Government in making laws which can be enforced.

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.

II. Environmental Management Act No.7 of 2007

This 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; and to provide for incidental matters.

The Act defines the term “*environment*” as an interconnected system of natural and human-made elements such as land, water and air; all living organisms and matter arising from nature, cultural, historical, artistic, economic and social heritage and values.

The Environmental Management Act has three main purposes:

- (a) to make sure that people consider the impact of activities on the environment carefully and in good time
- (b) to make sure that all interested or affected people have a chance to participate in environmental assessments
- (c) to make sure that the findings of environmental assessments are considered before any decisions are made about activities which might affect the environment

Line Ministry: Ministry of Environment and Tourism

III. The Water Act (Act No 54 of 1956)

The Water Act No. 54 of 1956 as amended, aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users.

The Act broadly controls the use and conservation of water for domestic, agricultural, urban and industrial purposes; to control, in certain respects, the use of sea water; to control certain activities on or in water in certain areas; and to control activities which may alter the natural occurrence of certain types of atmospheric precipitation.

IV. Water Resources Management Act of Namibia (2004) (Guideline only)

This act repealed the existing South African Water Act No.54 of 1956 which was used by Namibia. This Act ensures that Namibia's water resources are managed, developed, protected, conserved and used in ways which are consistent with fundamental principles depicted in section 3 of this Act. Part IX regulates the control and protection of groundwater resources. Part XI, titled Water Pollution Control, regulates discharge of effluent by permit.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

V. Environmental Assessment Policy of Namibia (1995)

Environmental Assessments (EA's) seek 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 (in the context of IEM and EA's) is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.

All listed policies, programmes and projects, whether initiated by the government or private sector, should be subjected to the established EA procedures.

Apart from the requirements of the Environmental Assessment Policy, the following sustainability principles need to be taken into consideration, particularly to achieve proper waste management and pollution control:

✓ **Cradle to Grave Responsibility**

This principle provides that those who manufacture potentially harmful products should be liable for their safe production, use and disposal and that those who initiate potentially polluting activities should be liable for their commissioning, operation and decommissioning.

✓ **Precautionary Principle**

There are numerous versions of the precautionary principle. At its simplest it provides that if there is any doubt about the effects of a potentially polluting activity, a cautious approach should be adopted.

✓ **The Polluter Pays Principle**

A person who generates waste or causes pollution should, in theory, pay the full costs of its treatment or of the harm, which it causes to the environment.

✓ **Public Participation and Access to Information**

In the context of environmental management, citizens should have access to information and the right to participate in decisions making.

Line Ministry: Ministry of Environment and Tourism

VI. Petroleum Products and Energy Act of Namibia (Act No. 13 of 1990)

The Act makes provision for impact assessment for petroleum products known to have detrimental effects on the environment.

VII. Draft Pollution Control and Waste Management Bill (Guideline only)

The proposed development, only applies to Parts 2, 7 and 8 of the Bill.

Part 2 stipulates that no person shall discharge or cause to be discharged any pollutant to the air from a process except under and in accordance with the provisions of an air pollution licence issued under section 23. It further provides for procedures to be followed in licence application, fees to be paid and required terms of conditions for air pollution licences.

Part 7 states that any person who sells, stores, transports or uses any hazardous substances or products containing hazardous substances shall notify the competent authority, in accordance with sub-section (2), of the presence and quantity of those substances.

Part 8 calls for emergency preparedness by the person handling hazardous substances, through emergency response plans.

VIII. Atmospheric Pollution Prevention Ordinance of Namibia No. 11 of 1976

The Ordinance prohibits anyone from carrying on a scheduled process without a registration certificate in a controlled area. A certificate must be issued if it can be demonstrated that the best practical means are being adopted for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process. Best practice would be to notify the line Ministry about emissions but it is not a legal requirement.

Line Ministry: Ministry of Health and Social Services

IX. Hazardous Substances Ordinance No. 14 of 1974

The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Welfare. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.

Line Ministry: Ministry of Health and Social Services

X. Forestry Act (No.12 of 2001)

This Act makes provision for the protection various plant species. Harvesting permits are required from the Directorate of Forestry to clear certain protected vegetation species from the site.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

XI. Soil Conservation Act (No.76 of 1969)

The Act advocates for the prevention and combating of soil erosion, conservation, improvement and manner of use of soil and vegetation, and protection of water resources.

XII. Public Health Act 36 of 1919 and Subsequent Amendments

The Act, with emphasis to Section 119 prohibits the presence of nuisance on any land occupied. The term nuisance for the purpose of this ESA is specifically relevant specified, where relevant in Section 122 as follows:

- ✓ any dwelling or premises which is or are of such construction as to be injurious or dangerous to health or which is or are liable to favour the spread of any infectious disease;
- ✓ any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable or preventable disease or injury or danger to health; or
- ✓ any other condition whatever which is offensive, injurious or dangerous to health.
- ✓ Potential impacts associated with the construction and operations are expected to include dust, air quality impacts, noise nuisance and smoke emissions.

Line Ministry: Ministry of Health and Social Services

3. ENVIRONMENTAL MANAGEMENT STRUCTURES

The Proponent and its contractor(s) will be responsible for environmental management on site during the site construction and operational period. For the purpose of this report,

- ❖ the Contractor (and its sub-contractors) refers to construction personnel responsible for the *construction* and/or *maintenance activities* of the development.
- ❖ the Project Personnel refers to the employees, staff and suppliers responsible for the *operational activities* of the development.

A pre-construction meeting is recommended before work commences, in order to reach agreement on specific roles of the various parties and penalties for non-compliances with the EMP. In addition surrounding land owners must be notified in advance of any potentially disturbing activities.

An independent environmental consultant will be appointed to act as the ECO; and conduct inspections of the construction activities; and EMP implementation throughout the duration of site construction. After each inspection, the ECO will produce a monitoring report that will be submitted to the environmental manager (and Ministry of Environment and Tourism (Department of Environmental Affairs) if required). Relevant sections of the minutes of site meetings will be attached to the monitoring report.

Roles, responsibility and authority shall be defined, documented and communicated in order to facilitate effective environmental management through implementation of the EMP.

3.1.1. Responsibility Parties

The responsibility matrix table below will be assigned and completed before any work commences at the site.

Table 1. Responsibility Matrix

Function	Name / Mobile Number	Responsibility
Environmental Manager (EM)	Beifang Mining Technologies Services (Pty) Ltd	<ul style="list-style-type: none"> ▪ Overall management of project and EMP implementation. ▪ Oversees site works, liaison with Contractor, ESO and ECO.
Environmental Control Officer (ECO)	Matrix Consulting Services	<ul style="list-style-type: none"> ▪ Implementation of EMP and liaison between Beifang Mining Technologies Services (Pty) Ltd, Department of Environmental Affairs (MET), Otjiwarongo Municipality, Contractor and stakeholders.
Environmental Site Officer (ESO)	To be appointed	<ul style="list-style-type: none"> ▪ Interaction with ECO, landowners and labourers. ESO must understand the content of the EMP.
Contractor	To be appointed	<ul style="list-style-type: none"> ▪ Implementation and compliance with recommendations and conditions of the EMP, Appoints dedicated person (ESO) to work with ECO

Management shall provide resources essential to the implementation and control of the EMP including: human resources, technology, and financial resources. The general roles and responsibilities of various parties during the construction phase of the project are outlined below.

3.1.2. Roles of the Environmental Manager (EM)

The EM (proponent's representative) will act as the employer's on-site implementing agent and has the responsibility to ensure that the Client's responsibilities are executed in compliance with the relevant legislations. Any on-site decisions regarding environmental management are ultimately the responsibility of the EM. The on-site EM shall assist the ECO where necessary and will have the following responsibilities in terms of the implementation of this EMP:

- ✓ Be fully knowledgeable with the contents of the Construction EMP;
- ✓ Review and authorise updates to the EMP.
- ✓ Ensure resource allocation for implementation of the EMP requirements.
- ✓ Ensure that environmental requirements are integrated into project plans, work method statements, tender and contract documents.
- ✓ Ensure necessary support to the ESO for implementation of the EMP.
- ✓ Undertake environmental system reviews, site inspections, audits and other verification activities to assure that the EMP implementation is at an optimal level.
- ✓ Participate in environmental performance verification activities to verify the level of compliance with the EMP in delivering the legal and environmental obligations.
- ✓ Assess the efficacy of the EMP and identify possible areas of improvement or amendment required within the EMP.
- ✓ Participate in incident investigations (as required).
- ✓ Initiate external audits (as required).

3.1.3. Roles of the Environmental Control officer (ECO)

The ECO for the site is an independent environmental consultant appointed by BMTS to monitor and review the on-site environmental management and implementation of this EMP on the construction site.

The duties of the ECO:

- ✓ Ensure that all construction and/or decommissioning activities on site are undertaken in accordance with the EMP;

- ✓ Undertake compliance audits against the EMP and conditions of the Environmental Authorisation (where required).
- ✓ Provide support and advice to the project team, contractor and all subcontractors in the implementation of environmental management procedures and corrective actions.
- ✓ Ensure that monitoring programs, which assess the performance of the EMP, are implemented.
- ✓ The ECO officer will submit all written instructions and verbal requests to the contractor and forward a copy to the proponent via the facility manager.
- ✓ Assist in the investigation of incidents and non-conformances and confirm in conjunction with the ESO that corrective and preventive action is taken and is effective.
- ✓ Assess the efficiency of the EMP and identify possible areas of improvement or amendment required within the EMP.
- ✓ Facilitate the amendment of the EMP in conjunction with the Environmental Manager (as required).
- ✓ Provide environmental training for key project personnel (in communication with Environmental Manager).
- ✓ Reviewing and approving method statements in consultation with the Environmental Manager.
- ✓ Prepare audit reports (and submit reports to the relevant authority as required).

3.1.4. Roles of the Environmental Site Officer (ESO)

The ESO is expected to administer and control all environmental matters relating to the construction activities of the development. The ESO will conduct the following:

- ✓ Ensure that the latest EMP documents are on site and readily accessible as required.
- ✓ Monitor the contractor's activities for compliance with the various environmental requirements contained in this EMP.
- ✓ Identify areas of non-compliance and recommend measures to rectify them in consultation with the ECO and the EM as required.
- ✓ Ensure communication of EMP requirements to relevant project, contractor and sub-contractor personnel as required for EMP implementation.
- ✓ Perform ongoing environmental awareness training of the Contractor's site personnel.
- ✓ Ensure that environmental problems are remedied timeously and to the satisfaction of the ECO and the EM as required.

- ✓ Request the removal of people and/or equipment not complying with the specifications of EMP.
- ✓ Facilitate environmental induction of all project staff and either deliver or coordinate delivery of all such training that would be required for the effective implementation of the EMP.
- ✓ Set up activity based method statements prior to the start of relevant construction activities and submit these to the EM and the ECO as required.
- ✓ Maintain environmental incidents and stakeholder complaints register.
- ✓ Undertake environmental system reviews, site inspections, audits and other verification activities to assure that the EMP implementation is at an optimal level.
- ✓ Report significant incidents internally and externally as required by law and the conditions of authorisation.
- ✓ Investigate incidents and recommend corrective and preventative actions.

3.1.5. Roles of the Contractor

The contractor shall ensure that all construction staff, sub-contractors, suppliers, etc. are familiar with, understand and adhere to the EMP. Failure by any Contractor, Sub-contractor, Suppliers etc. to show adequate consideration to the environmental aspects of this contract shall be considered sufficient cause for the ECO to instruct the EM to have the employee removed from the site. The EM will also order the removal of equipment from the site that is causing continual environmental damage (e.g. leaking oils and grease, diesel and petrol fuels, and any other hazardous substance). Such measures will not replace any legal proceedings the Client may institute against the Contractor.

The EM shall order the contractor to suspend part or all of the works if the contractor and/or any sub-contractor, suppliers, etc., fail to comply with both the EMP and the construction procedures supplied by the Contractor. The suspension will be enforced until such time as the offending procedure or equipment is corrected and/or if required remedial measures are put in place.

By virtue of the environmental obligations delegated to the Contractor through the Contract Document, all workers (including subcontractors, suppliers, and service providers) appointed for the project would be responsible for:

- ✓ Ensuring adherence by providing adequate staff and provisions to meet the requirements of the EMP;
- ✓ Ensuring that Method Statements are submitted to the Environmental Manager for approval before any work is undertaken, and monitor compliance with the EMP and approved Environmental Method Statements;

- ✓ Ensuring that any instructions issued by the ESO and/or EM are adhered to;
- ✓ Ensuring the representation of a report at each site meeting, documenting all incidents that have occurred during the period before the site meeting;
- ✓ Undertake daily, weekly and monthly inspections of the work area(s);
- ✓ Ensuring that a register of all the transgressions issued by the ESO is kept in the site office;
- ✓ Ensuring that a register of all public complaints is maintained; and
- ✓ Ensure that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the success full implementation of the environmental requirements of the Contract;
- ✓ Report and record any environmental incidents caused by the Contractor or due to the Contractor's activities;
- ✓ obtain required corrective action within specified time frames and close out of environmental incidents;
- ✓ Provide weekly checklists to the EM and ESO.

4. IMPLEMENTATION AND MONITORING

4.1. Construction Activities

4.1.1. Environmental Awareness Training

EOG Service Station / Total Namibia (Pty) Ltd. have the responsibility to ensure that all persons involved in the project are aware of, and are familiar with, the environmental requirements for the project. All project personnel, including contractors and sub-contractors are required to receive training of a type and level of detail that is appropriate for the environmental aspects of their work.

Training shall be held during normal working hours, preferably on site. A copy of the register shall be handed to the ECO. As a minimum, all personnel are required to complete the training requirements stipulated in Table 2 below.

Table 2. Environmental Awareness Requirements

Environmental Awareness Training and Induction Requirements											
Awareness Requirement	Frequency										
<p>Site Induction - the purpose of the induction is to ensure that, as a minimum, all on-site personnel understand the EMP in terms of:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Key issues relating to the project.</td></tr> <tr><td>Relevant conditions of the Environmental Authorisation.</td></tr> <tr><td>Location and protection of environmentally sensitive areas (if any).</td></tr> <tr><td>Waste management and minimisation.</td></tr> <tr><td>Minimising potential impacts to air, noise and water quality.</td></tr> <tr><td>Surface and groundwater contamination.</td></tr> <tr><td>Spill control measures.</td></tr> <tr><td>Environmental Emergency Plan.</td></tr> <tr><td>Incident reporting procedures.</td></tr> <tr><td>Roles and responsibility relating to environmental management.</td></tr> </table>	Key issues relating to the project.	Relevant conditions of the Environmental Authorisation.	Location and protection of environmentally sensitive areas (if any).	Waste management and minimisation.	Minimising potential impacts to air, noise and water quality.	Surface and groundwater contamination.	Spill control measures.	Environmental Emergency Plan.	Incident reporting procedures.	Roles and responsibility relating to environmental management.	<p>Construction and Operational Activities: prior to commencement of work by staff and / or contractors.</p>
Key issues relating to the project.											
Relevant conditions of the Environmental Authorisation.											
Location and protection of environmentally sensitive areas (if any).											
Waste management and minimisation.											
Minimising potential impacts to air, noise and water quality.											
Surface and groundwater contamination.											
Spill control measures.											
Environmental Emergency Plan.											
Incident reporting procedures.											
Roles and responsibility relating to environmental management.											
<p>Pre-Start Meeting – Pre-start meetings should be undertaken prior to commencement of a new activity in order to discuss the planned work and operational aspects of the tasks. Health, safety and environmental issues and controls should be discussed and understood.</p>	<p>Construction and Operational Activities: As required.</p>										

All senior and supervisory staff members shall familiarise themselves with the full contents of the EMP. They shall know and understand the specifications of the EMP and be able to assist other staff members in matters relating to the EMP.

4.1.2. Contractor’s Method Statements

The EMP provides the overall project strategy for management of environmental issues; however the Contractor’s Method Statement (CMS) will address environmental management issues at the site level. This shall also address environmental issues that are specific to an activity and/or site. CMS’s should be produced for all major construction and maintenance activities at the facility, and must typically provide detailed descriptions of items including, but not necessarily limited to:

- ✓ Nature, timing and location of activities;
- ✓ Procedural requirements and steps;
- ✓ Management responsibilities;
- ✓ Material and equipment requirements;

- ✓ Transportation of equipment to and from site;
- ✓ Develop methods for moving equipment/material while on site;
- ✓ How and where material will be stored;
- ✓ Emergency response approaches, particularly related to spill containment and clean-up;
- ✓ Response to compliance/non-conformance with the requirements of the EMP; and;
- ✓ Any other information deemed necessary by the EM/ECO.

The contractor shall not commence the activity until the Method Statement has been approved and shall, except in the case of emergency activities, allow an agreed period of time for approval of the Method Statement by the ECO and EM.

The ECO and EM may require changes to a Method Statement if the proposal does not comply with the specification or if, in the reasonable opinion of the ECO and EM, the proposal may result in, or carries a greater than reasonable risk of, damage to the environment in excess of that permitted specifications.

Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. The contractor shall carry out works in accordance with the approved Method Statement. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract.

Based on the specifications in this EMP, the following Method Statements are required as a minimum (but not limited to these):

- ✓ Site clearing;
- ✓ Site layout and establishment;
- ✓ Hazardous substances;
- ✓ Cement and concrete batching (for each operation)
- ✓ Traffic accommodation;
- ✓ Solid waste control system;
- ✓ Wastewater control system;
- ✓ Fire control and emergency procedures.

4.2. Site Establishment and Construction

4.2.1. Demarcation of the Project Site

The site will be properly demarcated and/or temporarily fenced off as agreed with the EM. The method of demarcation shall be determined by the contractor and agreed to by the EM prior to any work being undertaken. The contractor shall

maintain the demarcation line and ensure that materials used for construction do not blow on or move outside the site and environs, or pose a threat to people. The boundaries of the site shall be demarcated prior to any work commencing on the site. The site boundary demarcation fence shall be removed when all construction work is completed.

The contractor shall ensure that all his plant, labour and materials remain within the boundaries of the site, unless otherwise agreed in writing with EM. Failure to do so may result in the EM requiring the contractor to fence the boundaries of the site with wire mesh at his own expense to the satisfaction of the EM. It will be the responsibility of the contractor to decide on an appropriate system of protective fencing for the site.

The contractor shall be responsible to ensure that building materials such as sand is not blown away and take the necessary precautions to prevent sand from being blown by the wind.

4.2.2. Movement of Construction Personnel and Equipment

The contractor shall ensure that all construction personnel and equipment remain within the demarcated construction site at all times. Where construction personnel and/or equipment wish to move outside the boundaries of the site other than normal access to the road for loading and access purposes, the contractor shall obtain written permission from the EM and/or ESO.

4.2.3. Location of Construction Camp

The construction camp including temporary stockpile sites, storage and work areas required by the contractor, sub-contractors and suppliers shall be positioned in demarcated areas as approved by the EM.

4.2.4. Ablution Facilities

No toilet facilities exists at the project site, hence ablution facilities are required during the construction phase. The contractor shall provide the necessary portable toilets for its personnel. The sitting of these toilets shall be agreed with the EM. The toilets shall be secured to prevent them from blowing over, and the doors shall be properly lockable to prevent toilet paper from being blown out. Toilets shall be properly cleaned, emptied and serviced regularly.

The contractor shall ensure that any waste from the toilets is not spilled on the ground at any time. Should there be spillage of chemicals and/or waste, the EM shall require the contractor to place the toilets on solid base or containment structures with sumps. Abluting anywhere other than in the toilets shall not be permitted. The contractor shall be responsible for cleaning up any waste deposited by personnel.

4.2.5. Stockpiling, Handling, and Storage of Building Materials

The Contractor shall ensure that stockpiles and storage yards are demarcated in areas that are already disturbed or where they will cause minimal disturbance. The

Contractor / ESO shall indicate which activities are to take place in which areas within the site (e.g. mixing of cement, stockpiling of materials etc). These activities must be limited to single sites only. All the necessary handling and safety equipment required for the safe use of petrochemicals and oils shall be provided by the Contractor to, and used or worn by the staff whose duty it is to manage and maintain the Contractor's and his subcontractor's and supplier's plant, machinery and equipment.

4.2.6. Excavation, Backfilling and Trenching

The contractor shall ensure that all excavations and trenches are not to be left open for more than 5 days, thus it is recommended that excavations should be opened and closed the same day. Warning signs should be erected around the excavated areas to clearly demarcate the area against access. In addition, soil that was/has been removed shall be used to backfill areas where required and excavated material shall be stockpiled along the trench within the working servitude.

4.2.7. Erosion Control

The Contractor shall protect all areas susceptible to erosion and shall take measures, to the approval of the ECO. The Contractor shall not allow erosion to develop on a large scale before effecting repairs and all erosion damage shall be repaired as soon as possible.

4.2.8. Noise

The Contractor shall ensure that neighbouring properties / adjacent land is kept informed of the need and extent of noisy disruptive processes. The use of radios and other such equipment by workers must be controlled and noise levels kept to a level that does not disturb neighbouring land.

4.2.9. Dust

The Contractor shall take precautions to limit the production of dust and damage caused by dust. Dust suppression measures shall be agreed upon in consultation with the ECO. The following measures must be implemented to minimise dust impacts:

- ✓ During high wind conditions the Contractor must make the decision to cease works until the wind has calmed down; and
- ✓ Cover any stockpiles with a suitable material, such as plastic or shade-cloth, to minimise windblown dust.

4.3. Material Handling and Storage

4.3.1. Servicing and Re-fuelling of Construction Equipment

All maintenance and repair works shall be conducted in areas designated for this purpose (i.e. spill containment structures). The ground under the servicing and refuelling areas must be protected against pollution caused by spills or leakages from any point source.

The Contractor may only change oil or lubricant at agreed and designated locations, except if there is a breakdown or emergency repair, and then any accidental spillages must be cleaned up / removed immediately. Construction vehicles are to be maintained in an acceptable state of repair.

No vehicles or equipment with leaks or causing spills will be permitted to operate at any of the site. These shall be ordered off-site for maintenance or repairs.

4.3.2. Chemical, Harmful and Hazardous Materials

All project personnel and contractors shall comply with all relevant national and local legislation with regard to storage, transport, use and disposal of chemical, harmful and hazardous substances and materials. The contractor shall obtain the advice of the manufacturer with regard to the safe handling of such substances and materials.

The contractor shall provide the ESO and EM with a list of all chemical, harmful and hazardous substances and materials on site, together with storage, handling and disposal procedures for these materials.

The contractor shall ensure that information on all chemical, harmful and hazardous substances are available to all personnel on site. The contractor shall furthermore be responsible for the training and education of all its personnel on site who will be handling the material about its proper use, handling and disposal. A dangerous material datasheet should be available on site. The contractor shall submit method statements detailing the substances / materials to be used, together with the storage, handling and disposal procedures of the materials.

4.4. Waste Management

Waste will be generated in the form of rubble, cement bags, pipe and electrical wire cuttings. Contaminated soil due to oil leakages, lubricants and grease from the construction equipment and machinery shall also be generated during the construction activities. All hazardous waste generated at the site shall be stored in enclosed, bunded areas, the location of which shall be determined on site in conjunction with the EM. The bunded areas shall be clearly marked. Such waste shall be disposed offsite at an appropriate waste disposal site.

Proponent / Contractor shall institute a waste control and removal system for the site. The Contractor shall not dispose of any waste or construction debris by burning, or by burying. All waste shall be disposed off site at an approved landfill site.

Where necessary, the Contractor shall supply waste bins/skips at the site. The bins shall be secured in such a manner as to prevent their contents blowing out. The Contractor shall ensure that all personnel immediately deposit all waste in the waste bins for removal by the Contractor. Waste shall be properly contained in a scavenger, water and wind-proof containers until disposed of at an approved landfill. Bins shall be emptied and waste removed at least once a week from the site. The bins shall not be used for any purposes other than waste collection.

All contaminated soils must be removed from the site and disposed off or treated at a suitable facility.

4.5. Cement and Concrete Operations

The contractor is advised that cement and concrete are regarded as materials that are potentially damaging to the natural environment on account of the very high pH of the material, and the chemicals contained therein. The contractor shall ensure that all operations that involve the use of cement and concrete are carefully controlled. Concrete mixing shall only take place in agreed specific areas on site.

Water and slurry from concrete mixing operations shall be contained to prevent pollution of the ground surrounding the mixing points. Old cement bags shall be placed in wind and spill proof containers as soon as they are empty. The contractor shall not allow closed, open or empty bags to lie around the site.

Where exposed aggregate finishes are specified the contractor shall collect all cement-laden water and store it in conservancy tanks for disposal off site at an approved disposal site.

All visible remains of excess concrete shall be physically removed immediately and disposed of as waste. Washing the visible signs into the ground is not acceptable. All excess aggregate shall also be removed.

All excess concrete shall be removed from site on completion of concrete works and disposed of. Washing of the excess into the ground is not allowed. No cement or

concrete laden water will be permitted to be drained directly into any surface water source.

4.6. Waste Water Treatment

4.6.1. Discharge of Construction Water

Construction water in this report, refers to all water affected by construction activities. The Contractor shall construct and operate the necessary collection facilities to prevent pollution. The Contractor shall dispose of collected waste water in a manner agreed with the ECO.

No washing of plant, equipment, concreting equipment etc. shall be permitted on site unless approved by the EM.

4.6.2. Prevention of Soil, Surface-and Groundwater Pollution

The Contractor shall take all reasonable precautions to prevent the pollution of the surface and groundwater resources in the area, as a result of his activities. Such pollution could result from the release, accidental or otherwise, of chemicals, oils, fuels, sewage and waste products, etc.

The Contractor shall obtain oil absorbent pads, booms and spill kits, or similar products or materials to soak up oil, petrol and diesel. These materials shall be readily available for use wherever construction equipment is working. This should also be available at work stations where fuel and lubricants is handled, stored, equipment is filled and serviced. The Contractor shall ensure that he is familiar with the correct use and disposal of any materials designed to soak up petroleum products. Environmental friendly methods will be used during construction e.g.

- ✓ cement batching on boards, no wash water allowed to run off,
- ✓ paint washing in containers to be removed to licensed site,
- ✓ use of environmental friendly paints with low toxicity,
- ✓ use sand filters for paint brush washing and contain cement bags,
- ✓ waste water from paints with potential high environmental impact must be disposed of in accordance with an agreed method with the EM.

The Contractor shall ensure that no oil, petrol, diesel, etc. is discharged onto the ground. Pumps and other machinery requiring oil, diesel, etc. that is to remain in one position for longer than two days shall be placed on drip trays or other similar suitable containment structures. These containment structures shall be watertight and shall be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing and before long weekends and holidays.

The Contractor shall remove all oil, petrol, diesel-soaked soil immediately and shall dispose of it as hazardous waste.

4.7. Site Clean Up and Rehabilitation

4.7.1. Site Clean Up

The Contractor shall ensure that all waste, temporary structures, equipment, materials and facilities used during the construction activities are removed upon completion of the project. The Contractor shall clear and clean the construction site to the satisfaction of the ECO and EM upon completion of the project.

4.7.2. Rehabilitation

The Contractor must ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project. The project site should be fully rehabilitated (i.e. clear and clean area) including all disturbed areas and protect them from erosion.

4.8. Emergency Procedures

4.8.1. Fire and Safety Management

All electrical installations, wiring and systems at the project location must be approved by a qualified electrician who will issue a Certificate of Compliance before commencement of operations of the development.

Proper handling, storage, use and disposal of any hazardous waste (e.g. chemicals, hydrocarbons, paint, batteries, radioactive waste etc) should be conducted. Hydrocarbons are volatile under certain conditions and their vapours in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.

No uncontrolled fire, whether for cooking, heating or any other purpose, is to be made at the site during all phases. The proponent and contractor shall take all reasonable measures and active steps to avoid increasing the risk of fire through activities on site and prevent the accidental occurrence or spread of fire; and shall ensure that there is sufficient fire-fighting equipment on site at all times. This equipment shall include fire extinguishers. The Contractor should be prepared for such events.

The following measures will be followed to reduce the intensity of fires during the construction activities and operational phase:

- ✓ Ensure construction / maintenance personnel to perform construction activities carefully (e.g. some machines create sparks)
- ✓ Restrict smoking to designated areas,
- ✓ Provide fire extinguishers,
- ✓ Restrict fires to designated areas,
- ✓ Emergency response plan related to fuel and chemical storage,
- ✓ Emergency fire plan for visitors and staff.

4.8.2. Accidents on Site

The Contractor shall comply with the Occupational Health and Safety Act and any other national, regional or local regulations with regard to safety on site. The Contractor shall ensure that contact details of the local medical services are available to the relevant construction personnel prior to commencing work.

4.8.3. Emergency Advisory Procedures

The Contractor shall ensure that there is an emergency advisory procedure on site before commencing any operations that may cause damage to the environment. The Contractor shall also ensure that site staffs are familiar with all emergency procedures to be followed.

The Contractor shall ensure that lists of all emergency telephone numbers/contact people are kept up to date, and that all numbers and names are posted at the construction site at all times.

4.9. Compliance Monitoring

4.9.1. Procedures

The Contractor shall comply with the environmental specifications and requirements on an ongoing basis and any failure on his part to do so will entitle the ESO and to impose a penalty. In the event of non-compliance the following recommended process shall be followed:

- ✓ The ESO shall issue a notice of non-compliance to the Contractor, stating the nature and magnitude of the contravention. A copy shall be provided to the EM.
- ✓ The Contractor shall act to correct the non-conformance within 24 hours of receipt of the notice, or within a period that may be specified within the notice.
- ✓ The Contractor shall provide the ESO with a written statement describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions. A copy shall be provided to the EM.
- ✓ In the case of non-compliance giving rise to physical environmental damage or destruction, the ESO shall be entitled to undertake or to cause to be undertaken such remedial works as may be required to make good such damage and to recover from the Contractor the full costs incurred in doing so.
- ✓ The EM shall at all times have the right to stop work and/or certain activities on site in the case of non-compliance or failure to implement remediation measures.

4.9.2. Environmental Monitoring

Periodic inspections of the project site will be performed by the ECO. These will consist of formal reviews of conformance against policies and procedures stated in this document. Inspections will occur as required. Supervisors in all work areas will conduct performance and compliance reviews, using the EMP as guideline to ensure compliance.

4.9.3. EMP Administration

Copies of this EMP shall be kept at the project site and should be distributed to all senior staff members, including those of the contractors.

4.9.4. EMP Amendments

The EMP amendments can only be made with the approval of the EM and ECO, and if required ultimately by the DEA. Amendments to the EMP should be liaised to all employees and contractors.

4.9.5. Non-Compliance

Problems may occur in carrying out mitigation measures or monitoring procedures that could result in non-compliance of the EMP. The responsible personnel should encourage staff to comply with the EMP, and address acts of non-compliance and penalties.

The ESO is responsible for reporting non-conformance with the EMP, to the ECO. The ESO, in consultation with the ECO must, thereafter, undertake the following activities:

- ✓ Investigate and identify the cause of non-conformance.
- ✓ Implement suitable corrective action as well as prevent recurrence of the incident.
- ✓ Assign responsibility for corrective and preventative action.
- ✓ Any corrective action taken to eliminate the causes of non-conformance shall be appropriate to the magnitude of the problems and commensurate with the environmental impact encountered.

4.9.6. Environmental Register

An environmental register should be kept on site in which incidents related to actual impacts are recorded. This will include information related to incidents as spillages, dust generation and complaints from adjacent properties. It should also contain information relating to actions taken. Any party on site may complete the register, however, it is envisaged that the ECO, ESO and the contractor(s) will be the main contributors, and who will also be the main parties involved in suggesting mitigation measures.

4.9.7. Site Management

Areas outside the designated working zone shall be considered “no go” areas. The offloading zones must be clearly demarcated when offloading goods to enhance safety around the project location.

4.9.8. Access Routes and Work Sites

Vehicular movement, construction vehicles and equipment will access the construction site via existing farm tracks from the B1 and D2430 national roads. Work sites shall be clearly demarcated and road signs erected where needed. The general public should not have unauthorised or uncontrolled access to the project site during all phases of the development.

Vehicle access will be limited to only these two entrances to facilitate control. The entrance will be manned during the operation hours, but will be locked during non-operational hours to prevent unauthorised entry.

A notice board, in two languages or more, must be erected at the entrance and must state the most pertinent site health and safety issues, the operator/responsible person and emergency telephone numbers. Suitable signs must also be erected on the approach roads and on-site, to direct drivers and to control speed.

Furthermore, on-going controls, such as fencing and policing, must be implemented.

4.9.9. Staff Management

The Contractor must ensure that their employees have suitable personal protective equipment and properly trained in fire fighting and first aid. Training records must be kept for future references.

5. MANAGEMENT OF ENVIRONMENTAL ASPECTS DURING PRE-CONSTRUCTION ACTIVITIES

Pre-construction phase	
Description	<ul style="list-style-type: none"> ▪ Compliance Requirements ▪ Public Consultation ▪ Environmental Awareness ▪ Health and safety Aspects
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Conduct an environmental scoping assessment (ESA) to comply with the requirements of the Environmental Management Act (2007) and its regulations of 2012. ✚ Identify and address all environmental and social issues. ✚ Ensure that all persons involved in the project are aware of, and are familiar with, the environmental requirements for the project. ✚ Ensure that all contractors, sub-contractors, suppliers, etc. are familiar with, understand and adhere to the EMP. ✚ A pre-construction meeting is recommended in order to reach agreement on specific roles of the various parties and penalties for non-compliances with the EMP. ✚ Inform I&APs and key stakeholders about the proposed development and identify issues and concerns of key I&Aps with regards to the proposed development. ✚ Develop and implement environmental emergency preparedness procedures. ✚ Establish personnel protection standards and mandatory safety practices and procedures for the development. ✚ Establish the lines of communication among contractors and subcontractors involved in work operations for safety and health matters. ✚ Conduct HIV/AIDS Awareness Programme for all operations of the development for not less than 90% of workers. ✚ Provide and maintain condom dispenser and maintain HIV/AIDS awareness posters. ✚ Provide information regarding the voluntary testing of construction workers and counselling, support and care.
Proposed Monitoring	Record of environmental compliance (ECC). Record of approved site-specific EMP for project site. Record of awareness training and attendance register. Record of health and safety plan.
Responsible Party	Proponent / ECO

6. MANAGEMENT OF ENVIRONMENTAL ASPECTS DURING CONSTRUCTION AND OPERATIONAL PHASES

This section will look at the potential environmental impacts, which may arise during the construction and operational phase of development. The impacts associated with maintenance activities and possible site decommissioning is similar to construction activities.

Groundwater

Construction/Decommissioning phase	
Description	Groundwater contamination can be caused by leakages and spills of petroleum products (i.e. oil leakages, hydrocarbon fuel, lubricants and grease) from machinery and construction vehicles during construction and decommissioning phase. Care must be taken to avoid contamination of soil and groundwater.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Prevent spillages of any chemicals and petroleum products (i.e. oils, lubricants, petrol and diesel). Use drip trays, linings or concrete floors when evidence of leaks are observed on vehicles or equipment. ✚ Any major servicing and maintenance of vehicles and equipment should be conducted on containment surfaces provided for this purpose. ✚ All fuelling, storage and chemical handling should be conducted on surfaces provided for this purpose. Drip trays, linings or concrete floors must be used when removing oil from machinery. ✚ Spillage control procedures must be in place according to relevant SANS standards or better. Waste water collection systems should be connected to these systems. ✚ Should portable ablution facilities be necessary, adequate containment systems should be erected for these facilities. ✚ No urinating outside these designated facilities shall be allowed. ✚ Waste should be properly be contained to avoid any leakages and/or spillages, and should regularly be disposed off at a suitable sewage disposal site. Run-off from these toilets due to overflows should be avoided at all cost. ✚ Proper environmental awareness and remedial response training of operators must be conducted on a regular basis.
Proposed Monitoring	Regular visual inspection.
Responsible Party	Proponent / Contractors.

Operational phase	
Description	Groundwater quality could be impacted through leachate of oil leakages, hydrocarbon fuel, lubricants and grease from trucks and vehicles frequenting the development. Spillages may also occur during fuel / chemical delivery to the storage tanks from road transport tanker trucks. Similarly, spillages may also occur during loading of ANE to road and/or rail tankers. Care must be taken to avoid contamination of soil and groundwater.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ All operational surfaces, chemical and fuel storage tanks must be installed with spill containment areas as per the relevant SANS standards (or better). ✚ Proper monitoring of the product levels must take place to eliminate overfilling. ✚ All operational surfaces at the facility must be installed with spill containment areas. ✚ Ensure that any fuel and chemical products are contained in containment structures (e.g. plastic liners, drip trays etc.). ✚ Avoid discharge of pollutants (such as cement, concrete, lime, chemicals, contaminated waste water or leachate) into stormwater channels and water courses. ✚ Equipment and materials to deal with spill cleanup must be readily available on site and staff must be trained as to how to use the equipment and briefed about reporting procedures. ✚ Develop and implement a groundwater monitoring system and programme, with the aim of monitoring possible contamination to the water resources. ✚ Groundwater monitoring boreholes installed should be sampled and analysed periodically. ✚ Regular tank and pipeline tightness inspections are advised to eliminate the risk of impact on the environment due to leakage. ✚ The condition of the reticulation systems will have to be checked regularly and repaired to prevent leakages;
Proposed Monitoring	Regular visual inspection.
Responsible Party	Proponent / Contractors.

Surface Water

Construction /Decommissioning phase	
Description	Contaminants in the form of oil leakages, diesel, lubricants and grease from the construction vehicles, machinery and equipment may occur during the construction phase. Oil spills are known to form a film on water surfaces causing physical damage to

Operational phase	
Description	Groundwater quality could be impacted through leachate of oil leakages, hydrocarbon fuel, lubricants and grease from trucks and vehicles frequenting the development. Spillages may also occur during fuel / chemical delivery to the storage tanks from road transport tanker trucks. Similarly, spillages may also occur during loading of ANE to road and/or rail tankers. Care must be taken to avoid contamination of soil and groundwater.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Proper containment mechanisms installed should be able to contain any spillages that might occur during the operation of the facility. ✚ All spills should be cleaned up as soon as possible. ✚ The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently. ✚ Proper monitoring of the product levels must take place to eliminate overfilling. ✚ Ensure all stormwater drains or channels are clear of litter or obstructing material. ✚ Remove all excess sedimentation, rubble and any other waste material present in the waterway and dispose of in a suitable manner to ensure proper drainage runoff.
Proposed Monitoring	Regular visual inspection. Surface water monitoring sampling for hydrocarbon pollution.
Responsible Party	Proponent / Contractors.

Air Quality (Dust Pollution)

Construction /Decommissioning phase	
Description	<p>Dust may be produced during the construction and decommissioning phase; and might be worsened when strong winds occur. These are expected to be site specific and could potentially pose a slight nuisance to the neighbouring land.</p> <p>Possible air pollution in the form of emissions from construction vehicles and equipment could also deteriorate air quality in the area.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ It must be ensured that all vehicles entering the site and machinery used in construction activities are in good working order to prevent unnecessary emissions. ✚ Encourage reduction of engine idling at the project site. ✚ Excavation, handling and transport of materials must be avoided under high wind conditions. ✚ Dust suppression measures (e.g. dampening with water) may be required from time to time, should dust become a nuisance.
Proposed Monitoring	Regular visual inspection.
Responsible Party	Proponent / Contractors.

Operational phase	
Description	<p>Air quality around the site could be impacted by exhaust fumes from the vehicles accessing the facility. Hydrocarbon vapours will be released during delivery and dispensing, as liquid displaces the gaseous mixture in the tanks.</p> <p>In terms of fuel storage tanks, the vapours will be released through vent pipes on the tanks.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Vehicle idling time shall be minimised by putting up educative signs. ✚ All venting systems and procedures have to be designed according to SANS standards (SANS 1929:2011) and placed in a sensible manner. ✚ Vent pipes should be placed in such a manner as to prevent impact on potential receptors. Use vapour recovery equipment and techniques to avoid air pollution and minimise fuel loss.
Proposed Monitoring	<p>It is recommended that regular air quality monitoring be conducted at the facility. A complaints register regarding emissions/smell should be kept and acted on if it becomes a regular complaint.</p>
Responsible Body	<p>Proponent / Contractors.</p>

Health and Safety

Construction /Decommissioning phase	
Description	<p>Safety issues could arise from the construction vehicles, earthmoving equipment and tools that will be used on site during the construction phase. This increases the possibility of injuries and the contractor must ensure that all staff members are made aware of the potential risks of injuries on site.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Equipment and machinery operators should be equipped with ear protection equipment. ✚ Operations should be strictly between 07H00 to 17H00. First aid and safety awareness training for contractors. ✚ Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises. ✚ The construction staff must be properly trained on safety and health issues of the project. ✚ Workers should be fully equipped with personal protective equipment gear. ✚ The site must be clearly demarked and fenced off to prevent unauthorised persons from accessing the site, who could get injured on site.
Proposed Monitoring	<p>Safety procedures evaluation. Health and safety incident monitoring.</p>
Responsible Party	<p>Proponent / Contractors.</p>

Operational phase	
Description	The operations of the development can cause health and safety risks to workers on site. Occupational exposures are normally related to inhalation of fuel vapours and physical contact with fuels and chemicals.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises. ✚ Operators must be properly trained on safety and health issues of the project. ✚ Well stocked first aid box which is readily available and accessible should be provided within premises. ✚ Signs such as 'NO SMOKING' must be prominently displayed in parts where inflammable materials are stored on the premises. ✚ Workers should be fully equipped with personal protective equipment gear. ✚ Staff must be properly trained and made aware of all the MSDS (Material Safety Data Sheets) sheets of all chemicals on site.
Proposed Monitoring	Regular inspection and incident monitoring report evaluation.
Responsible Body	Proponent / Contractors.

Noise Pollution

Construction /Decommissioning phase	
Description	<p>An increase of ambient noise levels at the construction site is expected due to the construction activities. Noise pollution due to construction vehicles, equipment and machinery will be generated. It is not expected that the noise generated during construction will impact any third parties or neighbouring land; however it may interfere with the wildlife in the area.</p> <p>Excessive noise pollution has a negative impact on wildlife species by reducing habitat quality, increasing stress levels, and masking other sounds.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used. ✚ Ensure engines of construction machinery are fitted with mufflers. ✚ Equipment and machinery operators should be equipped with ear protection equipment. ✚ Audio equipment (if any) should not be played at levels considered intrusive by others. ✚ Operations should be strictly between 07H00 to 17H00.
Proposed Monitoring	Strict operational times. Regular inspection.
Responsible Party	Proponent / Contractors.

Operational phase	
Description	Noise pollution may be generated by vehicles, trucks and people frequenting the site.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Delivery of fuel and chemical products by road tankers should be limited to normal working hours (07h00 to 19h00). ✚ Loud music from vehicles / trucks frequenting the development should be restricted. ✚ Maintain the grievance mechanism to capture public perceptions and complaints with regard to noise impacts, track investigation actions and introduce corrective measures for continuous improvement.
Proposed Monitoring	Strict delivery and collection times. Observation of on-site noise levels by the ESO and ECO.
Responsible Body	Proponent / Contractors.

Waste Generation

Construction /Decommissioning phase	
Description	This can be in a form of rock cuttings, building rubble, pipe cuttings, electrical cuttings, oil spills or leakages of petroleum products might occur during the construction phase.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ensure that no excavated soil, refuse or building rubble generated on site are placed, dumped or deposited on adjacent/surrounding properties or land. ✚ Ensure that sufficient weather- proof bins / containers are present on site for the disposal of waste. ✚ The Contractor shall institute a waste control and removal system for the site. All waste shall be disposed off site at an approved landfill site. ✚ No disposal of /or burying of waste on site should be conducted. No waste should be burned on site. ✚ Hazardous waste storage is to be clearly marked to indicate the presence of hazardous substances, and the protocols associated with handling of such hazardous wastes shall be known by all relevant staff members. ✚ Ablution facilities should be provided for by the contractor during this phase. No urinating outside these designated facilities. ✚ Waste must be disposed off at a suitable waste disposal site.
Proposed Monitoring	Regular inspection and housekeeping procedure monitoring. Observation of site appearance by the ESO and ECO.
Responsible Party	Proponent / Contractors.

Operational phase	
Description	General waste such as contaminated soil, litter, cardboards, paper, glass and other products will be generated during the operational phase. Potential spills of the raw materials, waste oils and fuels from operations and maintenance activities.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Contamination of soil should be prevented through the use of containment areas as provided. ✚ Any contaminated soil generated must be contained and bioremediated accordingly. ✚ Sufficient waste bins / containers must be available at the project site at all times. Waste must be appropriately collected and disposed off at an approved appropriate waste disposal site. ✚ Each waste should be kept in a unique container at all times. Unidentified wastes must not, under any circumstances, be mixed with other wastes. ✚ Potential spills of raw materials must be managed in accordance with the requirements of for that specific raw material. Each waste should be disposed of by an approved method. ✚ All areas involving storage or use of oils and fuels must be bunded. ✚ Storm water spill (if any) and/or spills captured within the bund walls must be channeled and treated by an oil water separator.
Proposed Monitoring	Regular visual inspection. Containment area inspections and monitoring of the oil/water separators.
Responsible Body	Proponent / Contractors.

Traffic

Construction /Decommissioning phase	
Description	Construction vehicles will access the project site from the B1 and D2430 national roads. Construction related activities are expected to have a minimal impact on the movement of traffic along this road. However, slow traffic frequenting the construction site may become a nuisance to motorists accessing neighbouring land / properties.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ It is recommended that if the need arises for traffic diversion road closure, the contractor should liaise with the relevant authorities. ✚ Speed limit and construction site warning signs must be erected to minimise accidents. ✚ Construction vehicles must be tagged with reflective signs or tapes to maximise visibility of the vehicles and avoid accidents.

Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Construction vehicles should not be allowed to obstruct the road, hence no stopping in the road, wholly or partially, but rather pull off the road or park on the roadside.
Proposed Monitoring	Observations of the traffic flow along B1 and D2430 roads.
Responsible Party	Proponent / Contractors.

Operational phase	
Description	This impact will be long-lived, as vehicular movement will increase at the project location.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Speed limits and road signs as set out by national traffic regulations should be adhered to in order to minimise accidents. ✚ Appropriate road signs should be erected to reduce these impacts and their spin-offs.
Proposed Monitoring	Observation of traffic by the ESO and ECO.
Responsible Body	Proponent / Contractors.

Ecological impacts

Construction /Decommissioning phase	
Description	The dominant vegetation observed at the project location consists mainly of trees/bush, shrubs, weedy species and grass. Of the vegetation observed, the <i>Albizia anthelmintica</i> , <i>Boscia albitrunca</i> and <i>Ziziphus mucronata</i> are protected under Forestry Act (No.12 of 2001) of Namibia.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Vegetation protected under the Forestry Act (No.12 of 2001) of Namibia, should be conserved and incorporated into the project. ✚ Disturbance of areas outside the designated working zone is not allowed. ✚ No vegetation should be removed outside the designated project area.
Proposed Monitoring	Regular site inspection.

Operational phase	
Description	The proposed development operations will have minimal impacts the fauna and flora.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ The operational activities would not exceed the demarcated area of the development.
Proposed Monitoring	Regular site inspection.
Responsible Body	Proponent / Contractors.

Overfilling of tanks; and road / rail tankers

Operational phase	
Description	Overfilling of storage tanks, road and rail tankers during loading and off-loading may take place.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ This impact can be reduced by the installation of spill containment structures at all operational areas. ✚ Proper monitoring of the product levels in the tanks and loading tankers must take place to eliminate overfilling. ✚ Proper training of the operators on site is vital.
Proposed Monitoring	Regular inspection of the level of fuel in tanks.
Responsible Body	Proponent / Contractors.

Visual / Nuisance Impacts

Construction /Decommissioning phase	
Description	Aesthetics and inconvenience caused to person trying to access/exit the project site, and surrounding areas.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Contractor should maintain tidiness on site at all times. Take cognition when parking vehicles and placing equipment. ✚ Construction workers should be attentive to the importance of not littering. Littering is unsightly and has a negative visual impact. ✚ Sufficient waste bins must be provided onsite and must be emptied regularly. ✚ Any building rubble generated should not be allowed to accumulate onsite, but must at regular intervals be removed to a suitable landfill disposal site or to other construction sites where it may be used as fill.
Proposed Monitoring	Regular visual site inspection.
Responsible Party	Proponent / Contractors.

Fire and Explosion Hazard

Operational phase	
Description	<p>Ammonium nitrate by itself does not burn, but in contact with other combustible materials, it increases the fire hazard. AN in solid or molten form or in solution is a stable compound and generally is difficult to explode. AN may however explode when exposed to high temperature under confinement.</p> <p>Diesel fuel is volatile under certain conditions and its vapours in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Explosives are stored in dedicated explosive storage magazines separate from detonators, delays and detonating cord. ✚ Magazines have been fitted with lightning protection and locks, and are surrounded by earthen bund walls within a secure compound. ✚ Materials required for bulk explosive production are stored in separate tanks within the explosives batching plant compound. ✚ Emergency response procedures should be in place so as to alert the employees on how to react to fire and explosions incidents. ✚ An incident reporting procedure should also be implemented to make the employees aware of how, when and to whom to report fire and explosion incidents. ✚ Regular inspections should be carried out to inspect and test fire fighting equipment and emergency response at the development. ✚ Ensure sufficient water is available all the time for fire fighting purposes. ✚ It is highly recommended that electrical wiring of the facility be installed and approved by a qualified electrician who will issue a Certificate of Compliance. ✚
Proposed Monitoring	Regular inspections should be carried out to inspect and test fire fighting equipment.
Responsible Body	Proponent / Contractors.

Raw Material Management

Operational phase	
Description	Various materials are widely used in emulsions are associated with fires and explosions. However, the common factor in these materials is ammonium nitrate and it is the properties of this material that are at the centre of the hazardous behaviour. These chemicals are subject to a range of other hazards issues that have to be understood and preventative measures taken for their avoidance.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ammonium nitrate should be stored in conformance with the applicable regulatory requirements (these may involve applying quantity/distance considerations) and industry good practice guides. ✚ No other materials should be stored with ammonium nitrate. ✚ Odd cans of lubricants, antifreeze and other chemicals etc must not be stored with ammonium nitrate. ✚ Explosives and raw materials (including packaging) must always be kept as low as practical and appropriately separated. This includes the separation and segregation of waste. ✚ Non-related process people (i.e. support staff, office staffs, service waiters, etc) must be kept at appropriated safety distances). ✚ Ideally there should either be only one operation per building or at least only one operation at a time per building. ✚ Staff must be provided with emergency response procedures which they should be familiar with. ✚ Staff should at all times be aware of the precautions associated with the handling of petroleum / chemical products as described in the relevant Material Safety Data Sheets.
Proposed Monitoring	✚ Regular inspections should be carried out to ensure proper management procures are adhered to.
Responsible Body	Proponent / Contractors.

7. CONCLUSIONS

If the above-mentioned management recommendations are properly implemented, it is anticipated that most of the adverse impacts on the environment can be mitigated. An appointed environmental control officer will need to monitor or audit the site throughout the site upgrade and operations to ensure that the EMP is fully implemented and complied with.

The EMP should be used as an on-site tool during all phases of the proposed development. Regular environmental audits should be carried out throughout all phases to ensure compliance of the EMP and environmental regulations of Namibia. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

The environmental clearance is valid for 3 years only, as per the environmental management act No.7 of 2007, thus it is the responsibility of the proponent to commission an application for renewal of the permit by submitting an updated EIA/EMP document before it expires.

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