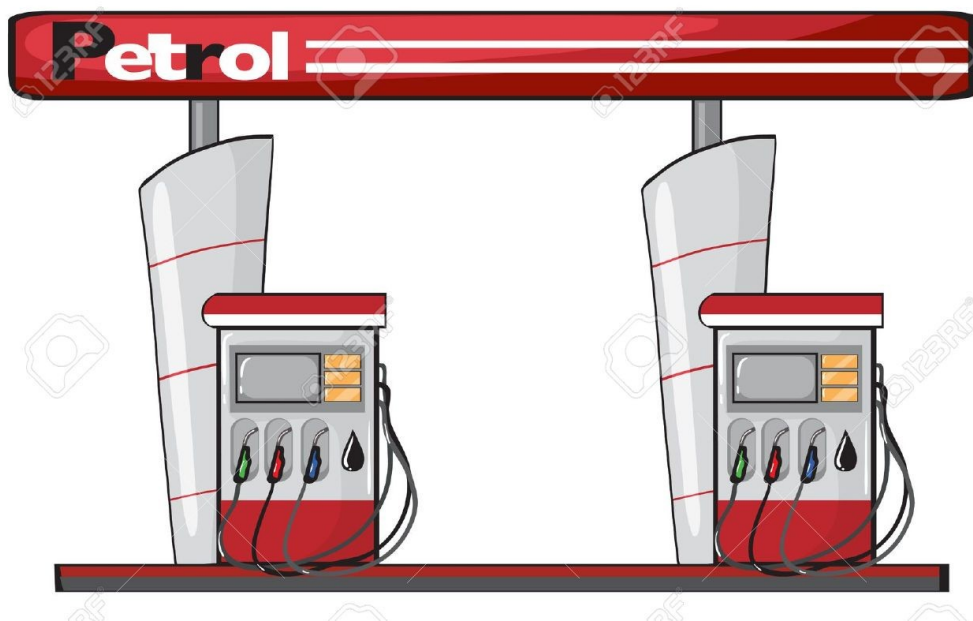


ENVIRONMENTAL MANAGEMENT PLAN (EMP)

**PROPOSED FOR TRUCKPORT FILLING STATION AT LISELO
COMMUNAL AREA ZAMBEZI TRUCKPORT & INVESTMENT CC**



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Assessed by:

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LIST OF ACRONYMS

BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
ERPs	Emergence Response plans
IEA	Initial Environmental Audit
NEMA	National Environmental management Authority
OHS	Occupational Health and Safety
PH	Power of Hydrogen
PMS	Petroleum Motor Spirit (Premium Gasoline)
PPE	Personal Protective Equipment
RMS	Regular Motor Spirit (Regular)
SEM	Sustainable Environmental Management
SS	Suspended Solids
ULG	Unleaded Gasoline
UPSS	Underground Petroleum Storage System
UST	Underground Storage Tank
WCC	Waste Collection Centre

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ENVIRONMENTAL MANAGEMENT PLAN

PETROLEUM FILLING STATION AT LISELO COMMUNAL AREA

Proposed Land Use: Petroleum Filling Station

Total Site Area: 1 Hectares (Part of the 9.8 hectares of Liselo Truckport)

EXECUTIVE SUMMARY

This project is a section or part of the proposed activities of the Liselo Truckport situated within Liselo communal area on the 9.8 hectares, in Zambezi region. Part of the truckport project component entails the establishment of truck fuelling service station on a ONE (1) hectares. The project will involve the preparation of the ground and installation of underground tanks, the project will essentially enhance the provision of fuel for the truckers along the Trans-Capriivi windmill boarder post road. This will optimize land use; hence increasing its utility. The Government revenue will increase as well as enhancement of economic investment; increasing national wealth. The proponent will enjoy income generated through sale of petroleum products. The project will also provide employment during both constructions and operation phases. It will create market for goods and services and especially construction inputs, which include raw materials, construction machinery. This project shall also create an outlet for various other goods and services such as petroleum products.

The proposed project shall entail the construction of other facilities such as the cover canopy, sanitary conveniences, station office and shops. An oil interceptor shall also be constructed to reduce chances of environmental pollution to soil and water by potentially contaminated surface/waste water from the station. The proposed project is designed in line with other similar projects (petrol stations) along the road and in other areas. N\$ 11 000 000.00 (Eleven million dollars)

The oil industry spurred on by regulators globally, has recognized the need for change in order to safeguard the environment. In relation to this, the Environmental concerns have now been integrated in the planning and implementation processes of any proposed projects in Zambezi region. The key objective is to mitigate conflicts with the environment at the

vicinity during implementation and operational phases. In addition, it is now mandatory for projects of such magnitude and nature to carry out Environmental Impact Assessments (EIA study reports in this particular case), to enhance Sustainable Environmental Management as well as controlling and revitalizing the much-degraded environment.

Pursuant to the prevailing legal requirements as envisaged in the EMCA and to ensure sustainable environmental management, the proponent undertook this EIA study for the proposed petrol service station; and incorporated substantial environmental aspects as advised by EMA. This EIA study report thus provides relevant information and environmental considerations on the project proponent's intention to see information and environmental considerations on the project proponent's intention to seek approval from EMA for the development of the proposed project.

The main objective of the EIA project is to provide information on the nature and extent of potential environmental impacts arising from the construction and operation of the proposed Filling station (hereinafter referred to as "the Project") and related activities taking place concurrently and to contribute to decisions on the overall environmental acceptability of the Project after the implementation of environmental mitigation measures. The methodologies used to conduct this EIA study were a Interviews) Field observations b) Desktop research. The public participation comments, Freehold document, and Architectural Designs have been annexed at the back of this report.

The scope of the study was to describe the project, document all the baseline information, address both the positive and negative impacts and develop mitigation measures for negative impacts including designing environmental management plan for the project. The following are areas of concern as well as positive impacts that have been discussed at depth in the report and their mitigation measures outlined. a) Solid and liquid waste generation b) Noise nuisance c) Employment d) dust emissions and air pollution e) occupational health and safety concerns f) National economic benefits g) energy use h) loss of vegetation i) Soil erosion j) Fire hazards and accidents) land use shift k) Increased water demand l) Gaseous emissions m) Increased pressure on existing infrastructure.

Project Design

The EIA report is based on information and Consultation with the proponent. The proposed site is composed of the following major sections:

- The canopy over pumps (fore court)
- Underground oil storage tanks and breathers
- Offices and shops
- Drive ways: walkways; acceleration and deceleration lanes; and parking areas
- Oil/water interceptor
- Washrooms

Possible Impact	Proposed Mitigation Measures
Impact on excavated soil	<ul style="list-style-type: none"> • Control construction especially during wet/rainy conditions Landscaping • Compact loose properly • Dispose excavated loose properly
Compromising Safety and health of workers, neighbours pedestrians and visitors	<ul style="list-style-type: none"> • Fence off the site • Display warning signs of construction works. • Issue workers with safety appliances. • Ensure safe access to the site through culverts. Provide a first aid kit. • Avail pit latrine and bathing facilities.
Traffic and Transport Impact	<ul style="list-style-type: none"> • Construct acceleration and deceleration lanes. • Deliver materials on need basis. • The personnel on the ground should guide traffic movements. • Damaged drainage should be repaired and maintained after construction
Increased Human Activities – Increased Solid Waste Generation	<ul style="list-style-type: none"> • Place litterbins at the site. • Ensure that there are elaborate programmes of waste removal frequently. • Waste generated should be contained appropriate
Impact on air quality	<ul style="list-style-type: none"> • Wet or cover dust generating activities. • Provide PPE to the workers. • Switch off vehicle engine and machinery when not in use.
Environmental concern during the construction phase	<ul style="list-style-type: none"> • Proponent will liaise with the environmental consultants throughout the construction phase
Noise and vibration levels	<ul style="list-style-type: none"> • Use of manual labour. • Noise assessment should be done. • Use of PPE. • Work with machinery should be limited today time only.
Solid waste generation	<ul style="list-style-type: none"> • Ensure all the waste, damaged and unused building materials are removed safely from the site and sold out, reused or disposed properly. • Ensure general cleaning of the compound and disposal of solid wastes. • Use oil receptors for containing waste oil.

	<ul style="list-style-type: none"> • Provide litter bin for trash and solid waste. • Liaise with waste handlers especially tyres recyclers to collect worn out • Tyres for disposal or retreat. • Service vehicles at the service bay to minimize oil spills. • Recover waste and split oil into oil receptors.
Emergency preparedness	<ul style="list-style-type: none"> • Provide suitable fire extinguishers including ABC or CO2 and place them near probable source ignition. • Warning signs should be in place. • Sources of fire should be restricted to all. • Smoking and disposal of cigarette waste should be limited to designated facilities and areas far from the fuel dispensing canopy.

Conclusion

It should always be remembered that petrol filling stations once put into operation need to be closely managed. This will ensure that the environment is always safeguarded. It is therefore important that the site conduct regular site assessments to provide early indication of leaks or releases of product into the ground and available risks. If there is considered to be a very high risk, a redevelopment should be considered. Other methods to be considered, which will point to early indications of leaks are: There should be accurate records of stocks and sales; modern stock control systems; associated with tank gauging systems, to provide an early warning when stock losses are outside acceptable parameters; the project's systems should be tested on a regular basis as they get older, to attest they are sound; testing of both the tanks and lines should be by precision tightness methods and; monitoring wells should be installed around the site to give an early indication of a product release. Considering the proposed location, construction, management and mitigation measures that will be put in place and the project's contribution in the provision of petroleum products and creating employment opportunities, its implementation is considered important and beneficial. The key effort should be geared towards safeguarding the environment. This can be effectively overcome through close following and implementation of the recommended Environmental Management Plan (EMP).

1 INTRODUCTION

1.1 Petroleum Industry in Namibia

The Southern African republic of Namibia has had no known oil or gas reserves, until recently oil reserves were discovered in Southern part of the country. The Namibia government has encouraged foreign interest in oil exploration and there is a modest upstream oil industry. It is endowed with other energy sources including wood fuel, coal, solar and wind power, much of which is untapped. The country's commercial energy needs are supplied by electricity, coal, fuel wood and oil-derived products.

Petroleum is Namibia's major source of commercial energy and has, over the years, accounted for about 80% of the country's commercial energy requirements. Demand for oil in Namibia is quite small due to the country's underdeveloped economy, which is heavily dependent on labour intensive and rain-fed agriculture systems. The domestic demand for various petroleum fuels on average stands at 1 million tons per year, all of it imported from the Gulf region, either as crude oil for processing at the Namibian Petroleum Refineries Limited or as refined petroleum products.

Prior to liberalization in 1990, a significant feature of Namibia's oil industry was a relatively high level of government's direct participation, and a correspondingly low level of private sector involvement. few marketing and distribution companies were responsible for procuring and importing their own oil. The National Oil Industry of Namibia was mandated to supply 30% of the crude oil requirement into the country.

Since liberalization, many new companies have been licensed by the government to engage in petroleum trading, especially import and export, wholesale and retail of petroleum products. The Namibian Petroleum industry, represent the government. s presence in the petroleum industry. The Petroleum is owned on a 50:50 equity holding between the government and other shippers, namely, Shell and British Petroleum have acquired exploration licenses in Namibia.

Despite the hype surrounding the possibility of oil off the Namibian coast, a viable find remains elusive, with the only discovery to date being nothing more than an appetite whether for exploration companies and prospect licence holders.

Nevertheless, exploration continues, and with the arrival of oil majors and many upcoming drilling projects, we will begin to see a clearer picture of Namibia's oil potential, and should oil be discovered, only time will tell if it will help or hamper Namibia's development

1.2 Environmental Impacts of the Petroleum Industry

The environmental impact of petroleum is often negative because it is toxic to almost all forms of life. The possibility of climate change exists. Petroleum, commonly referred to as oil, is closely linked to virtually all aspects of present society, especially for transportation and heating for both homes and for commercial activities.

Toxicity

Petroleum distillates contaminate surface run-off and kill almost all life. Crude oil is a mixture of many different kinds of organic compounds, many of which are highly toxic and cancer causing (carcinogenic). Oil is "acutely lethal" to fish, that is it kills fish quickly, at a concentration of 4000 parts per million (ppm) (0.4%). Crude oil and petroleum distillates cause birth defects. [2] Benzene is present in both crude oil and gasoline and is known to cause leukemia in humans. The compound is also known to lower the white blood cell count in humans, which would leave people exposed to it more susceptible to infections. Studies have linked benzene exposure in the mere parts per billion (ppb) ranges to terminal leukemia, Hodgkins lymphoma, and other blood and immune system diseases within 5-15 years of exposure."

Air pollution

When oil or petroleum distillates are burned usually the combustion is not complete. This means that incompletely burned compounds are created in addition to just water and carbon dioxide. The other compounds are often toxic to life. Examples are carbon monoxide and methanol. Also, fine particulates of soot blacken humans' and other animals' lungs and cause heart problems or

Acid rain

High temperatures created by the combustion of petroleum causes nitrogen gas in the surrounding air to oxidize, creating nitrous oxides. Nitrous oxides, along with sulfur dioxide from the sulfur in the oil, combine with water in the atmosphere to create acid rain. Acid rain causes many problems such as dead trees and acidified lakes with dead fish. Coral reefs in the world's oceans are killed by acidic water caused by acid rain.

Acid rain leads to increased corrosion of machinery and structures (large amounts of capital), and to the slow destruction of archaeological structures like the marble ruins in Rome and Greece.

Climate change

Humans burning large amounts of petroleum create large amounts of CO₂ (carbon dioxide) gas that traps heat in the earth's atmosphere. Also some organic compounds, such as methane released from petroleum drilling or from the petroleum itself, trap heat several times more efficiently than CO₂. Soot blocks the sun from reaching the earth and could cause cooling of the earth's atmosphere.

Oil spills

An oil spill is the release of a liquid petroleum hydrocarbon into the environment, especially marine areas, due to human activity, and is a form of pollution. The term is usually applied to marine oil spills, where oil is released into the ocean or coastal waters, but spills may also occur on land.

Oil spills may be due to releases of crude oil from tankers, offshore platforms, drilling rigs and wells, as well as spills of refined petroleum products (such as gasoline, diesel) and their by-products, heavier fuels used by large ships such as bunker fuel, or the spill of any oily refuse or waste oil. Major oil spills include the Kuwaiti oil fires, Kuwaiti oil lakes, Lakeview Gusher, Gulf War oil spill, and the Deepwater Horizon oil spill.

Spilt oil penetrates into the structure of the plumage of birds and the fur of mammals, reducing its insulating ability, and making them more vulnerable to temperature fluctuations and much less buoyant in the water. Clean-up and recovery from an oil spill is difficult and depends upon many factors, including the type of oil spilled, the temperature of the water (affecting evaporation and biodegradation), and the types of shorelines and beaches involved. Spills may take weeks, months or even years to clean up.

Volatile organic compounds

Volatile organic compounds (VOCs) are gases or vapours emitted by various solids and liquids, many of which have short- and long-term adverse effects on human health and the environment. VOCs from petroleum are toxic and foul the air, and some like benzene are extremely toxic, carcinogenic and cause DNA damage. Benzene often makes up about 1% of crude oil and gasoline. Benzene is present in automobile exhaust. More important for vapors from spills of diesel and crude oil are aliphatic, volatile compounds. Although "less toxic" than compounds like benzene, their overwhelming abundance can still cause health concerns even when benzene levels in the air are relatively low. The compounds are sometimes collectively measured as "Total Petroleum Hydrocarbons" or "TPH."

Waste oil

Waste oil is used oil containing breakdown products and impurities from use. Some examples of waste oil are used oils such as hydraulic, transmission oil, brake fluids, motor oil, crankcase oil, gear box oil and synthetic oil. Many of the same problems associated with natural petroleum exist with waste oil. When waste oil from vehicles drips out engines over streets and roads, the oil travels into the water table bringing with it such toxins as benzene. This poisons both soil and drinking water. Runoff from storms carries waste oil into rivers and oceans, poisoning them as well.

3 DETAILED DESCRIPTION OF THE PROPOSED ACTIVITY

3.1 Brief project Description

Trans-Zambezi Truckport & Investments cc was allocated 9.8 hectares of land by Mafwe traditional authority through Lislo Sub-khuta and Community for establishment of a truckport business land use. For the purpose of this report, the Investor proposed to use only a quarter of approximately 1 hectares allocated to him to develop the petroleum filling station by establishing a one stop trucks filling station in the Communal Land of Liselo on a 9.8 hectare and the other 1 hectare will be used for provision of fuel service facilities for truckers who will use the facility and require in transit accommodation. The remaining 8.8 hectare out of the 9.8 hectares will be reserved for truckport business operations and land use by the investor. The land or project site is situated about 12km east of the town of Katima Mulilo. The area is within the Katima Rural Constituency, in the Liselo communal area in the Zambezi Region (formerly known as (Caprivi Region). The petroleum filling station is aimed

at providing small accommodation for long distance truck drivers and workers, to provide for petroleum fuel pumps and parking for trucks and light weight vehicles in transit to the town of katima mulilo , Zambia or Botswana, which will also halt to relieve the pressure of parking spaces for trucks in town.

The site is located in the Katima Rural Constituency, about 12 KM east of the Town of Katima Mulilo, and about 15 kilometre from the Winella border post, which borders Zambia and Namibia in the Zambezi region. The site is located on the periphery of the boundary between the town and the communal land.

The site is situated or exist within an area where other commercial business exists, such as Guesthouse, Rental General Residential developments, Village sheebens, restaurant and many more general residential develops. The site is currently unoccupied and land is vegetated, comprising of acacia shrubs.

The project entails the construction of a filling station with:

- *underground fuel tanks, each of 23 000 litre (23 cubic metre) capacity;*
- *canopied forecourt with dispensing pumps;*
- *convenience store;*
- *take away shop; and*
- *car wash facility and Parking space for cars & trucks*

The total extent of the development is estimated to be 1 hectares earmarked for truck diesel fuel service station. It is envisaged that the Liselo & Mafwe traditional authority will return ownership of land once the lease period expires and the Mafwe traditional Authority will enter into agreement with an future independent developer to undertake the construction and operation of the project. It is anticipated that besides the 25 possible direct employment opportunities associated with construction and a further 10 to 20 indirect jobs could be generated during this phase of the development. However, it is unlikely that all of these job opportunities will accrue to Liselo's residents as much depends on the sourcing of services and skills. There will be the creation of between 5 and 20 permanent jobs associated directly with the operation of the various development components. Some further indirect job opportunities are likely to be generated in other sectors servicing the development, again it is to be expected that some of these indirect opportunities will accrue to areas outside Katima Mulilo and/or Liselo communal area.

**LOCALITY PLAN: PROPOSED TRUCKPORT PROJECT
DEVELOPMENT ON 9.8 HECTARES, LISELO COMMUNAL
AREA_TRANS ZAMBEZI TRUCKPORT & INVESTMENT CC**

Proposed Truckport project development area

Truckport Fuel service station

Legend

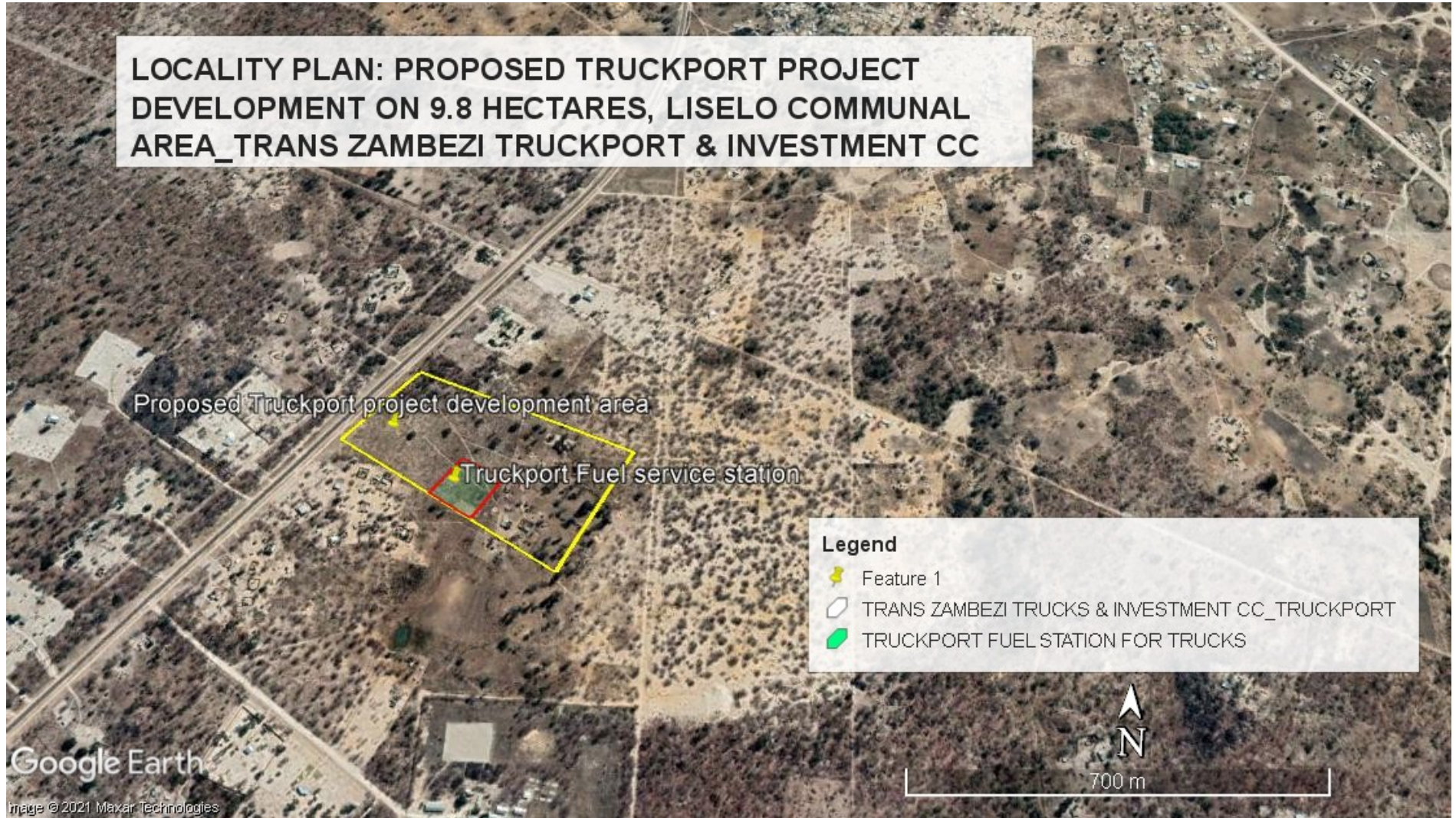
- Feature 1
- TRANS ZAMBEZI TRUCKS & INVESTMENT CC_TRUCKPORT
- TRUCKPORT FUEL STATION FOR TRUCKS

Google Earth

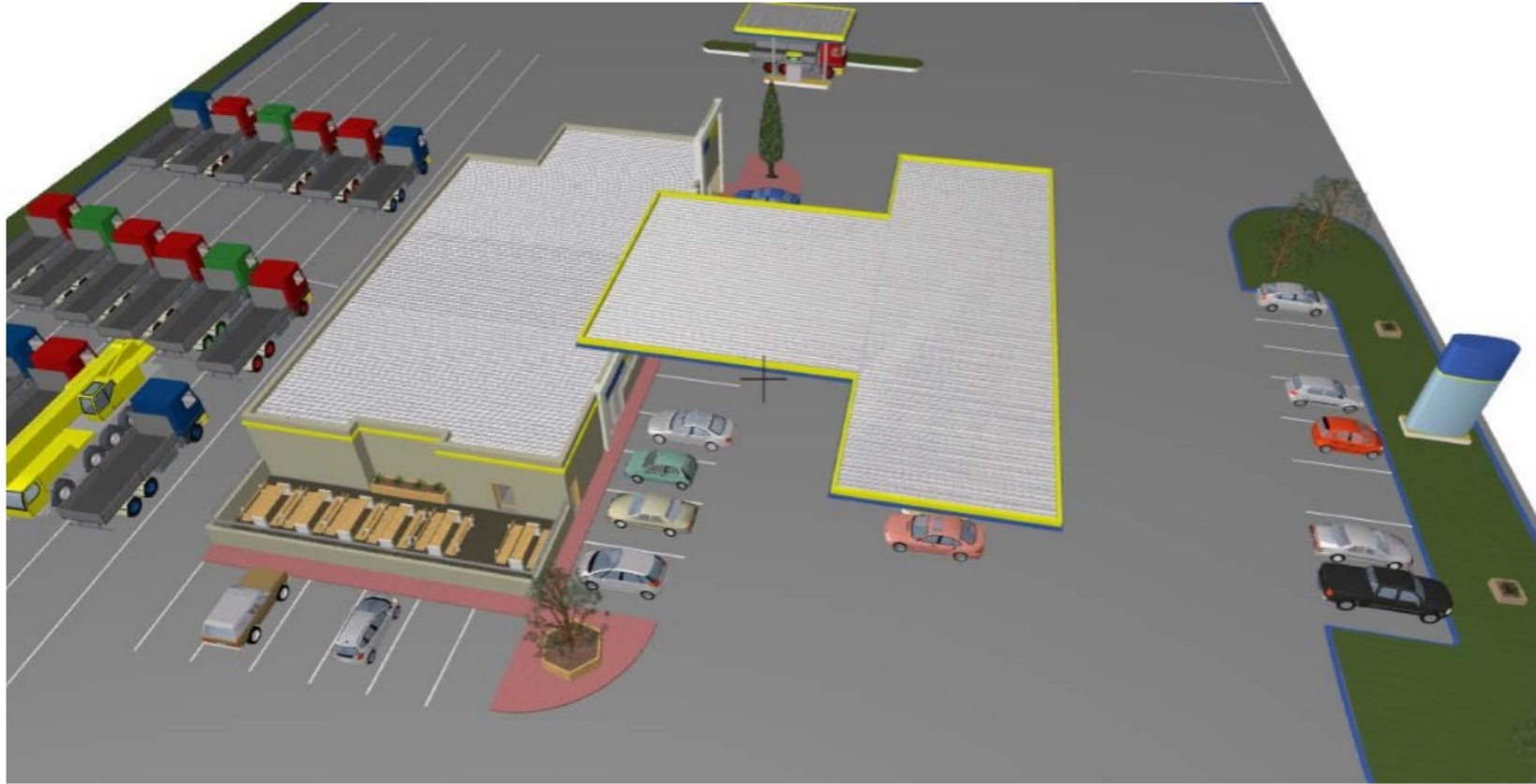
Image © 2021 Maxar Technologies



700 m







The EMP study report is based on information and consultations with the proponent, design Engineers and the general public. Main components of the proposed project shall include:

- The canopy over pumps (fore court)
- Underground diesel oil storage tanks and breathers
- 1 building- Offices/convenient store
- Drive ways: walkways; acceleration and deceleration lanes; and parking areas
- Oil/water interceptor
- Generator/compressor room
- Service bay
- Washrooms

3.5.1 Design of Tank Installation

Underground Storage Tanks (UST)

The tanks are manufactured from coated steel. These are called composite tanks. The manhole section is fitted with a overflow protection device and self-contained manhole which is impervious to hydrocarbon and is sealed to prevent contamination to the surrounding environment. The materials used to make the tanks are corrosive free metals. A documented leak monitoring system will be put in place.

Secondary Containment Fuel Systems

Secondary containment fuel systems will be installed including tank gauging. The secondary containment system encloses all primary fuel hoses and connections, isolating the system completely from the environment i.e. 'a pipe within a pipe'.

Underground Piping System

The proponent shall use co-axial polyethylene piping with fusion welded couplings terminated on either end with rubber boots within the pump and tank sumps. No joins are made between the tank and the pump thereby ensuring that if a leak occurs it is contained within the sumps. The piping is doubled walled and laid at a fall of 1:100 back to the tank,

ensuring that if a breakage occurs in the inner skin, the fuel will run back to the tank containment sump where it is able to be removed.

Tank Farm

The tank farm is the area of the filling station where the tanks that contain the relevant fuels are stored. These tanks are stored underground and are therefore referred to as USTs. When installing the USTs to assemble the tank farm, the proponent will utilize the latest technology, both in the manufacturing and installation process. The USTs are manufactured from mild steel and are coated with GRP on the exterior. These tanks are called Composite tanks. SANS 1535 and Underwriters Laboratories (UL) standards govern the manufacturing standards. A self-contained manhole, which is impervious to hydrocarbons, is fitted to the tank and is sealed to prevent contamination to the surrounding environment. Monitoring wells are also fitted to each end of the tank to allow for continued ground water sampling.

Leak Monitoring Wells

Before back-filling of the tank farm takes place, leak monitoring wells (i.e. high-density polyethylene slotted/perforated pipes with a 160mm outside diameter, wrapped in a porous geotextile, or ABS (acrylonitrile-butadiene-styrene) single-walled wedge-slot tubular screens) will be installed in each corner of the excavation. A minimum of four wells will be installed to a depth of 500mm below the floor of the excavation. If the soil at the bottom of the excavation is of a sandy nature, the observation wells will be taken down an additional depth of 500mm below the floor of the excavation. A minimum of one well should be installed at each corner of the excavation.

Tank Gauging System

Tank gauging is a complete fuel management system. The purpose of the fuel management system is to provide leak detection and reconciliation services for filling stations, thus allowing for early leak detection and system monitoring of the tanks. The sophisticated system very accurately monitors (up to 16 tanks and 64 sensors) all sales and deliveries relevant to the filling station, which then in turn determines if any losses in product has occurred. An alarm is incorporated into the system for the purpose of environmental monitoring, which is not only beneficial to the surrounding environmental elements, but facilitates the proponent in maintaining up-to date quantity and quality reports for record keeping purposes

Soil and ground/surface water analysis will be done for total Hydrocarbon (TPH), Polycyclic Aromatic Hydrocarbon (PAH) and BTEX analysis

Soil and water samples will be collected randomly from the petrol station once per annum it starts operating. The samples will be taken in NEMA approved laboratories for analysis. TPH will be estimated gravimetrically following standard methods of TPH analysis, while the heavy metals will also be determined.

Groundwater monitoring

Groundwater monitoring should be undertaken annually (once per year) where groundwater monitoring wells is installed. Groundwater monitoring bores should be sampled and analysed; all analysis for organic and inorganic substances must be done for total concentrations. That is; pH, Total Petroleum Hydrocarbons, BTEX (Total) Benzene Toluene Ethyl Benzene Xylene, and Lead. An exceedance of the groundwater parameters may indicate a leak

Oil/Water Interceptor

A chamber oil/water interceptor will be constructed at the filling station. The interceptor will be constructed out of reinforced concrete walls and floor and plastered internally with waterproof cement. A vent pipe from each chamber will be installed within the interceptor to allow for fugitive emissions to escape.

Oil Tank: for used oil

The provision for used oil tank shall be made on a concrete plinth. The plinth will have a retainer wall around it that will be able to contain the net contents of the used oil tank. The concrete plinth will be sloped towards a sump whose drainage will be connected to the oil interceptor tank/chamber for treatment of a potentially contaminated wastewater.

3.5.2 Forecourt Areas and Spillage Drainage

All service areas on the forecourt service area, as well as the refuelling area, will be constructed from concrete to form an impervious surface. Surfaces will be sloped to falls, and led to a spillage containment system, where the contamination is able to be removed without entering the sewage or storm water system or contaminating any surrounding soil

3.5.3 Fire Protection; Emergency Response

Fire extinguishers will be installed and fire incident management and control measures will be instituted, which will include provision of sand buckets, warning signs such as “NO SMOKING” signs, etc, which must be posted within the operation area and where they can easily be seen. The firefighting equipment will be located strategically within the proposed project. The electrical system at the service station will be connected to a centrally located emergency stop switch to enhance power control in the event of an emergence i.e. switch will shut off the electrical power of the entire project.

3.5.4 Steel Canopy over Pump Island

A structural steel canopy will be fabricated and erected at the proposed project. This canopy will be designed by a qualified structural engineer and fabricated/installed by a specialist.

3.5.5 Electrical System

The electrical system at the filling station will be designed by a registered engineer and in accordance with the electric power regulations in Namibia and other electrical standards such as National Electric Code. The electrical system will include power supply to the mechanical pumps, underside of the steel canopy, the offices, and Machine/compressor room and security systems. On completion of the electrical works, it is expected that Nam Power and/or Nored will approve the electrical works and issue a power connection certificate to the proponent

4. ENVIRONMENTAL ISSUES AND IMPACTS

This chapter seeks to fulfil the requirements of Sub-regulation 8 with respect to the description of environmental issues identified during the EIA process, their significance and potential for mitigation; and with respect to the assessment of identified significant impacts.

4.1 Environmental Issues

An environmental issue is defined as “a generally expressed environmental concern or impact” raised in an EIA process by the EAP, key stakeholders, authorities or I&APs. The purpose of this section is to reflect the key environmental issues associated with the proposed project that has been raised through the EIA process. Key issues were identified according to the following criteria:

- Whether or not the issue raised falls within the scope and the responsibility of the project;
- Whether or not there is sufficient information available to respond to the issues or concerns raised without further specialist investigation; and
- Whether any aspect of the project is inconsistent with the legal, policy or planning framework.

Table 4 shows the key environmental issues identified during the Scoping phase of the EIA process. Sub-regulation 8(d) requires that an assessment of the significance of each issue be provided together with an indication of the extent to which the issue could be addressed through the implementation of mitigation measures. It should be understood that an environmental issue does not equate to an environmental impact hence the identification of impacts associated with each issue.

In assessing the significance of an environmental issue, the following have been taken into account and a rating of High, Medium or Low is given:

- The number of potential impacts associated with the issue;
- The probable extent of these impacts; and
- The potential for mitigation of these impacts.

The following criteria have been taken into account in determining the mitigation potential of an environmental issue:

- The existence of legislation, norms and standards intended to safeguard the particular environmental issue;
- Whether mitigation can be achieved through design of the development;
- Whether mitigation can be achieved through management of the development.

Utilising the mitigation potential criteria listed above the rating of mitigation potential has been determined as follows:

- High = all three mitigation potential criteria apply
- Moderate = two mitigation potential criteria apply
- Low = one mitigation potential criterion applies

Table 4: Assessment of key environmental issues associated with the proposed development, their significance and potential for mitigation

Environmental Issue	Mitigation Potential	Significance of Issue	Associated Impacts
<i>Ecological/Biological</i>			
Damage to ecosystem components and loss of biodiversity	Low to Moderate potential for mitigation	Moderate	Transformation of vegetation
			Displacement of fauna
			Pollution
<i>Physical Environment</i>			
Contamination of air, soil and water resources	Moderate to High potential for mitigation	Moderate	Above ground: Air quality – dust, volatile organic compounds, odour Waste Management – litter
			Soil
			Surface water
			Ground water
<i>Socio-Economic</i>			
Change to the social and economic structure of Katima Mulilo, Zambezi Region & Liselo Community	Moderate to High potential for mitigation	High	Employment – includes both the creation of jobs and the possible loss of jobs
			Feasibility of filling station
			Safety risks to neighbours
			Security risks to neighbours: Increased noise and disturbance
			Decrease in property values of neighbouring residential area
			Health

			Visual impacts
			View and Sense of place
			Traffic impacts associated with the location of access to the development and construction activities Increased vehicle traffic through a residential area

5. ENVIRONMENTAL MANAGEMENT PLAN

5.1 Objectives of the Environmental Management Plan(EMP)

An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measure needed.

The Environmental Management Plan (EMP) provides management options to ensure impacts of the petroleum filling station development project operations are minimised.

The EMP acts as a stand-alone document, which can be used during the various phases (operational and decommissioning) of the petroleum filling station project. All personnel taking part in the operation of the filling station project should be made aware of the contents of the EMP, so as to plan the relevant activities accordingly in an environmental suitable way.

As a result, the objectives of an Environmental Management Plan are to ensure the following:

- To include all components of the petroleum filling station project operations
- To prescribe the best and practicable control methods to lessen the environmental impacts associated with the operations of the filling station
- To monitor and audit the performance and of operational personnel to supply such control
- Lastly is to ensure that appropriate environmental training is provided to all operational personnel.

The investor Trans Zambezi Truckport & Investment cc implements an Environmental Management System (EMS) similar to the ISO 14001 system. An environmental Management System is an internationally recognised and certified management system that will ensure ongoing incorporation of environmental constraints. At the heart of an ISO 14001 EMS is the concept of continual

improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following factors:

- A stated environmental policy which sets the desired level of environmental performance
- An environmental legal register
- An institutional structure which sets out the responsibility, authority, line of communications and the resources needed to implement the EMS
- Identification of environmental, safety and health training needs
- An environmental program, stipulating environmental objectives and target to be met and work instructions and control to be applied in order to achieve compliance with the environmental policy
- Periodic internal and external audits and reviews of environmental performance and the effectiveness of the EMS.

Accordingly, commitment of the Developer to effective environmental management provides the channel whereby strategies are transformed from the documented form and implemented. For the filling station project, the developer is committed to implementing a comprehensive environmental management programme. The project manager/developer and Operations Manager have ultimate responsibility for the achievement of environmental targets during the construction and operational phases, respectively. The environmental programme commits the owners or developers to allocation of sufficient resources, continuous improvement of environmental management practices in order to fulfil social and ethical responsibility and compliance with national and international standards.

The developer is responsible for the:

- Allocation of Resources
- Risk Assessment
- ensuring that the environmental policy is in place and communicated to all workers
- Designating role of staff members in EMP
- Appointment and monitoring of environmental management team

5.2 The implementation of the Environmental Management plan

Table 1 to table 2 outlines the management of the environmental elements during the planning and operational phases. Section 2 provides a brief summary of the management of the Filling Station development project. Contents of these tables could be incorporated into a HSEQ management system. The proponent who is also the investor or owner of the business Trans Zambezi Truckport & Investment cc would be responsible to assign the responsibilities and ensure that the tasks are executed.

5.3 Mitigation Measures during Constructions Phase & Operation Phases of the Filling Station Development (table 1)

Environmental /Social Impact	Proposed Mitigation Measures and Monitoring Aspects	Responsibility	Monitoring Means/Plan/Indicator	Cost (N\$)
(Construction/Operation Phase)				
Air pollution	<ol style="list-style-type: none"> 1. Spray water on excavated areas. 2. All bare areas should be landscaped after installation. 3. Workers should be provided with dust masks if working in sensitive areas. 4. Regular maintenance of construction plant and equipment. 5. Engage sensitive construction workers. 	Contractor	<ul style="list-style-type: none"> • Amount of dust produced. • Level of landscaping 	N\$ 10 000
Ecological considerations (flora & fauna)	<ol style="list-style-type: none"> 1. The flora and fauna should be restored after installation by landscaping and maintaining the introduced plants. 	Proponent	<ul style="list-style-type: none"> • Natural ecology in areas not in use 	
Changes in Hydrology/impended drainage	<ol style="list-style-type: none"> 1. Proper installation of drainage structures 2. Installation of cascades to break the impact of water flowing in the drains. 3. Ensure efficiency of drainage structures through proper design and maintenance. 4. Provide gratings to the drainage channel. 5. Regular check on any sludge along drainage 	Contractor/Proponent	Inspection and routine maintenance	N\$ 20 000

	<p>channels.</p> <p>6. Visual checks of oil interceptors and drainage channels for any leaks.</p>			
Soil erosion	<ol style="list-style-type: none"> 1. Levelling to reduce the impact of erosion 2. All bare areas should be well landscaped after completion. 3. Compact loose soils. 4. Ensure management of excavation activities 5. Control earthworks 6. Ensure proper disposal of excavated loose soil. 7. Provide soil erosion control and conservation structures where necessary. 8. Landscaping 	Contractor	<ul style="list-style-type: none"> • Landscaped areas • Inspection and routine maintenance 	N/A
Solid waste	<ol style="list-style-type: none"> 1. Excavation waste should be re-used or backfilled. 2. The site should have waste receptacles with bulk storage facilities at convenient points to prevent littering during occupation 	Management	<ul style="list-style-type: none"> • Presence of well-maintained receptacles and central collection point. 	N/A
Oil leaks and spills	<ol style="list-style-type: none"> 1. Machinery should be well maintained to prevent oil leaks. 2. Provide oil interceptors along the drains leading from oil storage areas and dispensing pump islands. 3. Maintenance of construction vehicles should be carried out in the contractor's yard. 	Contractor	<ul style="list-style-type: none"> • No oil spills and leaks on the site 	N\$ 90 000

Noise Pollution	<ol style="list-style-type: none"> 1. Maintain plant equipment 2. Restrict construction activities to daytime 3. Provision of appropriate PPEs i.e., earplugs and earmuffs. 4. Appropriate selection of machinery. 	Contractor	<ul style="list-style-type: none"> • Inspection/observation 	N\$ 10 000
First Aid	<ol style="list-style-type: none"> 1. A well stocked first aid kit shall be maintained by a qualified personnel 	Management	Contents of the first aid	N\$ 10 000
Loss of vegetation	<ol style="list-style-type: none"> 1. The flora and fauna should be restored after construction by landscaping and maintaining the introduced plants. 2. Planting flowers/grassing should be done just before the rains or irrigated during dry spells. 	Contractor/ Management	<ul style="list-style-type: none"> • Landscaped lawns 	N/A
Occupational Health & Safety	<ol style="list-style-type: none"> 1. Provide Personal Protective Equipment 2. Train workers on personal safety and how to handle equipments and machine. 3. A well stocked first aid kit shall be maintained by a qualified personnel 4. Report any accidents / incidences and treat and compensate affected workers 5. Provide sufficient and suitable sanitary conveniences which should be kept clean 	Management	<ul style="list-style-type: none"> • Workers using Protective • Presence of Well stocked First Aid Box • Separate and clean • washrooms (Gents & Ladies) 	N\$ 50 000
Underground fuel storage and handling	<ol style="list-style-type: none"> 1. Use properly maintained hoses and fittings. 2. Make the cement screeds in all the chambers using 	Contractor/ Management	<ul style="list-style-type: none"> • No fuel / Oil spills 	N\$ 50 000

	<p>water proof material.</p> <p>3. Install a monitoring well next to the tanks to check on leaks.</p> <p>4. Use water finding dipstick and/ or a hydrometer to check on density/ specific gravity</p> <p>5. Ensuring no spills during refilling and / or when offloading the fuel</p>			
Fire preparedness	<p>1. Fire fighting drills carried out regularly.</p> <p>2. Fire fighting emergency response plan</p> <p>3. Ensure all fire fighting equipment is regularly maintained, serviced and inspected.</p> <p>4. Fire hazard signs and directions to emergency exit, route to follow and assembly point in case of any fire incidence.</p> <p>5. Adapt effective Emergency Response Plan</p>	Management	<ul style="list-style-type: none"> • Number of fire drills carried. • Proof of inspection on fire fighting equipment • Fire Signs put up in strategic places. • Availability of fire fighting equipment 	N\$ 50 000
Environment Health and Safety preparedness	<p>1. Train workers on personal safety and disaster management</p> <p>2. Conduct Annual Health and Safety Audits</p>	Management	<ul style="list-style-type: none"> • Copies of Annual Audit Reports 	N\$ 20 000
Electricity usage	<p>1. Erect a meter in the premises to check on total kilowatts used and for billing purposes</p> <p>2. Apply for connection from NamPower</p> <p>3. Switch off light that are not in use</p> <p>4. Use of energy conserving bulbs/ tubes</p>	Contractor/ Management	<ul style="list-style-type: none"> • Presence of an KPLC meter • Electricity bills 	

Contamination of ground and surface water (Oil spills)	<ol style="list-style-type: none"> 1. Cleaning of the Oil Interceptor 2. Use special tool to do skimming 3. Install spill control kit next to the interceptor during skimming 	Management	<ul style="list-style-type: none"> • No oil spills hence no ground water contamination 	
Water quality & Waste Management	<ol style="list-style-type: none"> 1. Construct and monitor oil interceptors. 2. Reduce waste at source, recycling, and disposal of unrecyclable waste in approved dumpsites. The proponent should explore engaging the services of a registered waste handler 	Management		
Waste water disposal	<ol style="list-style-type: none"> 1. Conduct inspections for sewer pipe blockages or effluent presence on open drains 2. Waste water should drain through the laid sewage pipes 3. Compliance to the Water Quality Amendment Regulations 	Management	<ul style="list-style-type: none"> • Annual effluent discharge license from NEMA. 	N\$ 30 000
(Decommissioning Phase)				
Disturbed Physical environment	<ol style="list-style-type: none"> 1. Undertake a complete environmental restoration programme 2. Landscaping and introducing appropriate vegetation 3. Implement an appropriate re-vegetation programme to restore the site to its original status 4. During the re-vegetation period, appropriate 	Management	<ul style="list-style-type: none"> • Environmental restoration 	N\$ 80 000

	<p>surface water run off controls will be taken to prevent surface erosion;</p> <p>5. Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences;</p> <p>6. Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;</p> <p>7. Comprehensive landscaping</p>			
Fuel Tank	<p>1. Ensure there is no spillage during emptying and removing of the underground tank</p> <p>2. Any fuels removed from the tanks, surrounding soil that maybe contaminated must be disposed into licensed dumpsites.</p>	Contractor	<ul style="list-style-type: none"> • Empty and disused tanks on site 	10 000
<ul style="list-style-type: none"> • Loss of income • Reduced ability to support dependants • Loss of quality of life • Loss of benefits i.e., medical 	<p>1. The safety of workers should surpass as a priority of all other objectives in the decommissioning project</p> <p>2. Adapt a project-completion policy: identifying key issues to be considered.</p>	Management		

insurance cover etc.				
Occupational Health and Safety	<ol style="list-style-type: none"> 1. Demarcate area under demolition with Danger Tapes to control access 2. Provision of Protective Equipment 3. A well-stocked first aid kit shall be maintained by a qualified personnel 	Management	<ul style="list-style-type: none"> • Presence of well-stocked First Aid boxes and protective equipments 	50 000
Scraps and other debris on site	<ol style="list-style-type: none"> 1. Use of integrated waste management system i.e., through a hierarchy of options 2. Waste generated as a result of facility decommissioning activities will be characterized in compliance with standard waste management procedures. Disposal locations will be selected by the contractor based on the properties of the particular waste stream. 3. All building, machinery, equipment, structures and tools that will not be used for other purposes should be removed and recycled/ reused say in other projects. 4. Where recycling/re-use of the machinery, equipment, implements, structures, tools and other waste is not possible, the materials should be taken to an approved dumpsite. 	Management	<ul style="list-style-type: none"> • 	

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