

APP-002689

ENVIRONMENTAL SCOPING REPORT

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

- OTJOZONDJUPA REGION -



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May 2021

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EXECUTIVE SUMMARY

An Environmental Scoping Assessment (ESA) has been commissioned by Beifang Mining Technologies Services (Pty) Ltd. for the construction and operation of mobile explosive storage magazines and explosive manufacturing plant in Otjiwarongo, Otjozondjupa Region.

Ammonium nitrate is classified as an oxidising agent but it takes very little to turn it into an explosive. Obviously, the addition of small quantities of fuels will convert it into a type of ANFO. However, pure ammonium nitrate detonates if it is in sufficient quantity, confined and exposed to heat. Also, small quantities of “impurities” can change the explosion characteristics of ammonium nitrate to the point where it can become a very sensitive explosive.

Considering the nature of the proposed development and its activities, the ESA has been undertaken in accordance with the requirements of existing national legislations, of which the National Environmental Assessment Policy (1995), the Environmental Management Act (2007) and its regulations of 2012, and other relevant legislations and regulations pertaining to Environmental Assessments and protection of the environment in the Republic of Namibia are considered most important. Some existing international policies are also taken into account and are used as guidelines.

Impacts identified from baseline studies, site visits and stakeholder consultation process have been assessed making use of a comprehensive assessment methodology as provided by the Department of Environmental Affairs (DEA) of Namibia. This included looking at impact significance through, its nature, extent, duration, probability and intensity. Major issues or impacts identified are risk of fires and explosions; separation distances; generation of waste; raw material management; safety and security; air quality (including dust pollution); surface and ground water impacts; ecological impacts; heritage impacts; traffic safety, especially during construction; noise pollution; and cumulative impacts.

Socio-economic impacts amongst others include creation of part-time and permanent employment opportunities and economic spin-offs for the local businesses and suppliers. Waste generation during the construction activities is eminent; however implementation of proper management strategies should address these issues. Minor surface spillages during the operations of the development may result in a collective long-term significant impact on surface and groundwater.

Cumulative impacts expected as a result of the development include, dust and exhaust emissions from vehicles frequenting the project site during all phases of the development, coupled with the existing emissions from vehicles in the surrounding areas; the air quality will be impacted. An increase in traffic around the area due to the new development will also be observed.

In general, impacts are expected to be low to medium, mostly short lived and site specific. Mitigation options recommended in the Environmental Management Plan (EMP) will guide and ensure that the impacts of the construction work are minimised. All environmental risks can be minimised and managed through implementation of preventative measures and sound management systems. Environmental audits should be carried out to ensure compliance of the EMP and environmental regulations of Namibia.



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List of Abbreviations

| | |
|------------|---------------------------------|
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| EMA | Environmental Management Act |
| EMS | Environmental Management System |



| | |
|-------|--|
| ESA | Environmental Scoping Assessment |
| I&Aps | Interested and Affected Parties |
| PPPPs | Projects, Plans, Programmes and Policies |
| AN | Ammonium Nitrate NH4NO3 |
| ANE | Ammonium Nitrate Emulsions |
| ANS | Ammonium Nitrate Solution |
| ANFO | Ammonium Nitrate Fuel Oil |
| MMU | Mobile Mixing Unit |
| ANPP | Ammonium Nitrate Porous Prills |
| SANS | South African National Standards |

PROJECT DETAILS

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| NAME | POSITION | COMPANY |
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GLOSSARY OF TERMS

Project area - Refers to the entire study area encompassing the total area as indicated on the study area map.

Project site - Refers to the geographical setting (piece of land) on which the proposed development is to be located.

Assessment - The process of collecting, organising, analysing, interpreting and communicating information relevant to decision making.

Alternatives - A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The “no-go” alternative constitutes the ‘without project’ option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.

Cumulative Impacts - in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Evaluation – means the process of ascertaining the relative importance or significance of information, the light of people’s values, preference and judgements in order to make a decision.

Environment – Is the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life. As defined in the Environmental Policy and Environmental Management Bill of Namibia - *“land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, paleontological or social values”*.

Environmental Scoping Assessment (ESA) – process of assessment of the effects of a development on the environment.

Environmental Management Plan (EMP) - A legally binding working document, which stipulates environmental and socio-economic mitigation measures that must be implemented by several responsible parties throughout the duration of the proposed project.

Hazard - Anything that has the potential to cause damage to life, property and/or the environment. The hazard of a particular material or installation is constant; that is, it would present the same hazard wherever it was present.

Interested and Affected Party (I&AP) - any person, group of persons or organization interested in or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.



Proponent (Applicant) – means a person who intends or undertakes a project, policy, programme or plan.

Significant Impact - means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Environmental Clearance Certificate - This Certificate obtained from the Ministry of Environment and Tourism (Directorate of Environmental Affairs) approving the EIA study and providing clearance to the proponent to initiate work.

Environmental Assessment Practitioner - A person designated by a proponent to manage the assessment process.

Local Authority - Means a local authority council as defined in section 1 of the Local Authorities Act, 1992 (Act No. 23 of 1992).

Mobile Mixing Unit (MMU) - A vehicle or a moveable piece of equipment designed to transport the constituents of a bulk ammonium nitrate-based explosive to the place where the explosive will be manufactured and used.

Ammonium Nitrate Porous Prills (ANPP) - Ammonium Nitrate in prill form is the primary ingredient in ANFO based products and the key component (in both prill and liquid form) in a full range of customized bulk explosive blends.



1. BACKGROUND AND INTRODUCTION

Beifang Mining Technologies Services (Pty) Ltd (BMTS) has commissioned an Environmental Scoping Assessment (ESA) for the proposed construction and operation of mobile explosive storage magazines and explosive manufacturing plant in Otjiwarongo, Otjozondjupa Region. See Figure 3.

BMTS as a company was established in 2013 in Namibia, in order to provide blasting services to Swakop Uranium at Husab Mine. The company focuses on blasting operations, such as on-site explosive manufacturing, in-hole blasting services, explosive chemistry supply, drilling and loading. Since its inception in Namibia, BMTS possess a highly professional team of explosive manufacturing and blasting technology. It also boasts the perfect system of supply chain and the SHEQ management system of high quality

Ammonium nitrate (AN) consumption for explosives has grown preferentially in the Namibian mining industry due to its safety advantage over other products such as dynamite. AN can be shipped and stored and mixed with fuel oil when needed. Ammonium nitrate fuel oil (ANFO) is made of about 94% ammonium nitrate and 6% fuel oil. ANFO is widely used as an explosive in mining, quarrying, and tunneling construction or wherever dry conditions exist.

Drill and blast mining is a common method used to break up 'benches' of rock in order to send the smaller pieces of rock containing ore to the processing plant to further separate the valuable ore from the waste rock. As the name suggests, holes are drilled into a section of rock, either above or below ground, and explosives placed in the drill holes.

The volume of explosive needed varies greatly between mine sites, depending on the mining method used as well as the rock type and hardness. Explosives are serious business and potentially hazardous. As a result, the production, distribution, trade, movement and use of explosives in Namibia are highly regulated with all levels of government having important roles to play.

Matrix Consulting Services was appointed to undertake the Environmental Scoping Assessment of the proposed development. This study will enable decision makers to make an informed decision regarding the development and make sure it does not have significant impacts on the environment and that they are mitigated. The environmental Scoping assessment was conducted to comply with Namibia's Environmental Assessment Policy and the Environmental Management Act.

1.1. Project Description

Beifang Mining Technology Services (Pty) Ltd. hereafter referred to as the proponent is of the intention to undertake the following development:



- Phase 1 - The construction of two Mobile Magazine for explosives accessories; and a Mobile Warehouse for Ammonium Nitrate for storage purpose,
- Phase 2 - The construction of an Emulsion Production Plant,

These phases will be made up of the following activities:

Pre-Construction Activities:

- ❖ Ensuring and maintaining environmental authorisations/permits/licences.
- ❖ Ensuring environmental awareness for all project personnel (i.e. contractors, sub-contractors and suppliers).
- ❖ Developing and implementing environmental emergency preparedness procedures for the project.

Construction Activities:

- ❖ Land clearing and preparation.
- ❖ Transporting relevant building material, equipment.
- ❖ Construction of associated buildings and other infrastructure.
- ❖ Installation of associated electrical services.
- ❖ Installation of associated water pipelines.
- ❖ Installation of associated sewer lines.
- ❖ Installation of stormwater management systems.
- ❖ Construction of access roads.

Operational Activities:

- ❖ Storage of explosive magazines and other accessories.
- ❖ Delivery of the fuel and various chemicals storage tanks from road/rail transport tankers.
- ❖ Manufacturing of the ANE.
- ❖ Loading of ANE into road/rail transport tankers.
- ❖ Maintenance of the development.

Decommissioning Activities:

- ❖ Removal of all infrastructure not reused during future use of land; and
- ❖ Rehabilitation of the land.

1.2. Project Rationale

The development will provide the much-needed supply of explosives and blasting agents, such as ANFO, emulsion and other accessories for the mining industry at the town and region at large.



Potential spin-offs:

- ❖ **Employment:** It is estimated that the new jobs will improve the livelihoods of the new workers and their families. Given the unemployment rate of 47.4% in the region, this in itself is regarded as a significant benefit to the socio-economic situation in the region (The Namibia Labour Force Survey, Namibia Statistics Agency, 2018).
- ❖ **Skills development:** As the construction and operation of the development requires specialised work and skills it can be expected that experts will be training locals in certain skills during development and operation.
- ❖ **Contribution to economic development** (e.g. supply of materials and goods for construction purposes; new businesses, employment etc.).
- ❖ **Technology transfer to Namibia:** The development includes state-of-the-art technology. The construction, operation, maintenance and support of these new technologies will expose local artisans and industries to these technologies. This can have a positive effect on the area.
- ❖ **General enhancement of the quality of life** at Otjiwarongo and the surrounding areas, especially the immediate businesses and residence; and
- ❖ **Expansion of trade and industrial activity** in the area.

2. TERMS OF REFERENCE

BMTS has commissioned an Environmental Scoping Assessment (**ESA**) for the proposed mobile explosive storage magazines and an explosive manufacturing plant at Otjiwarongo. The project site is located at 20.40938°S; 16.61075°E.

Matrix Consulting Services was appointed to undertake the Environmental Scoping Assessment of the proposed development. This study will enable decision makers to make an informed decision regarding the development and make sure it does not have significant impacts and that they are mitigated. The environmental scoping assessment was conducted to comply with the Environmental Assessment Policy (1995) and the Environmental Management Act (2007) and its regulations of 2012.

3. ENVIRONMENTAL STUDY REQUIREMENTS

The proposed development is listed as a project requiring an environmental assessment as per the following listed activities in the Environmental Management Act no 7 of 2007 and its Guidelines (06 February 2012).

The proponent commissioned this EIA and appointed Matrix Consulting Services to undertake the necessary activities to enable an application for an Environmental Clearance with the Environmental Commissioner as prescribed by the EMA (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012).



Importantly the process is undertaken to ensure that environmental issues are raised during the project plan, so as to address all concerns as the project gains momentum through to implementation. The findings, comments and recommendations made by the ESA are intended to necessitate the redesign of some project components or suggest changes to the proposed development, if necessary.

Table 1. List of activities identified in the EIA Regulations that apply to the proposed project

| Activity Description: | Description of Activity | Activities |
|--|--|---|
| Activity 8.9 Water Resource Developments | Construction and other activities within a catchment area. | The project entails activities that will be undertaken within a catchment area. |
| Activity 9.4 Hazardous Substance Treatment, Handling and Storage | The storage and handling of dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic meters at any one location. | The project entails the handling of hazardous substances. The manufacturing of Ammonium Nitrate explosives |
| Activity 9.2 Hazardous Substance Treatment, Handling and Storage | Any process or activity which requires a permit, licence or other form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licence or authorisation or which requires a new permit, licence or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste. | The project requires authorization from the Ministry of Safety and Security. |
| Activity 10.2 (a) (Infrastructure) | The route determination of roads and design of associated physical infrastructure where – it is a public road; | The proposed project includes the construction of roads. |

4. DESCRIPTION OF ALTERNATIVES

4.1 *No-Go Alternative*

Otjiwarongo is considered as one of the most important mining towns in Namibia, which supports various mines such as the open-pit B2 Gold mine (approximately 70 km northwest), the Okorusu Fluorspar mine (approximately 48 km north), the Cheetah cement, and other potential resource for rare-earth elements in the region. Together, mining contributes about 20% of the town's economy.



The 'no-go' alternative is undesirable in terms of the current lack of explosive supply services at the town and region at large.

The earmarked land for development is vacant, with part of it previously disturbed with indications of farming footprints, human walkways and illegal dumping. The illegal informal settlements are growing rapidly all over Namibia due to a lack of available serviced land. Should the site remain in this state, the possibility and threat of illegal land invasions and squatters settling on the land will persist.

Should the proposed BMTS explosives development not take place, the mining industry in the region could be deprived of an explosive storage magazines and manufacturing plant which is critical for their blasting operations. The No-go option will not be a viable alternative at this stage.

4.2 Site Alternative

The proposed land is situated approximately 7km northwest of the Otjiwarongo CBD, within the Otjiwarongo townlands. The land is currently utilised as a Municipal grazing area. The land was strategically allocated to the BMTS by the Otjiwarongo municipality as the site is ideally suited for this type of development.

The area holds less ecological and conservation values, and the best option chosen is to develop the BMTS explosives project with strict considerations of environmental aspects especially the indigenous species present at the site and to minimise impacts on such species. Mitigation measures on impacts likely to be caused by the activity are incorporated in the planning and execution of the activity. The development of BMTS project will then have minimal impact on the environment. The environmental footprint of this activity is expected to be minimal.

5. SCOPE

The scope of the ESA aims at identifying and evaluating potential environmental impacts emanating from the construction, operations and possible decommissioning of the development. Relevant data have been compiled by making use of secondary sources and from project site visits. Potential environmental impacts and associated social impacts will be identified and addressed in this report.

The environmental scoping assessment report aims to address the following:

- a) Identification of potential positive and negative environmental impacts.
- b) Provide sufficient information to determine if the proposed project will result in significant adverse impacts.



- c) Identification of “hotspots” which should be avoided where possible due to the significance of impacts.
- d) Evaluation of the nature and extent of potential environmental impacts
- e) Identify a range of management actions which could mitigate the potential adverse impacts to required levels.
- f) Provide sufficient information to the Ministry of Environment to make an informed decision regarding the proposed project.
- g) Consult relevant stakeholders (i.e. local authority etc.) regarding the proposed development.

6. METHODOLOGY

The following methods were used to investigate the potential impacts on the social and natural environment due to the construction and operations of the mobile explosive storage magazines; and explosive manufacturing plant:

- a) Information about the site and its surroundings was obtained from existing secondary information and site visits.
- b) Neighbours, interested and affected Parties (I&APs) were consulted and their views, comments and opinions are presented in this report.

7. STATUTORY REQUIREMENTS

The ESA process is undertaken in terms of Namibia’s Environmental Management act no. 7 of 2007 and the Environmental Assessment Policy of 1995, which stipulates activities that may have significant impacts on the environment. Listed activities require the authorisation from the Ministry of Environment and Tourism (DEA). Section 32 of the Environmental Management Act requires that an application for an environmental clearance certificate be made for the listed activities. The following environmental legislation is relevant to this project:

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. Atmosphere Pollution Prevention Ordinance (1976)

This Ordinance generally provides for the prevention of the pollution of the atmosphere. Part IV of this ordinance deals with dust control. The Ordinance is clear in requiring that any person carrying out an industrial process which is liable to cause a nuisance to persons residing in the vicinity or to cause dust pollution to the atmosphere, shall take the prescribed steps or, where no steps have been prescribed, to adopt the best practicable means for preventing such dust from becoming dispersed and causing a nuisance.

Line Ministry: Ministry of Environment and Tourism

VI. National Heritage Act No 27 of 2004

The Act calls for the protection and conservation of heritage resources and artefacts. Should any archaeological material, e.g. old weapons, coins, bones found during the construction, work should stop immediately and the National Heritage Council of Namibia must be informed as soon as possible. The Heritage Council will then decide to clear the area or decide to conserve the site or material.

VII. 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 the private sector, should be subjected to the established EA procedure as set out in Figure 1.

Line Ministry: Ministry of Environment and Tourism

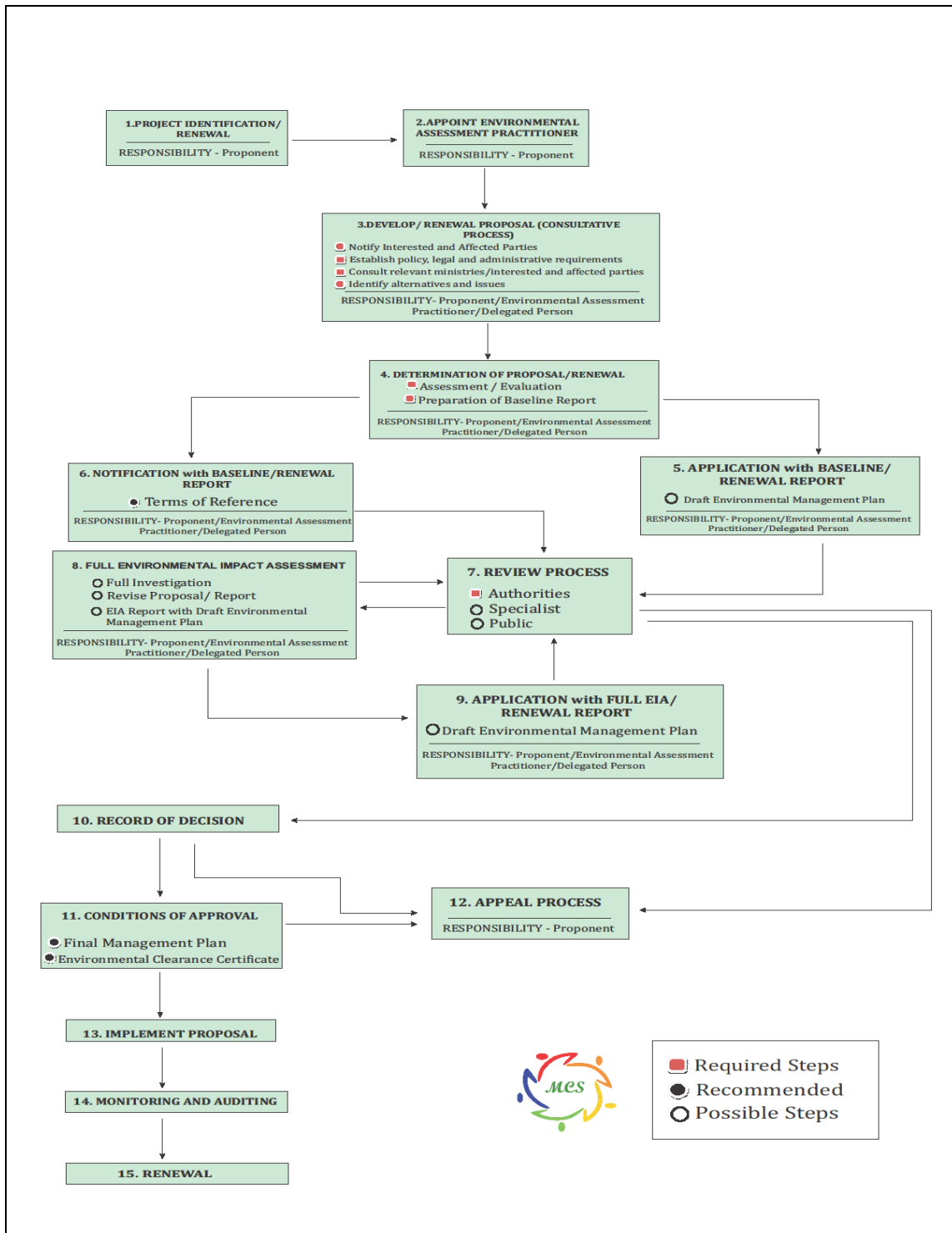


Figure 1. Environmental Assessment Procedure of Namibia (Adapted from the Environmental Assessment Policy of 1995)

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.

VIII. 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

IX. 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.

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

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

XI. 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.

XII. 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

XIII. 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

XIV. 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 upgrade and operations are expected to include dust, air quality impacts, noise nuisance and smoke emissions.

Line Ministry: Ministry of Health and Social Services

8. INSTALLATIONS AND RELATED ACTIVITIES

The proposed layout of the mobile explosive storage magazines and explosive manufacturing plant is illustrated in the maps below. The development will consist mainly of the following:

- Mobile Plant and MMU,
- ANPP Warehouse,
- Future Emulsion Plant,
- Explosive Accessories Magazines,
- HSE (i.e. fire facilities, containment structures and facilities, perimeter fencing and security).



Photo 1. Mobile Plant and MMU (*illustrative*)



Photo 2. ANPP Warehouse (*illustrative*)

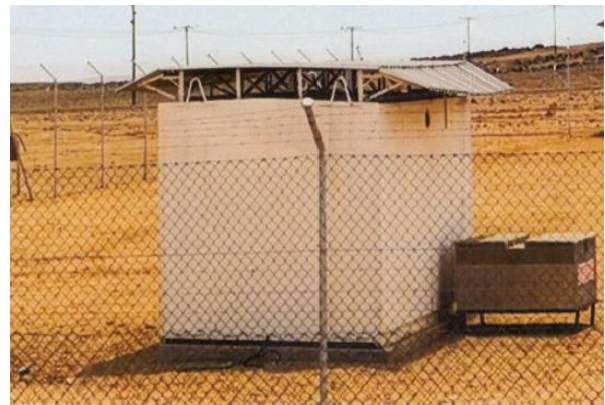


Photo 3. Explosive Accessories Magazine (*illustrative*)

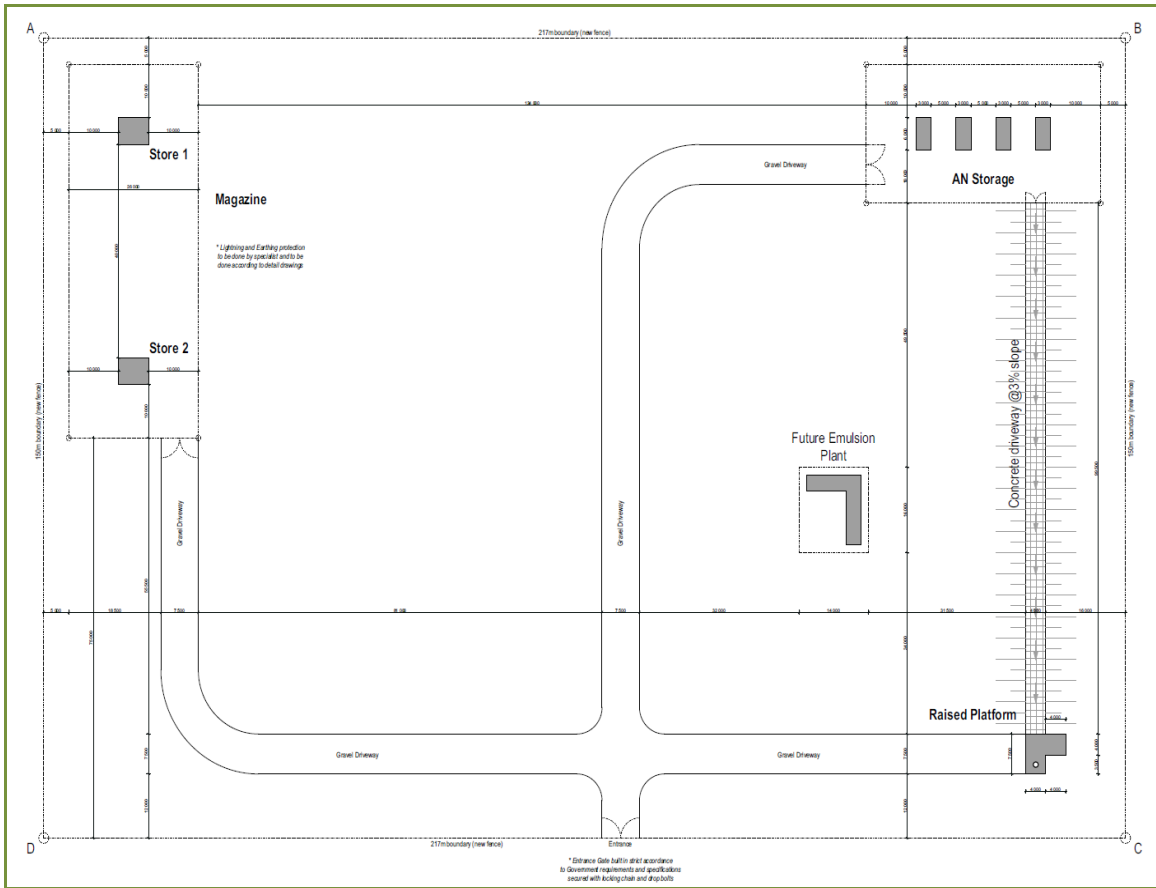


Figure 2. Proposed site layout plan



8.1 Emulsion Process Description

The explosives manufacturing plant will include a factory building with areas for a bunded diesel storage tank, mobile plant and MMU storage; wash bay, raw storage area, AN Prill silos and bunded emulsion tank. The factory building will also contain process rooms, a boiler and electrical room.

The process to manufacture emulsion is a semi-continuous blending process. The two main raw materials are oxidiser solution and a fuel oil/emulsifier blend. The four basic steps in the production of emulsion are characterised below.

8.1.1 Oxidiser Solution Preparation

Oxidiser solution is prepared by combining ANS and minor chemicals in a series of batch tanks. The insulated batch tanks are heated using circulating hot water. Batches of oxidiser solution are prepared by pumping quantities of ANS, recycled/imported or town's water, caustic soda, acetic acid as defined by the product recipe. Thiourea and urea are added via forklift and screw feeder if required. The batch is stirred and sampled for routine quality control testing. The oxidiser solution is cooled to the appropriate temperature inline as it is pumped to the ANE manufacturing area.

8.1.2 Fuel Blend Preparation

The fuel oil blends are either created onsite or imported pre-blended. The raw materials utilized in the fuel oil blend include diesel, canola, paraffin and an emulsifier. These products are combined in-line for direct manufacture or combined in a blend tank for short term storage. The fuel oils are stored at ambient temperature and then blended and heated inline as they are pumped to the ANE manufacturing area.

8.1.3 ANE Manufacturing

ANE is formed by spray emulsification of oxidiser solution blend in a process. The freshly formed ANE is subsequently refined using static mixers. Progressive cavity pumps are utilized to pump through the static mixers and to surge tanks or directly to road tanker trucks. The ANE is sensitized by a process of mixing and blending with other substances immediately prior to discharge into blast holes at the mine or quarry site. Without the sensitisation process, the ANE is not classified as explosive.

8.1.5 ANE Storage

The ANE is either stored short term in surge tanks prior to distribution to customers or pumped directly to bulk road tankers. An overhead system will be provided for export tanker loading. Production of ANE will be tailored to demand in order to minimize the quantities of ANE held in surge tanks prior to distribution.



8.2 Raw Material Storage and Handling

A number of raw materials are utilized in the production of ANE, including ammonium nitrate solutions, fuel blend ingredients, thiourea, urea, acetic acid caustic soda and process water.

8.2.1 ANS and Weak ANS

Any minor spills during the unloading of acetic acid will be collected at a low point in the unloading bay. Stormwater collected in the bund will be tested for low pH prior to being pumped to a storage tank for recycling.

8.2.2 Caustic Soda

Caustic soda is used as a 50% aqueous solution. Caustic soda will be delivered to the proposed ANE production facility by tankers and will be stored in tanks within dedicated bunds.

8.2.3 Thiourea and Urea

Thiourea is an organic compound similar to urea and is used as a minor ingredient in oxidiser solution. Thiourea will be delivered and stored in bulk bags. The bags of dry thiourea will be stored in a bunded undercover area to prevent stormwater ingress. Dry urea will be delivered to the proposed ANE production facility in bulk bags and stored in an undercover, bunded area to prevent stormwater ingress.

8.2.4 Fuels

Fuels will be delivered to the proposed ANE production facility by road tankers from various locations and will be stored in self bunded above ground storage tanks.

8.2.5 Water

The water required for the manufacturing process will be obtained from three sources, comprising:

- Boreholes in and around the area.
- Imported to the proposed ANE production facility by tankers from Otjiwarongo's water supply scheme.
- Recycled from rainwater tanks or treated stormwater captured in manufacturing or storage areas.

8.3 Explosive Accessories Magazines

Specifications for explosives storage magazines and the locations of these facilities will adhere to the Explosives Act of Namibia regulations. The explosives factory and the explosives magazines will be located as determined by the distances that govern the manufacturing and storage of explosives and blasting agents.



Two explosive magazines will be erected at the site, with spacing between the magazines that will enable trucks to manoeuvre easily around the magazines.

The AN Prill storage area shall be adequately built with containment structures. The prill will be stored in 1 tonne tote bags, which will be stored together in sea cans to protect the AN Prill from exposure to the environment as well as any accidental release. Sufficient space is required at the AN Prill storage facility for delivery trucks and unloading fork-lifts to manoeuvre.

The proposed development will be constructed and operated according to relevant national and international standards (or better).

9. GENERAL ENVIRONMENT OF THE STUDY AREA

This section lists the most important environmental characteristics of the study area and provides a statement on the potential environmental impacts on each.

9.1 Location and Land Use

The project site (20.40938°S; 16.61075°E) is situated on Portion of Municipal Grazing Camp 3, in Otjiwarongo. The 3Ha plot is situated within the Otjiwarongo townlands. See Figure 3. The town of Otjiwarongo is the capital and biggest business centre of the Otjozondjupa Region. It is located along the B1 national road in the Northern parts of the country and has a total population of approximately 70 000 residents. It is considered one of the country's fastest growing towns in Namibia.

Access to the project site will be from the national B1 road, via existing access tracks on the farm (Figure 4). The explosives magazines and manufacturing plant are 2.5 and 3.2km from the NDF shooting range; and the nearest road (D2430) respectively.

The Cheetah Cement Factory and the B1 national road are situated approximately 8.6km from the site.

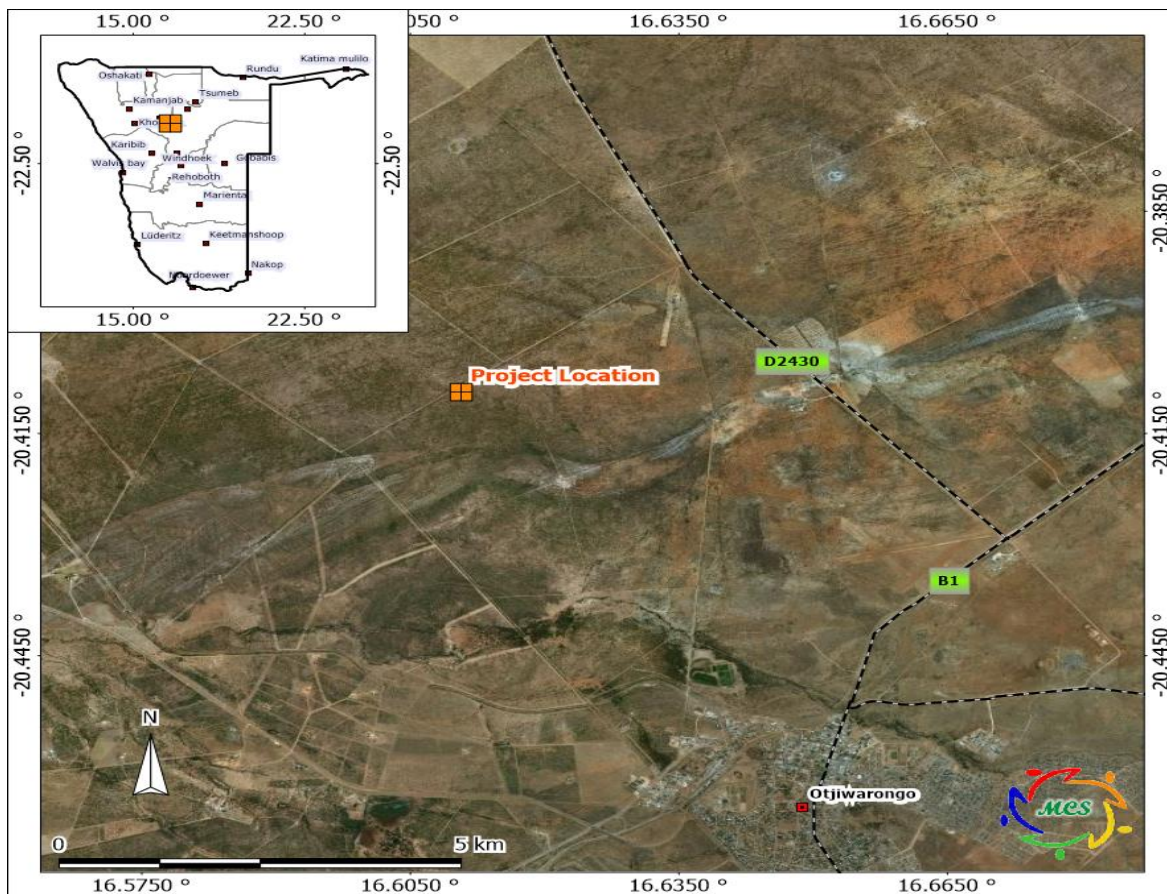


Figure 3. Project location (20.40938°S; 16.61075°E)

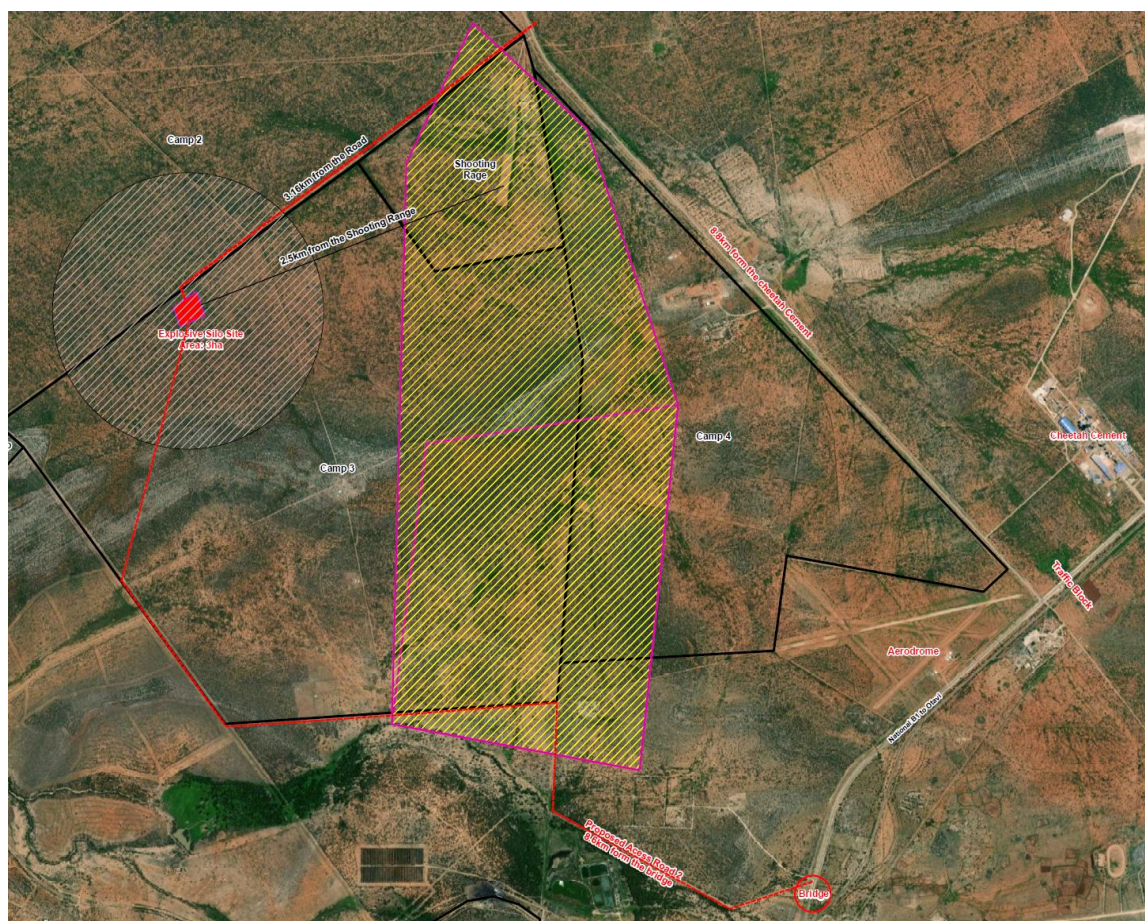


Figure 4. Surrounding land use



9.2 Topography and Drainage

The landscape is classified as being in the Central-western plains, which is characterized as an area of dissection and erosional cutback. The site is located within the catchment of the Ugab River, an ephemeral river draining in a western direction.

Drainage from the site is well developed and runoff takes place southward. The relief of the town's stormwater system remains intact, and allows good drainage from site and its surroundings. Proper drainage systems however should be developed at the facility itself, in order to control the flow of surface water run-off from the site. Storm water management systems should form part of the engineering designs.

9.3 Climatic Conditions

| | |
|----------------------------|--|
| Classification of climate: | Semi-arid area |
| Average rainfall: | Rainfall in the area is averaged to be between 400 mm-450 mm per year. |
| Variation in rainfall: | Variation in rainfall is averaged to be 30-40 % per year. |
| Average evaporation: | Evaporation in the area is averaged to be between 2800-3000 mm per year. |
| Precipitation: | The highest summer rains are experienced in February. Sporadic and unpredictable, high intensity, highly localised storm events between October and April does occur. |
| Water Deficit: | Water deficit in the area is averaged to be between 1500-1700 mm per year. |
| Temperatures: | The temperatures are highest in December and January with an average of 24.8°C. The lowest average temperatures of 18°C occur in May during the year. During the year, the average temperatures vary by 9.6°C. |
| Wind direction: | Wind direction in the area is predominantly northerly, northeasterly and northwesterly. |



9.4 Hydrogeology of the Study Area

Granite of the Cambrian Age (Egd) underlies a surface soil cover of unknown thickness in the area. All of the underlying formations are classified as hard rock formations. Groundwater flow would be mostly along fractures, faults (secondary porosity) and other geological structures present within the formations.

Groundwater flow from the site can be expected into a southerly direction; however local drainage patterns may vary due to groundwater abstraction. According to the Department of Water Affairs (DWA) database, no borehole exists within a 2km radius from the site. Local flow patterns may vary due to groundwater abstraction. Depth to water table is expected to be less than 10m below ground level (mbgl).

This area falls within the Otjiwarongo-Otavi Subterranean Water Control Area. - Proclamation 18 of 4 February 1977. This means that Government controls groundwater usage and exploration thereof. See Figure 5 below for the hydrogeological map.

9.4.1 Portable Water Supply to Otjiwarongo

Otjiwarongo relies on water supply via pipelines from the Otjiwarongo Water Supply Scheme. The Scheme consists of two well fields referred to as northeast and southwest, which are mainly located in the marble aquifers.

The Northeast well field comprises of the Omarassa boreholes, which can be grouped per compartment in Drukwerk-Brunnental, Nebraska-Horseshoe, Omarassa-Okaputa, Janhelpman and Phase 5. The Southwest comprises of the Omatjene, Buffelhoek, Otjitazu, Hoasas and Kilo 9 compartments. All of the well fields are outside the municipal boundaries of Otjiwarongo.

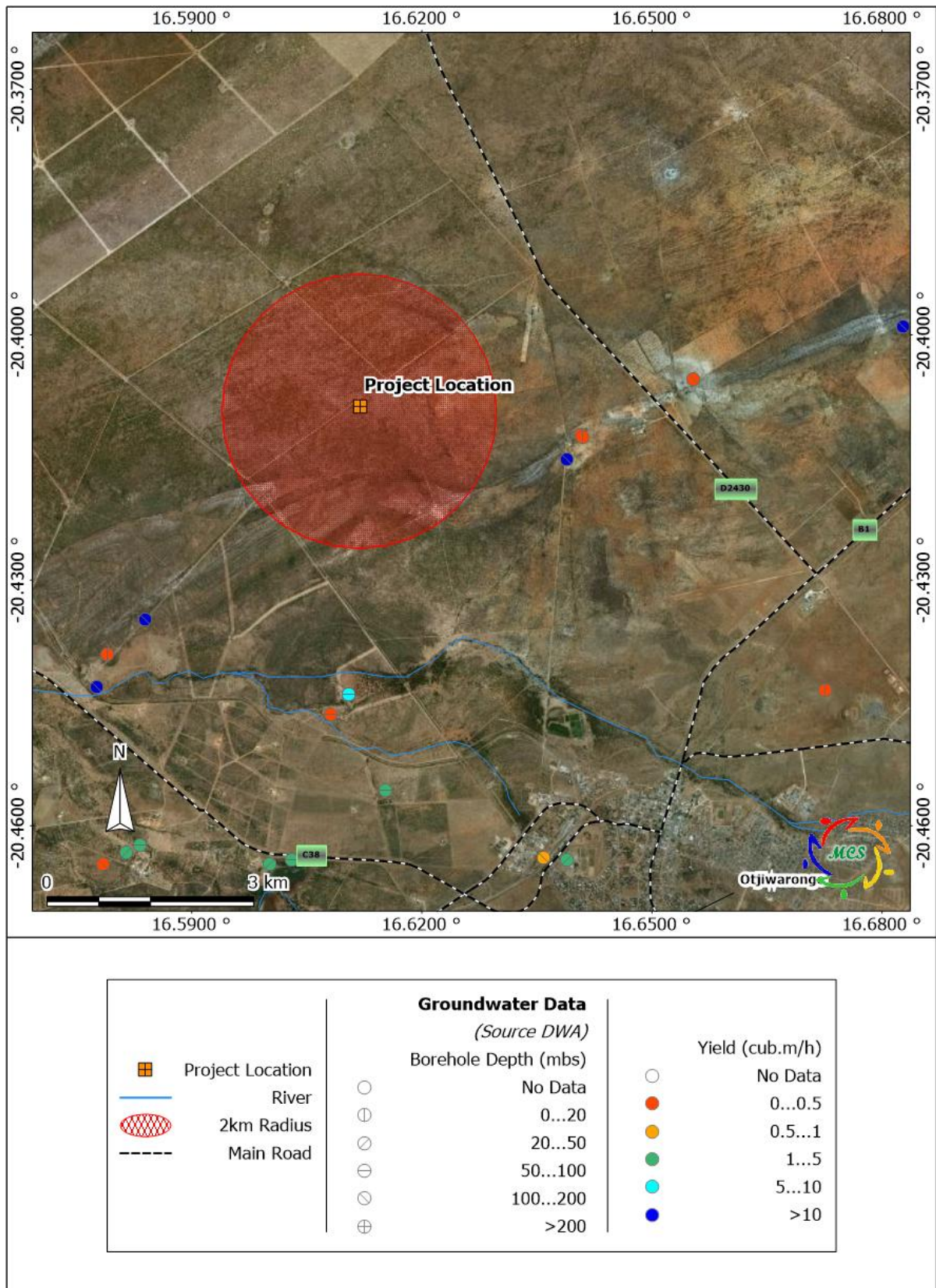


Figure 5. Hydrogeology of Area



9.4.2 Surface- and Groundwater Pollution Monitoring

Groundwater and surface water are therefore essentially one resource, physically connected by the hydrologic cycle. Streams interact with groundwater in three basic ways, *i.e. streams gain water from inflow of groundwater through the streambed, streams lose water by outflow through the streambed, or they do both depending upon the location along the stream.* It is the groundwater contribution that keeps streams flowing between precipitation events. Groundwater from the local fractured network is used for human consumption and stock watering purposes.

The consultant recommends that groundwater pollution be monitored with the installation of three (3) monitoring boreholes in and around the site. All boreholes should be drilled with a drill diameter of 165mm. The holes shall be installed with 2.9m-uPVC plain (140mm OD) casing, followed by factory slotted casing to final depth. Casing bottom caps shall be installed in each hole. Gravel pack and bentonite powder shall be installed around casing in each installed borehole to prevent any possible surface pollution inflow from the facility. A protective manhole will then be placed over each borehole installed. The purpose of these boreholes is to quantify levels of any pollution in the subsurface and to monitor the migration of possible pollution off site. The borehole construction parameters above are designed to allow ease of groundwater remediation and/or data collection (where necessary).

Baseline water samples should be collected from the boreholes immediately after drilling completion, in order to represent baseline conditions at the site. As such, these conditions can be important in forecasting potential environmental impacts during the site operations, and can become measurements against which future changes are compared. Water samples shall be collected from these holes on a regular basis and send to laboratories for chemical of concern analysis.

9.5 General Ecology

The site falls within the Tree and shrub savanna biome, which is characterised by Thornbush shrubland type vegetation. The vegetation structure type is classified as Dense shrubland. In general, approximately 66 and 83 species of larger trees and shrubs are known to occur in the area respectively. Of this, at least 32.5% species of larger trees and shrubs have protected status in the general area.

During the site visit, the dominant vegetation observed in the project location consists mainly of trees/bush, shrubs, weedy species and grass. A low number of trees are however observed at the project area. Of the vegetation observed, the *Albizia anthelmintica*, *Boscia albitrunca* and *Ziziphus mucronata* are protected under Forestry Act (No.12 of 2001) of Namibia. Invasive species were also

encountered at the site, which is a sign of disturbance. All protected species will be conserved and integrated into the development.



Deducing from the Atlas of Namibia, the proposed site is within the area that is known to have 300 to 400 plant species and a high to medium diversity of higher plants (Mandelsohn et al (2003). With regards to fauna, minimal wildlife has been observed in the vicinity of the study area.

Faunal species diversity is presented in the table below:

Table 2. General Fauna Diversity (Atlas of Namibia)

| | <u>Diversity</u> | <u>Endemism</u> |
|-----------------|-------------------|-----------------|
| Mammal | 73 - 90 Species | 3 - 4 Species |
| Scorpion | 12 - 13 Species | 3 - 4 Species |
| Bird | 171 - 210 Species | 4 - 5 Species |
| Reptile | 71 - 80 Species | 13 - 16 Species |
| Frog | 12 - 15 Species | N/A |
| Lizard | > 35 Species | 6 - 8 Species |
| Termite | 7 - 9 Genera | N/A |
| Snakes | 35 - 39 Species | 9 - 10 Species |

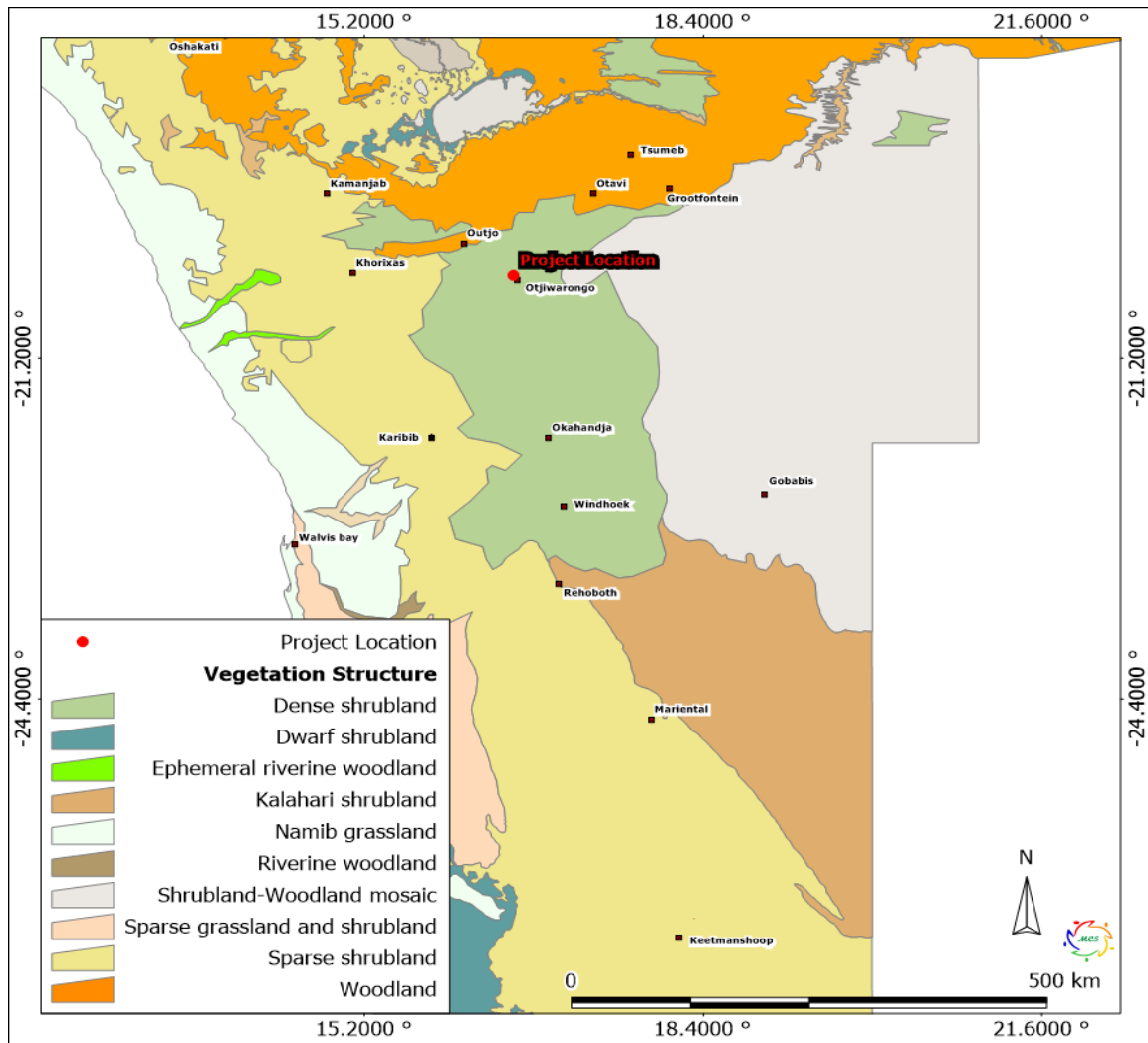


Figure 6. Vegetation map of study area

9.6 Socio-Economic Aspects

This section provides an overview of socio-economic characteristics of the study area. It provides regional and local information on the, economic activities, population dynamics, vulnerability, and social services currently available in the area.

9.6.1 Regional information

The project location is situated in Otjiwarongo, in the Otjozondjupa Region of Namibia. The total current population of Otjozondjupa Region is estimated to be 143,903 with 70,001 females and 73,902 males (NPC, 2011). According to The Namibia Labour Force Survey (NSA, 2018), 47.4% of the population of Kunene Region over 15 years of age are literate. The total population of Otavi to be specific is 16,632. The estimated unemployment rate in Otjozondjupa Region is 37%. The population density in Otjozondjupa Region is relatively low at 0.8 persons per km², compared to the national average of 2.1 persons per km².

9.6.2 Otjiwarongo

9.6.2.1 Economic activities

Otjiwarongo is the main capital centre of the Otjozondjupa Region, which forms part of the hub for all economic activities in the area and the region at large.

The town is best known as the gateway to all the regions and the Etosha National Park. As a result, a large number of tourists travel through the town to other regions and the mighty Etosha National Park.

The town has become an economic hub due to the presence of recent mining activities in the region i.e. B2 gold mine, Cheetah Cement, Ohorongo Cement factory etc. As a result, business and employment at the town has picked up significantly.

9.6.2.2 Employment Creation (Job Opportunities)

Unemployment still hampers most of the developing world and Otjiwarongo and the region at large is no exception. The Construction phase of the project will provide job opportunities, of which 80% are expected to be unskilled and semi-skilled people and can be sourced from the unemployed labour force of the town and the surrounding areas.

The principle of maximising local employment creation can be applied by identifying suitable construction contractors at the town and region. Otjiwarongo is well-supplied with competent small and medium enterprise (SME) construction companies to conduct the proposed development. The project would also give rise to indirect economic benefits through the procurement of materials, goods and local services.

The local economy of the town is expected to benefit from the project. A percentage of moneys derived from salaries and wages earned by construction workers is likely to be spent at the town and surrounding areas. The moneys spent in communities around the project location would create substantial flows of revenue within these communities, thus acting as a catalyst for growth in the local economy.

In addition, procurement of construction materials, goods and services would have beneficial downstream economic impacts by stimulating demand up the supply chain. The more goods and services procured from local SMEs or enterprises at the town, the greater the project's contribution to the growth of the local economy.

It is therefore recommended that, where feasible, contractors employ local labour by recruiting from the town and local communities; that procurement of materials, goods and services from local suppliers be encouraged.



9.6.2.3 Livelihoods

Economic activities at the town are limited and livelihoods are heavily dependent on wages and salaries of civil servants; subsistence and commercial farming. The livelihoods of the local communities in the area are expected to be positively impacted by the proposed development.

9.6.2.4 Procurement

Local businesses are to benefit from the envisaged construction and operational activities. BMTS and/or its sub-contractors might need to procure services from these businesses e.g. domestic waste removal, transport, security services etc.

9.6.2.5 Tourism

Private game farms and conservancies in Otjozondjupa Region offer protection to wildlife which then becomes an attraction to tourists and trophy hunters, in turn providing farm owners with alternate livelihoods as well as sources of income from game farming, hunting and ecotourism.

This town is situated near some of the best game reserves and nature reserves the country has to offer. The nearby Etosha National Park and Waterberg Plateau Park are some of Namibia's number one tourist attractions. Both Parks are nature conservation areas in central and northern Namibia. The Etosha Park, in particular, is one of the most significant game reserves in Africa. The Park is by far the best known and most important national park and covers an area of nearly 22.912 km² and is completely fenced for the protection of the animals. The name Etosha is derived from the Oshiwambo and means "big, white place". More than 100 mammal species and 340 different species of birds are found in the park.

The Waterberg Plateau is a particularly prominent feature, elevated high above the plains of the Kalahari of Eastern Namibia. The plateau and some 405 km² of surrounding land were declared a nature reserve in 1972. The Park is ecologically diverse and rich and has over 200 different species of birds and some rare species of small antelope on the lower hills of the mountain.

The project area attracts a lot of tourists from all over the world. Excessive waste, dust, noise and vibrations can have negative impacts on the tourism industry in the area, as it can become a nuisance to tourists. Mitigation measures at the site must be put in place to reduce these impacts.

9.6.2.6 In - Migration

Due to enhanced employment opportunities that could be created by the envisaged project, some in-migration of job seekers to Otjiwarongo can be



expected. Depending on the amount of in-migration, local areas may start experiencing overcrowdings, over use of infrastructure, local conflicts, increase of goods prices due to increased demand etc.

9.6.2.7 HIV & Prostitution

Namibia has a high incidence of HIV/AIDS, which has a strong and adverse socio-economic impact on livelihoods of people in the region. The HIV prevalence rate is estimated at 19.7% for Namibia (Poverty profile 2007).

The spending powers of contractors working for the BMTS project are likely to increase, and this might be a perfect opportunity for sex workers to explore. Migrant labourers from other regions and expatriates are normally vulnerable and may use the services rendered by the sex workers.

Construction camps (if any) often become a focal point for promiscuous sexual activities. Such activities, particularly when carried out without protection, can result in increases in sexually transmitted diseases (STDs) and especially AIDS among neighbouring communities, construction workers and their partners.

Should the HIV prevalence increase, the following consequential issues could arise:

- ✓ Reduced workforce in the Otjozondjupa Region.
- ✓ Diversion of income expenditure to medical care.
- ✓ Increase in orphans and households headed by children.
- ✓ Increase in pregnancy related mortality.
- ✓ The current rate of people per doctor could increase.

Educate workers and surrounding communities on measures to prevent the spread of HIV/AIDs through awareness campaigns, provision of safety equipment for workers, child labour prohibited.

9.6.2.8 Infrastructure & Increased Traffic

The traffic in the area is expected to increase slightly and it might contribute to heavy traffic during peak hours and a higher number of car accidents in the area. Infrastructure like roads (i.e. national roads B1 and D2430) may be affected due to increased traffic and construction/operational trucks accessing the site.



10. PROVISION OF ENGINEERING SERVICES

10.1 Electricity Supply

The site will source its electricity supply from Cenored, which is the local power utility distributor.

10.2 Water Supply

The provision of water to the development will mainly be sourced from boreholes on and around the plot. The import of portable water from the town's water supply scheme via road tankers is also being considered. Rainwater collected from all the buildings of the development will be recycled as drinking water and fire water.

10.3 Sewage

No formal sewage system exists at plot. It is therefore the responsibility of the proponent to ensure that a suitable and proper sewage system is installed at the site.

The consultant recommends that a Clarus Fusion sewage treatment facility (or better) be installed on project site. The facility is a factory-built activated sludge sewage treatment plant which follows the exact same treatment process as that of municipal activated sludge plants. The fusion treatment plant is suitable for sewage treatment in remote areas without formal treatment facilities, or where these facilities are a distance from the development.

10.4 Access Roads

Access to the proposed development will be obtained from the B1 and D2430 roads.

10.5 Waste Removal

The facility will be adequately equipped with waste bins in all point of source and active locations at the site. Waste removal from the site will be the responsibility of the proponent. Any spills of raw material will be properly contained, collected and disposed of by a licensed contractor. Any stormwater or spills captured within bunded areas will be treated by an on-site oil water separator.

11. STAKEHOLDER PARTICIPATION

Stakeholder consultation forms an integral component of an ESA investigation and enables comments on the potential environmental impacts associated with the proposed development and to identify additional issues which they feel should be addressed in the ESA. The primary aims of public participation were:

- ❖ To inform I&APs and key stakeholders about the proposed development



- ❖ To identify issues and concerns of key stakeholders and I&APs with regards to the proposed development.
- ❖ To provide information to enable informed decision making
- ❖ To develop a communication structure with stakeholder and I&APs
- ❖ To promote transparency of the project
- ❖ To ensure that stakeholders comments are considered for the development.

Public participation posters (A3 size) notices were placed at strategic locations at the town (i.e. access roads to project site, Spar Otjiwarongo, Municipality offices and Post office). See Photos below.



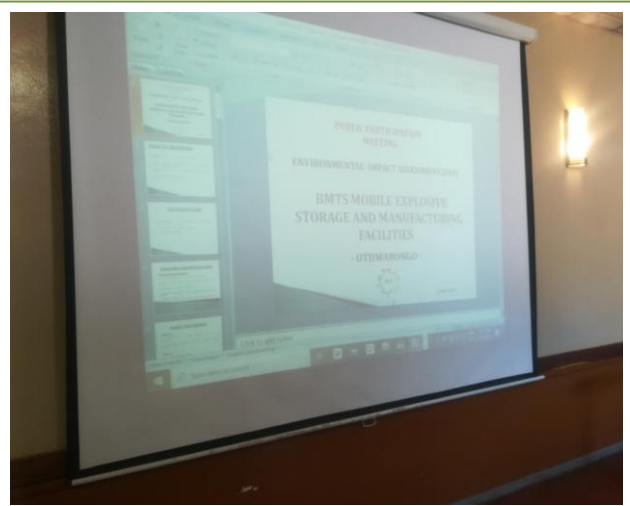
Figure 5. Poster at project site entrance (along D2430)



Figure 6. Poster at project site entrance (along B1 road)



Figure 7. Public consultation meeting



The posters provided background information about the project and gave interested and affected parties an opportunity to forward their issues and comments about the project.

Decision-making authorities were consulted during the study, and have been engaged throughout the project process. Consultation with the department of Environmental Affairs (MET) included the environmental assessment procedure and application procedure.



Public participation notices were placed and run in two local newspapers on two different occasions, namely; (See Appendix C).

- ✓ The New Era Newspaper, 27 April and 05 May 2021
- ✓ The Observer, 27 April and 03 May 2021

In the adverts an e-mail address, phone number and fax number was provided to the general public to register as interested and affected parties; and to request a background information document for the project. As indicated before, notification posters were placed at strategic locations to invite interested and affected parties for comments and concerns.

A consultative meeting with key stakeholders was held at the project location on the 4th March 2021. No environmental concerns regarding the proposed development were raised; however the team agreed amongst other things that an environmental impact assessment be conducted as per the requirements of Namibia's Environmental Management act no. 7 of 2007. See Appendix C minutes of the meeting.

Mr Moses Matyayi (CEO of Otjiwarongo Municipality) was consulted regarding the project. He indicated that the municipality is aware of the proposed development and indicated no environmental objections or concerns regarding the project. He however advised that the development must be subjected to an EIA (as per relevant legislations).

A public consultation meeting was held on 11 May 2021, at Casa Forno Country Hotel in Otjiwarongo. No attendance was recorded at the meeting. At the time of report writing, no further environmental or social concerns regarding the development was received from the general public.

Table 3. Consulted Stakeholders/I&APS

| NAME | ORGANISATION/ERF | DESIGNATION/POSITION |
|-------------------|--|--------------------------|
| Ms. S. Angula | Ministry of Environment and Tourism, Directorate of Environmental Affairs. | EA procedure |
| Mr. P. Rooi | Beifang Mining Technologies Services (Pty) Ltd. / Proponent | Installation Information |
| Ms. C. Zhang | Beifang Mining Technologies Services (Pty) Ltd. / Proponent | Installation Information |
| Mr. M. Matyayi | Otjiwarongo Municipality / Chief Executive Officer | Local Authority |
| Mr. C. Lubsi | Otjiwarongo Municipality / Environmental Health Officer | Local Authority |
| Mr. H. Tjiveze | Namibian Police Force/ Commissioner Otjzondjupa Regional Commander | Relevant Authority |
| Mr. J.N. Alweendo | Namibian Police Force/ Commissioner Office of Inspector General | Relevant Authority |
| Mr. P.S. Sauzuo | Namibian Police Force/ Chief Inspector Head of Explosives Disposal Sub-Division | Relevant Authority |



| | | |
|-----------------|--|--------------------|
| Mr. K. Anghuwo | Namibian Police Force/ Chief Inspector Special Branch Otjozondjupa Region | Relevant Authority |
| Mr. S. Amaambo | Namibian Police Force/ Inspector Explosives Control Sub-Division Otjozondjupa Region | Relevant Authority |
| Mr. A. Amputu | Namibian Police Force/ Warrant Officer Explosives Control Sub-Division Otjozondjupa Region | Relevant Authority |
| Mr. M. Siseho | Ministry of Environment and Tourism | Relevant Authority |
| Mr. E.N. Simeon | Ministry of Defence / Major | Relevant Authority |

12. ENVIRONMENTAL IMPACT EVALUATION

The Environmental Scoping Assessment sets out potential positive and negative environmental impacts associated with the proposed development. The following assessment methodology will be used to examine each impact identified, see Table 4.

Table 4. Impact Evaluation Criterion (DEAT 2006)

| Criteria | Rating (Severity) | |
|--|-------------------|------------------------------|
| Impact Type | +VE | Positive |
| | 0 | No Impact |
| | -VE | Negative |
| Significance of impact being either | L | Low (Little or no impact) |
| | M | Medium (Manageable impacts). |
| | H | High (Adverse impact). |

| Probability: | Duration: |
|-------------------------|-------------------------------|
| 5 - Definite/don't know | 5 - Permanent |
| 4 - Highly probable | 4 - Long-term (impact ceases) |
| 3 - Medium probability | 3 - Medium-term (5-15 years) |
| 2 - Low probability | 2 - Short-term (0-5 years) |
| 1 - Improbable | 1 - Immediate |
| 0 - None | |
| Scale: | Magnitude: |
| 5 - International | 10 - Very high/don't know |
| 4 - National | 8 - High |
| 3 - Regional | 6 - Moderate |
| 2 - Local | 4 - Low |
| 1 - Site only | 2 - Minor |
| | 0 - None |

12.1 Construction Phase

12.1.1 Dust Pollution and Air Quality

Dust will be generated during the construction phase along the access tracks on the farm and the construction site. This might be worse during the winter months when strong winds occur. Dust problems are expected to be site specific and could pose a slight nuisance to neighbouring properties land. Road users of the B1 and D2430



roads will not be affected by any dust pollution, due to the large distance from site (more than 3km). Dust is regarded as a nuisance as it reduces visibility, affects the human health and retards plant growth.

Possible air pollution in the form of emissions from construction vehicles and equipment could also deteriorate air quality in the area.

Proposed Mitigation Measures

- ✚ Ensure measures are in place to minimise dust generated during the construction phase.
- ✚ Use appropriate dust suppression measures when dust generation is unavoidable, e.g. dampening with water, particularly during prolonged periods of dry weather.
- ✚ Avoid excavation, handling and transport of materials which may generate dust under high wind conditions.
- ✚ Locate stockpiles of construction materials in sheltered areas where they are not exposed to erosive effects of the wind.
- ✚ Ensure all vehicle, plant and equipment are in good condition.
- ✚ Encourage reduction of engine idling.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|--------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Dust | -VE | 1 | 2 | 6 | 3 | L | L |

12.1.2 Noise Impact

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.

Excessive noise pollution has a negative impact on wildlife species by reducing habitat quality, increasing stress levels, and masking other sounds. Chronic noise exposure is especially disruptive for species that rely on sound for communication or hunting. Animals that use noise for hunting, such as bats and owls, and prey species that rely on noise to detect predators may have decreased patterns of foraging, reducing growth and survivability.

Proposed Mitigation Measures

- ✚ Ensure the use of construction vehicles and equipment that emit reduced noise levels.
- ✚ Ensure proper maintenance is conducted on vehicles to ensure the reduction of noise emission.
- ✚ Ensure that all mufflers on vehicles and machinery are in full operational order.



- ✚ The construction staff should be equipped with ear protection equipment.
- ✚ Audio equipment (if any) should not be played at levels considered intrusive by others.
- ✚ Construction activities will be limited to a period between 07h00 and 17h00.

Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|--------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Noise | -VE | 1 | 1 | 4 | 3 | L | L |

12.1.3 Safety & Security

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. Construction sites usually house construction building material and equipment on site which may attract criminal activities.

Proposed Mitigation Measures

- ✚ Display telephone numbers of emergency services at the project location.
- ✚ Provide suitable emergency and safety signage on site (manufactured of durable, weatherproof material). The signage signs should be placed at strategic locations to ensure awareness.
- ✚ Demarcate and barricade any areas which may pose a safety risk (including hazardous substances, deep excavations etc). These notices must be worded in English and local languages.
- ✚ Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times.
- ✚ Prevent illegal access to the construction site by implementing appropriate security measures. These security measures must not pose a threat to surrounding communities.
- ✚ Should a construction camp be necessary, it should be located in such a way that it does not pose a risk to the public.
- ✚ Equipment housed on site must be placed in a way that does not encourage criminal activities.
- ✚ For safety and security reasons it is recommended that the entire site (construction site and camp) be fenced-off and security personnel be employed to safeguard the premises and to avert criminal activities.
- ✚ Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used.
- ✚ The contractor is advised to ensure that the team is equipped with first aid kits and that they are available on site, at all times.
- ✚ Adequate lighting within and around the construction location should be erected, when visibility becomes an issue.



Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|-------------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Safety & Security | -VE | 1 | 1 | 4 | 2 | M | L |

12.1.4 Traffic

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, due to the fact that construction vehicles will frequent the site only periodically.

No diversion of traffic or closure of the road is expected, however a slight nuisance might be experienced by motorists using the same roads. This will most likely be caused by slow moving vehicles frequenting the construction site. It is however expected to be short-lived.

Proposed Mitigation Measures

- ✚ Maintain official traffic signalling when approaching the farm access road in conjunction with local or national traffic regulations.
- ✚ Speed limit warning signs must be erected to minimise accidents.
- ✚ Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents.
- ✚ Where feasible, Construction vehicles should not travel to and from the site during peak times, to minimise impacts on traffic along the B1 and D2430 roads.
- ✚ 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.

Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|---------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Traffic | -VE | 1 | 2 | 2 | 2 | L | L |

12.1.5 Groundwater

Groundwater quality could be impacted through leachate of petroleum, chemical, harmful and hazardous substances. In particular, oil leakages, diesel, lubricants and grease from construction vehicles, equipment and machinery utilised during the construction phase may occur. Care must be taken to avoid contamination of soil and groundwater.

Any leaks, spills and/or overflow from portable toilets (if any) at the project location may transport the effluent to sensitive drainage lines; or areas where sensitive geological structures and formations are present. Inflow into these structures and formations would cause a pollution threat.



Proposed Mitigation Measures

- ✚ 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. Removal of oil from machinery should be conducted on these surfaces.
- ✚ All fuelling, storage and chemical handling should be conducted on containment surfaces provided for this purpose.
- ✚ Spillage control procedures must be in place according to relevant SANS standards or better.
- ✚ Should portable ablation facilities be necessary, adequate containment systems should be erected for these facilities.
- ✚ Waste should be properly 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.

Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|-------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Groundwater | -VE | 2 | 2 | 4 | 2 | M | L |

12.1.6 Surface Water

Surface drainage in the area is well developed and run-off from the site takes place through the relief of nearby dry streams in the area. Contaminants in the form of oil leakages, diesel, lubricants and grease from the construction equipment and machinery may occur during the construction phase.

Proposed Mitigation Measures

- ✚ Use drip trays, linings or concrete floors when evidence of leaks are observed on construction vehicles or equipment.
- ✚ Remove leaking vehicles from project site immediately.
- ✚ Any major servicing and maintenance of vehicles and equipment should be conducted on containment surfaces provided for this purpose. Removal of oil from machinery should be conducted on these surfaces.
- ✚ Any spillage of hazardous substances including fuel, oil, paint or cleaning solvent must be cleaned up immediately and disposed off at a designated disposal facility.
- ✚ Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons into the nearby water ways and courses.
- ✚ Ablution facilities should be provided for at the site. Prohibit urination on site, other than at designated facilities.



- ✚ Properly secure all temporary / portable toilets (if any) to the ground to prevent them toppling due to wind or any other cause.
- ✚ Maintain toilets in a hygienic state and remove waste to a licensed disposal facility.
- ✚ Contain contaminated water from batching operations and allow sediments to settle before being disposed of as waste water.
- ✚ Stabilise cleared areas as soon as possible to prevent and control surface erosion.
- ✚ Proper environmental awareness and remedial response training of operators must be conducted on a regular basis.
- ✚ An emergency plan should be in place on how to deal with spillages and leakages during this phase.

Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|---------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Surface water | -VE | 2 | 2 | 4 | 2 | M | L |

12.1.7 Generation of Waste

Waste material will be generated during the construction activities of the proposed development. Waste in the form of rock cuttings, pipe cuttings, electrical cuttings, oil spills or leakages of petroleum products might occur during the construction phase.

Proposed Mitigation Measures

- ✚ Ensure that sufficient weather- and vermin- proof bins / containers are present on site for the disposal of solid waste. Waste and litter generated during this phase must be placed in these disposal bins.
- ✚ Empty bins regularly as required.
- ✚ 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.
- ✚ Regular inspection and housekeeping procedure monitoring should be maintained at all times.
- ✚ Awareness of the hazardous nature of various types of waste should be enforced.



Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|------------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Waste Generation | -VE | 1 | 2 | 6 | 4 | M | L |

12.1.8 Fires and Explosions

Although explosions and fires are not the most common cause of construction site injuries, the impact of such incidents on worker health and safety can be devastating. Furthermore, an explosion or fire at a worksite tends to impact all workers present, and is likely to give rise to a third party liability claim.

Proposed Mitigation Measures

- ✚ Ensure that all fire fighting devices are in good working order and they are serviced.
- ✚ All personnel have to be trained about responsible fire protection measures and good housekeeping such as the removal of flammable materials on site.
- ✚ Exhaust from engine powered equipment must be kept a safe distance from combustible materials.
- ✚ No smoking may be allowed near fire hazards.
- ✚ Temporary buildings may not block any means of exit.
- ✚ Combustible materials must be stored so as to reduce the risk of catching fire, and to minimize the spread of fire internally and to permit convenient access for fire fighting.
- ✚ Regular inspections should be carried out to inspect and test fire fighting equipment by the contractor.

Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|----------------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Fires and Explosions | -VE | 1 | 1 | 4 | 2 | M | L |

12.1.9 Heritage Impacts

There are no known heritage areas envisaged to be impacted by the development; however the contractor might come across archaeological features or objects that possess cultural values during construction activities.

Proposed Mitigation Measures

- ✚ If such remains or objects with cultural values (e.g. bones, weapons, ancient cutlery, graves etc) are uncovered at the project location or surrounding, it should be barricaded off, and
- ✚ The relevant authorities (i.e. the local police and National Heritage Council of Namibia) should be contacted immediately.

Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|----------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Heritage | -VE | 1 | 1 | 2 | 2 | L | L |



12.1.10 Ecological Impacts

The dominant vegetation observed at the project location consists mainly of trees/bush, shrubs, weedy species and grass. Of the vegetation observed, the Albizia anthelmintica, Boscia albitrunca and Ziziphus mucronata are protected under Forestry Act (No.12 of 2001) of Namibia.

Proposed Mitigation Measures

- ✚ Vegetation protected under the Forestry Act (No.12 of 2001) of Namibia, should be conserved and incorporated into the project.
- ✚ Limit clearing of vegetation to areas within the footprint of the construction sites and reduce the frequency of disturbance.
- ✚ Disturbance of areas outside the designated working zone is not allowed.
- ✚ No vegetation should be removed outside the designated project area.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|---------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Ecology | -VE | 1 | 1 | 2 | 2 | L | L |

12.1.11 Socio-Economic Aspects

Temporary employment opportunities are anticipated to be created during construction, both directly through construction workers and indirectly through suppliers, service providers, and informal traders attracted to the project site.

Proposed Mitigation Measures

- ✚ The construction contractor should be sourced from the town, or region at large (where feasible).
- ✚ The construction workers should be sourced from the town, or region at large (where feasible).
- ✚ Suppliers of construction materials should be sourced from the town, or region at large (where feasible).
- ✚ Locally source services required during the construction process, such as securities, rental of portable toilets, plant hire, etc.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|----------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Socio-economic | -VE | 1 | 1 | 6 | 4 | L | L |

Summary of all potential impacts during the construction phase:

In general, impacts are expected to be low to medium, mostly short lived and site specific. Mitigation options recommended in the Environmental Management Plan (EMP) will guide and ensure that the impacts of the construction activities are minimised. Proper storm water management plans must be in place to minimise the risk of flooding and pollution, and must form part of the engineering designs.

The appointed contractor should be made aware of the content and environmental requirements of this report through proper induction training.



12.2 Operational Phase

12.2.1 Fire and Explosion Risks

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.

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.

Proposed Mitigation Measures

- ✚ 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.

All project personnel should be aware of the hazards of AN and ensure that the conditions that may lead to an explosion are not present. Actions that may help to prevent explosions include:

- ✚ Avoid heating AN in a confined space (e.g., processes involving ammonium nitrate should be designed to avoid this possibility).
- ✚ Avoid localized heating of AN, potentially leading to development of high temperature areas.
- ✚ Ensure that AN is not exposed to strong shock waves from explosives.
- ✚ Avoid contamination of AN with combustible materials or organic substances such as oils and waxes.
- ✚ Avoid contamination of AN with inorganic materials that may contribute to its sensitivity to explosion, including chlorides and some metals, such as chromium, copper, cobalt, and nickel.



- ✚ Maintain the pH of AN solutions within the safe operating range of the process. In particular, avoid low pH (acidic) conditions.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|-------------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Fire & Explosions | -VE | 1 | 1 | 6 | 2 | M | L |

12.2.2 Spillages

Spillages are bound to occur during delivery of diesel fuel and other chemicals to their storage tanks.

Proposed Mitigation Measures

- ✚ Risk of impact from this can be lowered through proper training of staff.
- ✚ Installation of suitable containment structures around the around all storage tanks and other operational areas. Where necessary, the containment system must be connected to a 3-chamber separator pit.
- ✚ 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.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|-----------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Spillages | -VE | 1 | 2 | 6 | 4 | M | L |

12.2.3 Separation Distances

No human settlement exists within a 5km radius from of the project site. The explosives magazines and manufacturing plant are situated 2.5 and 3.2km from the NDF shooting range; and road D2430 respectively. The Cheetah Cement and the B1 national road are also situated more than 8km from the site.

12.2.4 Raw Materials Management

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

- ✚ 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.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|---------------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Chemical Management | -VE | 1 | 2 | 4 | 4 | M | L |

12.2.5 Air Quality

Vapour emissions are wasteful in terms of product loss and also add volatile organic compounds (VOCs) to the atmosphere, which contribute to the formation of photochemical smog. This is the haze that can be seen over cities on a warm summer's day. Fuel vapours are also a significant source of benzene, a known carcinogen for humans.

Proposed Mitigation Measures

- ✚ Vent pipes should be placed in such a manner as to prevent impact on potential receptors.
- ✚ Ensure fuel products are delivered in the forecourt containment area, and can't contaminate stormwater or land.
- ✚ Encourage reduction of engine idling at the project site.
- ✚ Regular air quality monitoring should be conducted at the project site.
- ✚ Keep a complaints register regarding vapour smells at the site; and act on it if becomes a regular complaint.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|-------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Air Quality | -VE | 1 | 4 | 4 | 2 | L | L |



12.2.6 Generation of Waste

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

- ✚ 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.

Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|------------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Waste Generation | -VE | 1 | 4 | 4 | 2 | L | L |

12.2.7 Surface- and Groundwater

Spillages may occur during fuel / chemical products delivery to the storage tanks from road transport tanker trucks. Spillages and leakages may also occur due to failure of pipelines or storage tanks. Similarly, spillages may also occur during loading of ANE to road and/or rail tankers. Contaminated soil may pose a risk to surface water.

Proposed Mitigation Measures

- ✚ Proper containment mechanisms installed should be able to contain any spillages that might occur during the operation of the development.
- ✚ Use drip trays, linings or concrete floors when evidence of leaks are observed on transport vehicles.



- ✚ The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently.
- ✚ Ensure that stormwater management systems are regularly maintained and tested, and are in good working order.
- ✚ Ensure that fuel and chemical products is delivered in the forecourt containment area, and must not contaminate stormwater or land.
- ✚ Proper monitoring of the product levels must take place to eliminate overfilling.
- ✚ Avoid discharge of pollutants (such as chemicals, contaminated waste water or leachate) into stormwater channels and water courses.
- ✚ Develop and implement a groundwater monitoring system and programme, with the aim of monitoring possible contamination to the water resources.
- ✚ Regular tank and pipeline tightness inspections are advised to eliminate the risk of impact on the environment due to leakage.

Impact
Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|-------------------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Surface-and groundwater | -VE | 1 | 3 | 6 | 3 | M | L |

12.2.8 Health and Safety

The operations of the development can cause health and safety risks to workers on site. Employees could be exposed through to the skin contact with chemicals/fuel products and inhalation of hazardous particulates during handling of such products.

Safety issues could also arise from the operational vehicles, equipment and tools that will be used on site during the operational activities. This increases the possibility of injuries and all project personnel must be made aware of the potential risks of injuries on site.

Proposed Mitigation Measures

- ✚ Staff must be properly trained and made aware of all the MSDS (Material Safety Data Sheets) sheets of all chemicals on site.
- ✚ Fire fighting equipment and first aid kit should be made available and must be serviced regularly.
- ✚ Employees are expected to be trained on how to use all equipment and how to handle petroleum products, and training attendance lists must be kept.
- ✚ Display contact details of emergency services in the area at strategic locations of the facility.
- ✚ Demarcate and place signage on any areas which may pose a safety risk (including trenches, excavations etc).



- ✚ The project personnel are advised to ensure that proper personal protective gear and first aid kits are available, at all times.
- ✚ Staff should be properly trained in first aid and safety awareness.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|-----------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Health & Safety | -VE | 1 | 3 | 6 | 3 | M | L |

12.2.9 Traffic

This impact will be long-lived, as vehicular movement will increase at the project location.

Proposed Mitigation Measures

- ✚ 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.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|---------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Traffic | -VE | 1 | 4 | 6 | 3 | M | L |

12.2.10 Ecological Impacts

The operations of the proposed development will have minimal impacts on fauna and flora.

Proposed Mitigation Measures

- ✚ The operational activities would not exceed the demarcated areas of operations.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|---------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Ecology | -VE | 1 | 2 | 2 | 2 | L | L |

12.2.11 Socio-Economic Aspects

The creation of new employment opportunities is considered to be a positive impact. It is not clear how many new, permanent employment positions will be created but jobs will be created.

Proposed Mitigation Measures

- ✚ Employment creation should be targeted at the unemployed communities of Otjiwarongo, and region at large
- ✚ Suppliers of operational stock should be sourced from the town, or region at large (where feasible).



- ✚ Locally source services required during the operational process, such as securities, rental of portable toilets, plant hire, etc.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|----------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Socio-economic | -VE | 1 | 1 | 8 | 2 | L | L |

12.3 Possible Decommissioning Phase

The impacts associated with this phase will be similar to that of the construction phase. The Environmental Management Plan for this phase will have to be reviewed at the time of decommissioning to cater for changes made to the development.

13. CUMMULATIVE IMPACTS

These are impacts on the environment, which results from the incremental impacts of the proposed development, when added to other past, present, and reasonably foreseeable future actions regardless of what person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In relation to an activity, it means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertakings in the area.

Possible cumulative impacts associated with the development includes, noise emissions, dust and air quality, land disturbance and ecological. This could collectively impact on the environmental conditions in the area. Cumulative impacts may occur in both the operational and the construction phase.

Impact Evaluation:

| Aspect | Impact Type | Scale | Duration | Magnitude | Probability | Significance | |
|---------------------|-------------|-------|----------|-----------|-------------|--------------|-----------|
| | | | | | | Unmitigated | Mitigated |
| Cummulative impacts | -VE | 1 | 3 | 4 | 3 | L | L |

14. FORMAL SYSTEMS AND PROCEDURES

Vigorous safety systems and procedures have to be in place and complied with including:

- ✓ Maintenance schedules.
- ✓ Materials management
- ✓ Waste management
- ✓ Safety devices.
- ✓ Design codes.



- ✓ Routine validation of all critical systems.
- ✓ Control of modifications - including process, equipment, operation and formulation.

15. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (**EMP**) provides management options to ensure impacts of the proposed development are minimised. An EMP is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented, and the positive benefits of the projects are enhanced.

The objectives of the EMP are:

- ✓ to include all components of the development;
- ✓ to prescribe the best practicable control methods to lessen the environmental impacts associated with the construction of the development;
- ✓ to monitor and audit the performance of construction personnel in applying such controls; and
- ✓ to ensure that appropriate environmental training is provided to responsible construction personnel.

The EMP acts as a stand-alone document, which can be used during the various phases of the proposed development. All contractors taking part in the development should be made aware of the contents of the EMP. An EMP for the construction and operational phases of the development has been developed and is attached as Appendix A.

16. CONCLUSIONS

In general, the proposed development would pose limited environmental and social risks.

The site has been in operation for over years and is generally suitable for such a development. All environmental risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that this information be made available to the relevant authorities and stakeholders on a regular basis.

The Environmental Management Plan should be used as an on-site tool during all phases of the development. Future environmental audits should be carried out 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 ESA/EMP document before it expires.

Matrix Consulting Services

M. Shippiki
Environmental Practitioner
July 2021



17. REFERENCES

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