

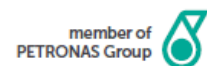
**OPERATIONS AND MAINTENANCE OF THE BULK STORAGE
FACILITY FOR PETROLEUM PRODUCTS OF ENGEN NAMIBIA
WINDHOEK DEPOT
ENVIRONMENTAL MANAGEMENT PLAN**



Prepared by:



Prepared for:

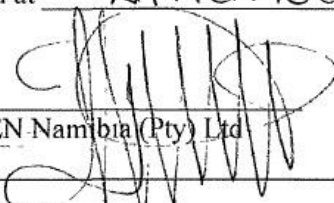


April 2023

Project:	ENVIRONMENTAL MANAGEMENT PLAN FOR THE OPERATIONS AND MAINTENANCE OF THE ENGEN NAMIBIA BULK STORAGE FACILITY FOR PETROLEUM PRODUCTS IN WINDHOEK
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I, Nambata Ullenga, acting as representative of ENGEN Namibia (Pty) Ltd, hereby confirm that the project description contained in this report is a true reflection of the information which the Proponent provided to Geo Pollution Technologies. All material information in the possession of the Proponent that reasonably has or may have the potential of influencing any decision or the objectivity of this assessment is fairly represented in this report and the report is hereby approved.

Signed at Windhoek on the 09 day of May 2023


ENGEN Namibia (Pty) Ltd

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Business Registrator/ID No.

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1 INTRODUCTION

ENGEN Namibia (Pty) Ltd (the Proponent) operates an existing bulk fuel storage facility in Windhoek (Figure 1-1). The facility for the receipt and distribution of petroleum products has been in operation for many years. ENGEN Namibia intends to continue operating the site into the foreseeable future.

Fuel is received by rail tank cars, which are offloaded at the rail gantry, or by road tankers, which are offloaded at the road gantry. Fuel is pumped to the respective tanks via the aboveground reticulation network consisting of pumps, manifolds and pipelines. Fuel to be distributed nationwide is collected by road tankers at the road gantry. Bulk customers also purchase and collect diesel at the customer own collection facility. A site layout is presented in Figure 1-2.

Daily operations include administrative tasks, on-site security services, cleaning and basic maintenance. When required, the liquid collected in the separator is removed by truck and pump and disposed of at a hazardous waste disposal facility. Regular firefighting drills are performed and equipment is serviced and tested to ensure their optimum performance. All persons entering the site undergo induction and must adhere to all health and safety requirements.

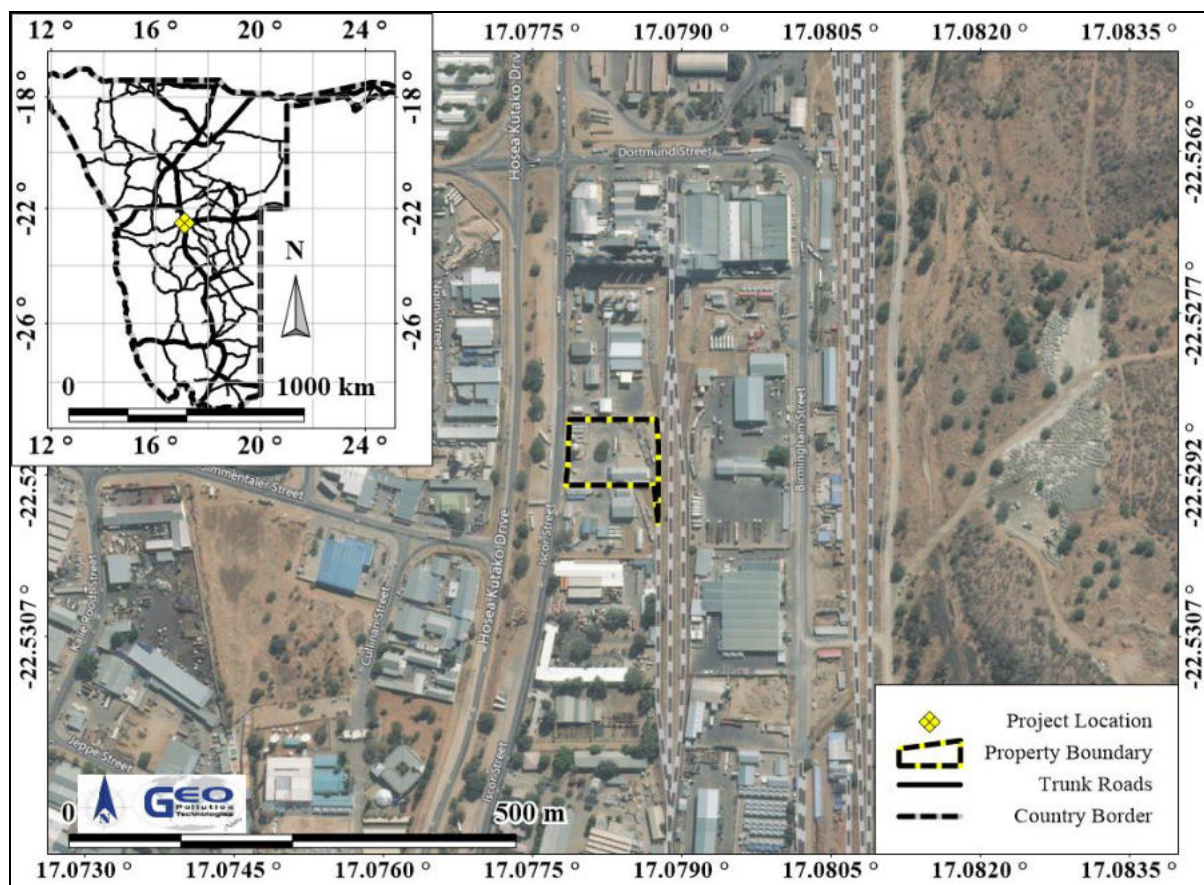


Figure 1-1 Project location

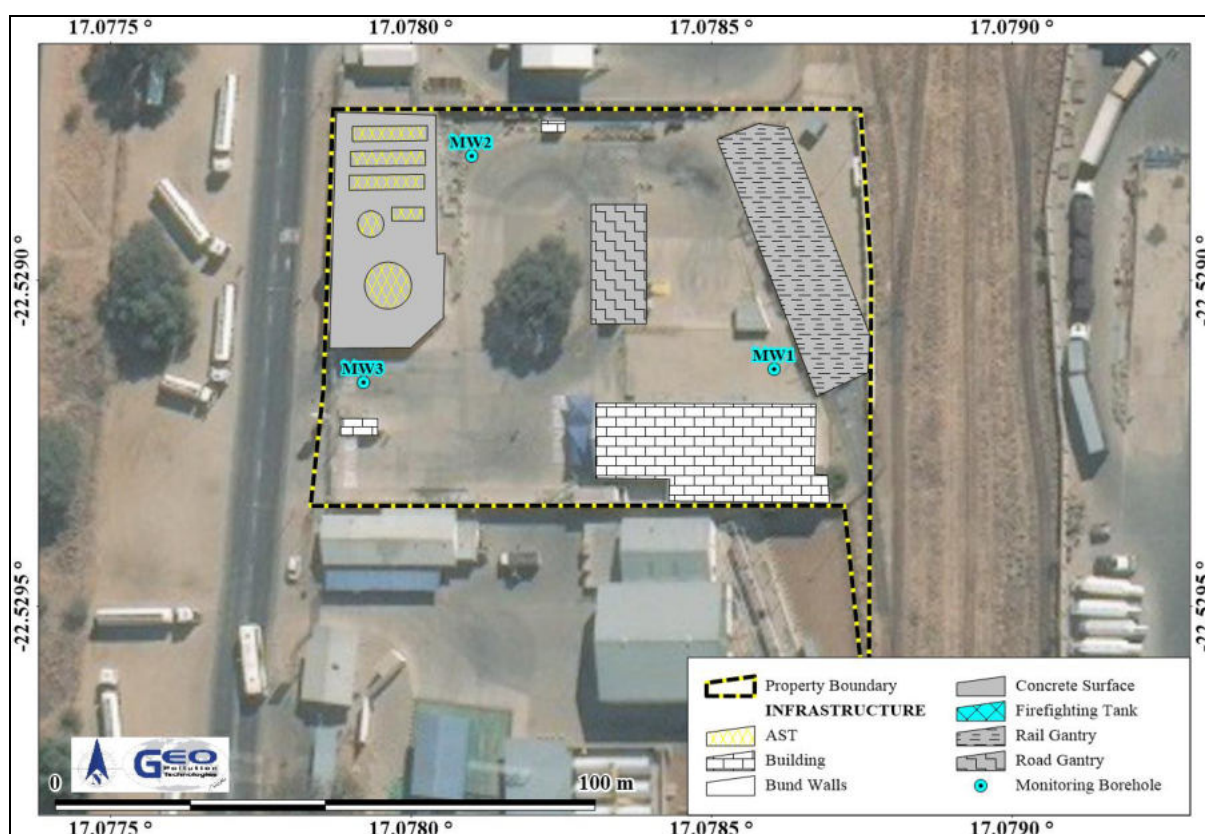


Figure 1-2 Site layout

2 ADMINISTRATIVE, LEGAL AND POLICY REQUIREMENTS

To protect the environment and achieve sustainable development, all projects, plans, programmes and policies deemed to have adverse impacts on the environment require an environmental assessment, as per the Namibian legislation. The legislation and standards provided in Table 2-1 to Table 2-4 govern the environmental assessment process in Namibia and/or are relevant to the facility.

Table 2-1 Namibian law applicable to the bulk fuel storage facility

Law	Key Aspects
The Namibian Constitution	<ul style="list-style-type: none"> ◆ Promote the welfare of people ◆ Incorporates a high level of environmental protection ◆ Incorporates international agreements as part of Namibian law
Environmental Management Act Act No. 7 of 2007, Government Notice No. 232 of 2007	<ul style="list-style-type: none"> ◆ Defines the environment ◆ Promote sustainable management of the environment and the use of natural resources ◆ Provide a process of assessment and control of activities with possible significant effects on the environment
Environmental Management Act Regulations Government Notice No. 28-30 of 2012	<ul style="list-style-type: none"> ◆ Commencement of the Environmental Management Act ◆ List activities that requires an environmental clearance certificate ◆ Provide Environmental Impact Assessment Regulations

Law	Key Aspects
Petroleum Products and Energy Act Act No. 13 of 1990, Government Notice No. 45 of 1990	<ul style="list-style-type: none"> ◆ Regulates petroleum industry ◆ Makes provision for impact assessment ◆ Petroleum Products Regulations (Government Notice No. 155 of 2000) <ul style="list-style-type: none"> ○ Prescribes South African National Standards (SANS) or equivalents for construction, operation and decommissioning of petroleum facilities (refer to Government Notice No. 21 of 2002)
The Water Act Act No. 54 of 1956	<ul style="list-style-type: none"> ◆ Remains in force until the new Water Resources Management Act comes into force ◆ Defines the interests of the state in protecting water resources ◆ Controls the disposal of effluent ◆ Numerous amendments
Water Resources Management Act Act No. 11 of 2013	<ul style="list-style-type: none"> ◆ Provide for management, protection, development, use and conservation of water resources ◆ Prevention of water pollution and assignment of liability ◆ Not in force yet
Local Authorities Act Act No. 23 of 1992, Government Notice No. 116 of 1992	<ul style="list-style-type: none"> ◆ Define the powers, duties and functions of local authority councils ◆ Regulates discharges into sewers
Public and Environmental Health Act Act No. 1 of 2015, Government Notice No. 86 of 2015	<ul style="list-style-type: none"> ◆ Provides a framework for a structured more uniform public and environmental health system, and for incidental matters ◆ Deals with Integrated Waste Management including waste collection disposal and recycling; waste generation and storage; and sanitation.
Labour Act Act No 11 of 2007, Government Notice No. 236 of 2007	<ul style="list-style-type: none"> ◆ Provides for Labour Law and the protection and safety of employees ◆ Labour Act, 1992: Regulations relating to the health and safety of employees at work (Government Notice No. 156 of 1997)
Atmospheric Pollution Prevention Ordinance Ordinance No. 11 of 1976	<ul style="list-style-type: none"> ◆ Governs the control of noxious or offensive gases ◆ Prohibits scheduled process without a registration certificate in a controlled area ◆ Requires best practical means for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process
Hazardous Substances Ordinance Ordinance No. 14 of 1974	<ul style="list-style-type: none"> ◆ Applies to the manufacture, sale, use, disposal and dumping of hazardous substances as well as their import and export ◆ Aims to prevent hazardous substances from causing injury, ill-health or the death of human beings
Pollution Control and Waste Management Bill (draft document)	<ul style="list-style-type: none"> ◆ Not in force yet ◆ Provides for prevention and control of pollution and waste ◆ Provides for procedures to be followed for licence applications

Table 2-2 Municipal by-laws, guidelines and regulations

Groundwater Protection Regulations	<ul style="list-style-type: none"> ◆ Provides for the protection of groundwater, landscape and vegetation sensitivity ◆ Requires an EIA and EMP for projects that may potentially impact on groundwater ◆ Identifies three groundwater control zones: medium, high and very high.
Windhoek Environmental Structure Plan and Environmental Policy	<ul style="list-style-type: none"> ◆ Integrates spatial planning decision-making, environmental planning and environmental impact management
Town Planning Scheme	<ul style="list-style-type: none"> ◆ Enables the comprehensive management of all property and related public sector functions across the city. ◆ Provides for the protection of groundwater and the environment. ◆ Prohibits any sewer, septic tank, pit latrine, VIP or French drain within 500 m of any private or production borehole without council's consent. ◆ Sets the Southern Development Limit for Windhoek.
Municipal Council of Windhoek: Noise Control Regulations General Notice No. 77 of 2006	<ul style="list-style-type: none"> ◆ Resolution 215/09/2006 dealing with noise ◆ Impose various noise limits for residential commercial and industrial areas for day and night time. ◆ Restricts noise reaching single residential areas at 55 dBA during the day and 45 dBA at night.
Drainage and Sewage Regulations	<ul style="list-style-type: none"> ◆ Regulates discharges into sewer systems. ◆ Provides standards to which effluents entering a sewer system must adhere. ◆ Regulates storm water run-off.

Table 2-3 Relevant multilateral environmental agreements for Namibia and the development

Agreement	Key Aspects
Stockholm Declaration on the Human Environment, Stockholm 1972.	<ul style="list-style-type: none"> ◆ Recognizes the need for a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.
1985 Vienna Convention for the Protection of the Ozone Layer	<ul style="list-style-type: none"> ◆ Aims to protect human health and the environment against adverse effects from modification of the Ozone Layer are considered. ◆ Adopted to regulate levels of greenhouse gas concentration in the atmosphere.
United Nations Framework Convention on Climate Change (UNFCCC)	<ul style="list-style-type: none"> ◆ The Convention recognises that developing countries should be accorded appropriate assistance to enable them to fulfil the terms of the Convention.
Convention on Biological Diversity, Rio de Janeiro, 1992	<ul style="list-style-type: none"> ◆ Under article 14 of The Convention, EIAs must be conducted for projects that may negatively affect biological diversity.

Table 2-4 Standards or codes of practise

Standard or Code	Key Aspects
South African National Standards (SANS)	<ul style="list-style-type: none"> ◆ The Petroleum Products and Energy Act prescribes SANS standards for the construction, operations and demolition of petroleum facilities. ◆ SANS 10089-1 (2008): The petroleum industry Part 1: Storage and distribution of petroleum products in above-ground bulk installations ◆ Provide requirements for spill control infrastructure

The project is listed as an activity requiring an environmental clearance certificate as per the following points from Section 9 of Government Notice No. 29 of 2012:

- ◆ 9.1 “The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974.”
- ◆ 9.2 “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.”
- ◆ 9.4 “The storage and handling of a 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.”
- ◆ 9.5 “Construction of filling stations or any other facility for the underground and aboveground storage of dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin.”

3 ENVIRONMENTAL CHARACTERISTICS

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

3.1 Locality and Surrounding Land Use

The facility is located on erf 7997, Iscor Street in the Northern Industrial Area of Windhoek (22.52904 °S, 17.07825 °E) (Figure 1-1). The property is situated within the municipal area of Windhoek and is zoned for industrial use. It is surrounded by industrial properties including bulk fuel storage facilities of other petroleum companies. There are no heritage or cultural sites known of nearby.

Implications and Impacts

The site is situated in an area zoned for industrial purposes. Being a relatively low impact establishment, no significant land use impact is expected on nearby establishments.

3.2 Climate

According to the Köppen-Geiger Climate Classification system the project is located in a hot semi-arid climate (BSh) (Kottek et al. 2006). This means that the area receives precipitation below potential evapotranspiration, but not as low as a desert climate and has a mean annual temperature of at least 18 °C. Average rainfall received is 300-350 mm/a with a variation of 30-40%. Monthly rainfall peaks in February. The potential evapotranspiration is 2,500 – 2,600 mm/a. By dividing the mean annual potential evapotranspiration into the mean annual precipitation, an aridity index value for the area was computed as 0.12, which indicates the area to be arid. The average annual minimum temperature is 6-8 °C, while the average annual maximum temperature is 32-34 °C, with an average annual temperature range of 24-26 °C. An average diurnal temperature (difference between daily minimum and maximum temperature) for this area is around 14-16 °C. Direct normal solar irradiance for the area is 7.778 kWh/m²/day.

Long term precipitation data was obtained from the CHIRPS-2 database (Funk et al., 2015). The CHIRPS-2 dataset (Climate Hazards Group Infra-Red Precipitation with Station data version 2) consist of long term precipitation data (1981 to near-present) obtained from satellite imagery and in-situ station data and therefore represents more recent data. Data is averaged over an area of roughly 5 km by 5 km. This averaging effect should be kept in mind during data analyses as high precipitation from single thunder storm cells would be averaged out, thereby providing an reduced daily maximum precipitation value.

The average annual precipitation for the last 41 years was calculated as 321 mm/a, with a coefficient of variance of 34%. Heavier precipitation (single day events) occur between January and February, with a single event of 53 mm in April (last 41 years data) being the highest. Daily and seasonal precipitation data (Funk et al., 2015) is presented in Table 3-1 and in Figure 3-1. Seasonal (July to June) total precipitation, centered on the average line for the last 41 years, is presented, with the daily total precipitation and the seasonal cumulative precipitation. From the figure it is clear that 7 out of the last 10 seasons were below the average.

Table 3-1 Long term precipitation data based on remote sensing (Funk et al. 2015)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (mm/m)	11.99	18.54	9.31	7.06	0.00	0.00	0.00	0.00	0.00	0.00	5.28	8.02
Maximum (mm/m)	264.87	258.65	150.71	133.58	8.99	3.82	0.11	1.30	6.65	39.22	64.38	103.99
Average (mm/m)	71.4	86.2	57.3	32.7	1.1	0.2	0.0	0.0	1.6	10.4	20.4	32.8
Variability (%)	74.0	61.0	63.0	87.0	212.0	411.0	351.0	466.0	139.0	82.0	69.0	69.0
Daily maximum (mm)	48.6	45.6	43.2	53.3	9.0	3.8	0.1	1.3	5.1	18.1	25.2	24.6
Average rain days	8	9	6	3	0	0	0	0	1	2	4	5
Season July - June average: 321 mm			Season coefficient of variation: 34 %									
Data range	1981-Jul-01 to					2022-Jun-30					Lat: 22.5289°S Long: 17.0783°E	

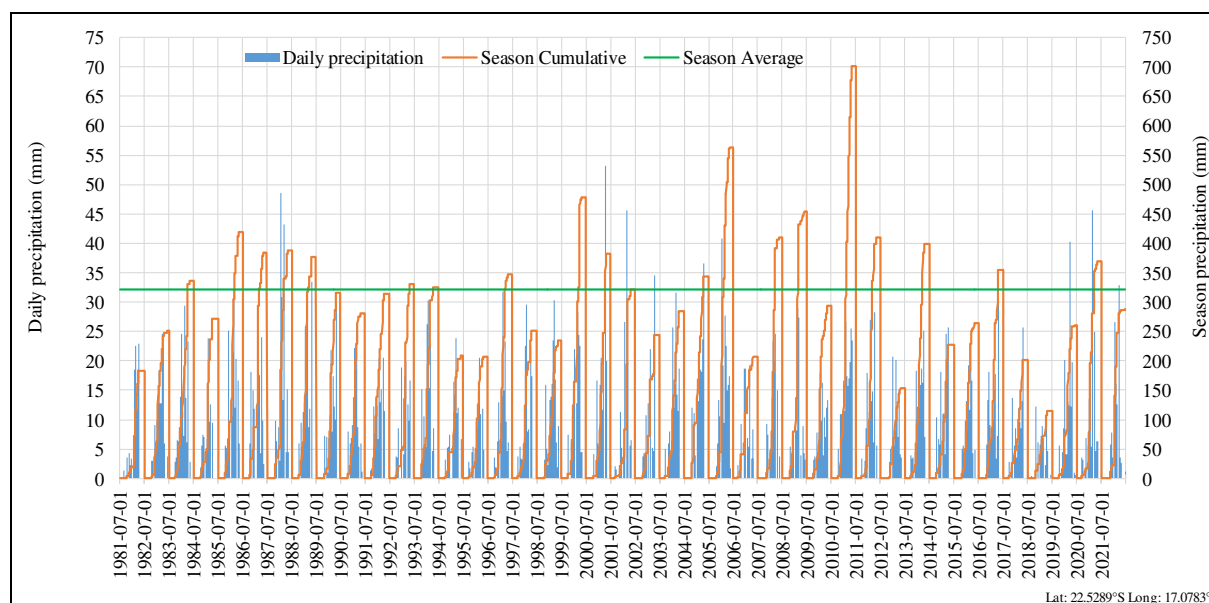


Figure 3-1 Long term seasonal precipitation data based on remote sensing (Funk et al. 2015)

Implications and Impacts

Rainfall events are typically thunderstorms with heavy rainfall that can occur in short periods of time (cloud bursts). Heavy rainfall events may result in the leaching of pollutants or hazardous substances into groundwater. The extreme variability in seasonal rainfall makes water an extremely vulnerable resource. Heavy rainfall events may further result in an overflow from the separator which may present a contamination risk.

3.3 Topography and Drainage

The regional topography of the area can be described as a wide graben valley sloping north inside the surrounding hilly terrain. The valley floor is relatively flat compared to the surrounding terrain (Komas Hochland to the west and Eros Mountains to the east) where moderate to steep slopes are the norm. A very distinct mountain range (Auas Mountains) cuts across the valley south of the city and divides the valley into two parts, with the southern part draining to the south. The topography is strongly related to the historic geological structural activities that took place in the area. These can be summarised as a graben structure striking roughly from north to south and thrusting that is evident along the Auas Mountains.

Regional drainage patterns are presented in Figure 3-2. Regional drainage tend to be in a northern direction. The site is located in the western edge of the catchment of the Klein Windhoek River, a tributary of the Swakop River. The on-site surface drainage is heavily impacted by anthropogenic activities but is expected to be mainly in a western direction from the site. The site has a low relief with a slope of $< 5^\circ$.

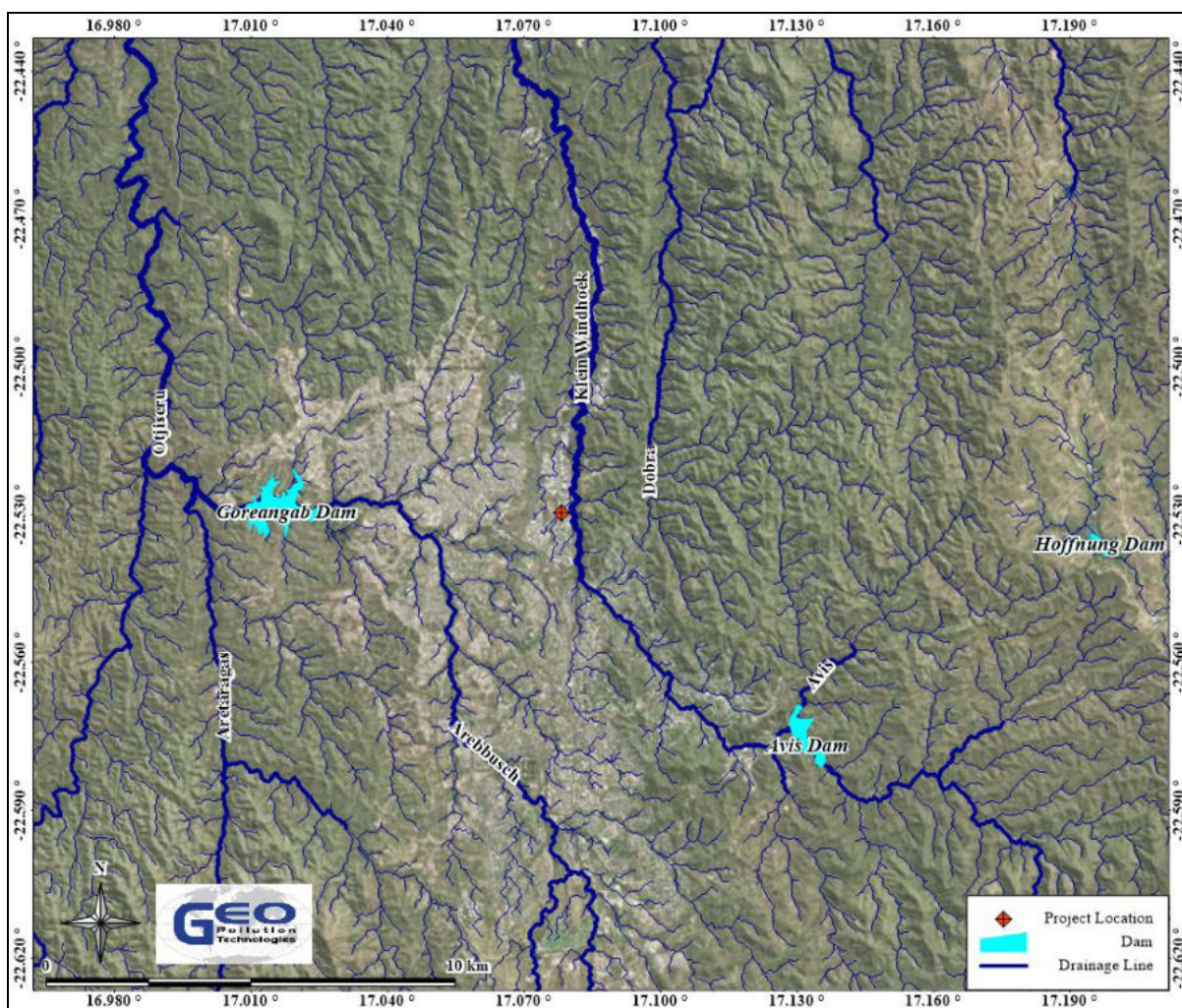


Figure 3-2 Drainage lines

Implications and Impacts

There are no topographical features which may impact or be impacted by the proposed operations. Any pollutants that are not contained and are transported via surface water flow, will flow out of the site via storm water drainage lines and potentially pollute the natural environment. Cumulative effects may be considered for the Klein Windhoek River and the Swakoppoort Dam.

3.4 Geology and Hydrogeology

Metasedimentary rocks of the Namibian Age constitute the regional geology of the study area, consisting of rocks from the Damara Sequence. The Damara Sequence is locally subdivided into the Swakop Group rocks. The Kuiseb Formation make up the Swakop Group and include amphibolite, schist, micaceous quartzite and quartzite. The project location is situated on an alluvial deposits (sand) and is potentially underlain by the Kuiseb Formation rocks when inferred. See Figure 3-3 for the hydrogeological map of the area.

The metamorphic formations of the study area strike in a west-south-westerly direction and dip 15-35° to the north-northwest. The structural geology of the Windhoek area is complex as a result of numerous episodes of folding, faulting, thrusting and rifting. A number of north- to north-westerly striking faults and joints found in Windhoek form the major underground water conduits and therefore determine the conditions of the aquifer. A shallow colluvial basin overlay these formations within the Windhoek Graben Valley. Host rock fracturing along fault planes results in better development of secondary porosity in quartzite compared to schistose terrain, which is prone to plastic deformation rather than brittle fracturing. The quartzite therefore exhibits significantly higher secondary porosity and permeability, compared to the micaceous schist. The project area is situated on quaternary sediments and thus has a medium geological sensitivity (Figure 3-4).

The groundwater level in the area is expected to be more than 8 m below surface. Groundwater flow is expected to take place through primary porosity in the surface cover, while it is expected to flow along fractures, faults (secondary porosity) and other geological structures present within the underlying formations (hard rock formations). Groundwater flow from the site can be expected in a northerly direction. Local flow patterns may vary due to groundwater abstraction. Water is utilized in the area, with at least 18 boreholes known of within a 5 km radius. Table 3-2 presents groundwater statistics of boreholes contained in the Department of Groundwater (DWA) database. Note that this database is generally outdated and more boreholes might be present.

Furthermore it is found north of the aquifer management divide in an area where less strict control on potential pollution sources are placed (Africon et al. 2004). Based on the Windhoek Environmental Structure plan the project location falls within a zone of low geological sensitivity due to the underlying geology. The project location is situated in the Okahandja groundwater basin (Christelis & Struckmeier 2001). Flow along preferred flow paths might be in different directions, but the larger scale flow is still expected to be in a northerly direction. This area falls in the Windhoek-Gobabis Subterranean Water Control Area (Extension). The groundwater is therefore a permit controlled area. Groundwater remains the property of the Government of Namibia.

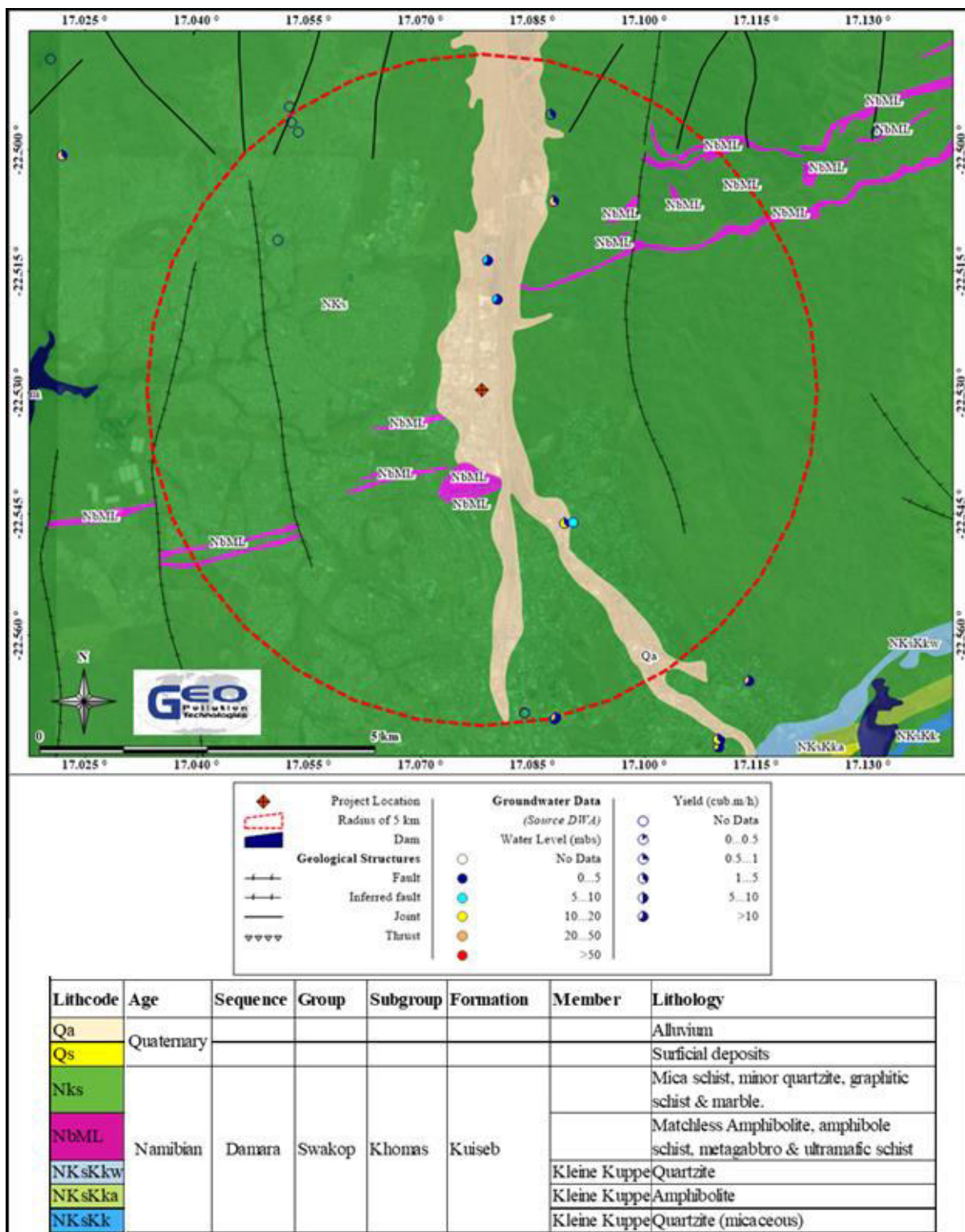


Figure 3-3 Hydrogeology map

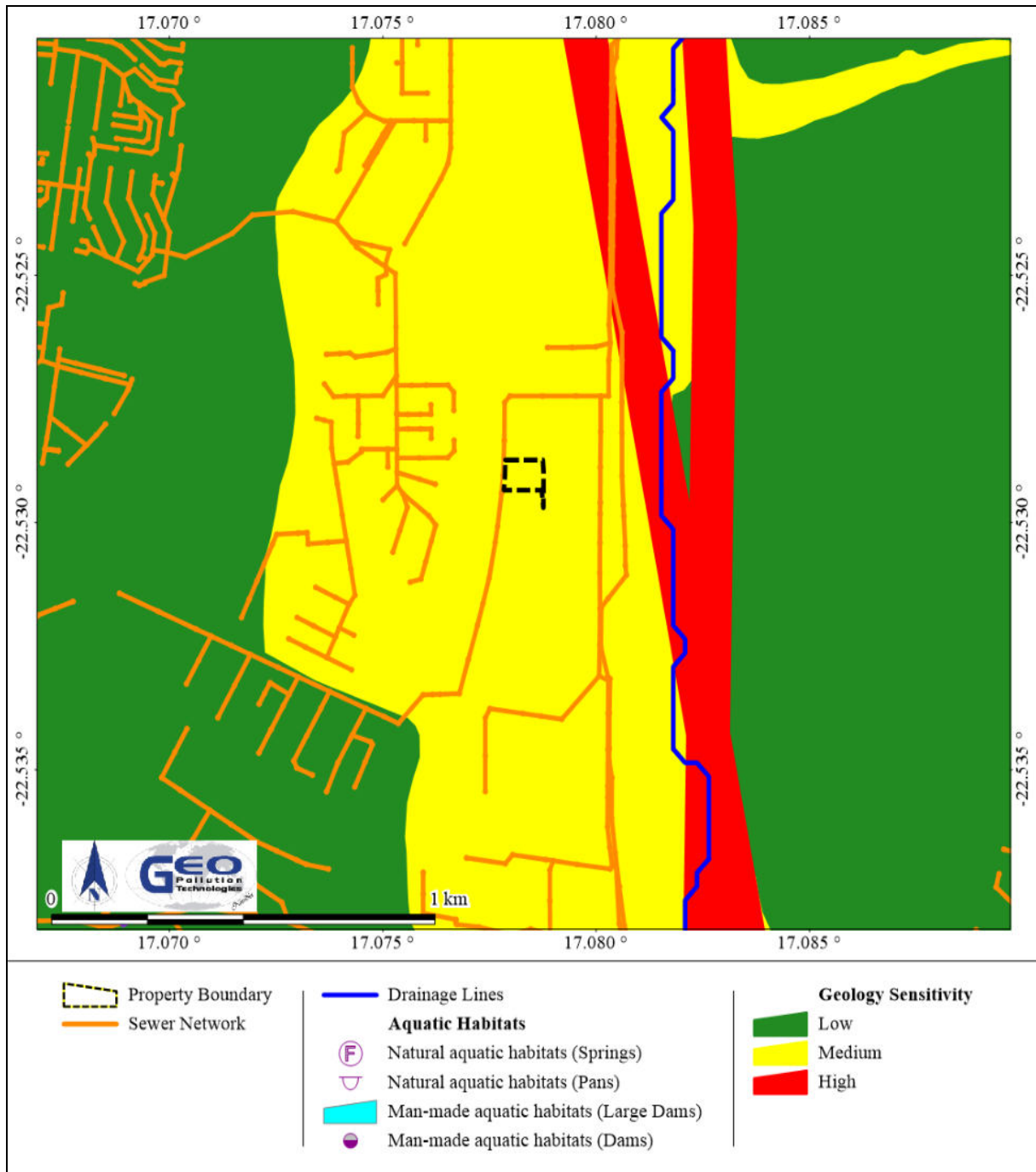



Figure 3-4 Geological sensitivity of the project area

Table 3-2 Groundwater statistics

Query Centre: Engen Depot; -22.5289°S; 17.0783°E		Query Box Radius: 5.0km										
		NUMBER OF KNOWN BOREHOLES	LATITUDE	LONGITUDE	DEPTH (mbs)	YIELD (m3/h)	WATER LEVEL (mbs)	WATER STRIKE (mbs)	TDS (ppm)	SULPHATE (ppm)	NITRATE (ppm)	FLUORIDE (ppm)
Data points		18			11	11	11	7	13	11	12	12
Minimum			-22.483904	17.029587	38	2	8	18	30	5	0	0
Average					142	27	17	36	739	171	7	1
Maximum			-22.573896	17.127013	524	62	46	64	2567	510	36	4
Group A					18.18%	63.64%	45.45%	0.00%	76.92%	72.73%	75.00%	66.67%
<i>Limit</i>					50	>10	10	10	1000	200	10	1.5
Group B					36.36%	0.00%	54.55%	71.43%	15.38%	27.27%	8.33%	8.33%
<i>Limit</i>					100	>5	50	50	1500	600	20	2.0
Group C					27.27%	36.36%	0.00%	28.57%	0.00%	0.00%	16.67%	0.00%
<i>Limit</i>					200	>0.5	100	100	2000	1200	40	3.0
Group D					18.18%	0.00%	0.00%	0.00%	7.69%	0.00%	0.00%	25.00%
<i>Limit</i>					>200	<0.5	>100	>100	>2000	>1200	>40	>3

Statistical grouping of parameters is for ease of interpretation, except for the grouping used for sulphate, nitrate and fluoride, which follow the Namibian guidelines for the evaluation of drinking-water quality for human consumption, with regard to chemical, physical and bacteriological quality. In this case the groupings has the following meaning:

Group A: Water with an excellent quality

Group B: Water with acceptable quality

Group C: Water with low health risk

Group D: Water with a high health risk, or water unsuitable for human consumption.

Implications and Impacts

Groundwater is not utilised in the area. Pollution of the groundwater is however still prohibited and is likely due to the area being of medium geological sensitivity. Spill control structures installed and maintained to SANS specifications or better would successfully prevent pollution of groundwater, surface water or soil.

3.5 Public Water Supply

Water consumption in Windhoek is well managed by means of water demand management. Nevertheless available water is one of the city's most scarce resources and represents a constraint for sustainable development in future. Consumption will increase with the influx of people to the city.

Listed in order of resource development, Windhoek receive its water from boreholes in and around town, reclaimed water (New Goreangab Water Reclamation Plant), and a NamWater Scheme that transfers water from the Von Bach Dam, the Swakoppoort Dam, the Omatako Dam and the Grootfontein Karst Area. Water from the dams makes up 74% of the average daily consumption of water in Windhoek. About 21% of the water is provided from reclaimed water and the rest from groundwater (Pazvakawambwa 2018).

The City of Windhoek has also started with artificial recharge of the Windhoek aquifer and is planning to extend this scheme through the installation of new recharge boreholes as well as the development of deeper abstraction boreholes, 400 to 500 m deep. This clearly illustrates the value of the aquifer. The boreholes are the second most important water resource of the city and the sustained use of the aquifer needs to be assured.

Implications and Impacts

Groundwater is a source of potable water and as such public water supply is at risk if a significant hydrocarbon spill occurs on site. The likelihood that the Municipal water supply boreholes are impacted by pollution from this facility is low, but other groundwater users nearby might be at risk. Spill control structures installed and maintained to SANS specifications (or better) would successfully prevent pollution of groundwater, surface water or soil.

3.6 Fauna and Flora

Windhoek lies in the Savanna biome. Trees such as *Acacia mellifera*, *A. reficiens* and *A. fleckii* and a variety of other acacia trees are characteristic of this zone. Table 3-3 and Table 3-4 present a summary of the general fauna and flora of the area. The project area is considered to have low ecological sensitivity, but the nearby Klein Windhoek River has high ecological sensitivity (Figure 3-5). Apart from few ornamental plants or trees, no vegetation of note is present in the direct vicinity of the facility as this is an existing facility with mainly an artificial ground cover. No further impact on the fauna and flora is expected from the continued operation of the facility.

Table 3-3 General flora data (Atlas of Namibia Project, 2002)

Biome	Savanna
Vegetation type	Thornbush shrubland
Vegetation structure type	Dense shrubland
Diversity of higher plants	Highest (Diversity rank = 1 [1 to 7 representing highest to lowest diversity])
Number of plant species	More than 500
Percentage tree cover	26-50
Tree height (m)	2-5
Percentage shrub cover	26-50
Shrub height (m)	1-2
Percentage dwarf shrub cover	2-10
Dwarf shrub height (m)	< 0.5
Percentage grass cover	51-75
Grass height (m)	0.5-1
Dominant plant species 1	<i>Acacia mellifera</i>
Dominant plant species 2	<i>Acacia reficiens</i>
Dominant plant species 3	<i>Acacia fleckii</i>
Dominant plant species 4	<i>Boscia albitrunca</i>
Dominant plant species 5	<i>Lonchocarpus nelsii</i>
Dominant plant species 6	<i>Acacia erioloba</i>

Table 3-4 General fauna data (Atlas of Namibia Project, 2002)

Mammal Diversity	61 - 75 Species
Rodent Diversity	20 - 23 Species
Bird Diversity	> 230 Species
Reptile Diversity	71 - 80 Species
Snake Diversity	35 - 39 Species
Lizard Diversity	> 35 Species
Frog Diversity	8 - 11 Species
Termite Diversity	7 - 9 Genera
Scorpion Diversity	18 - 21 Species

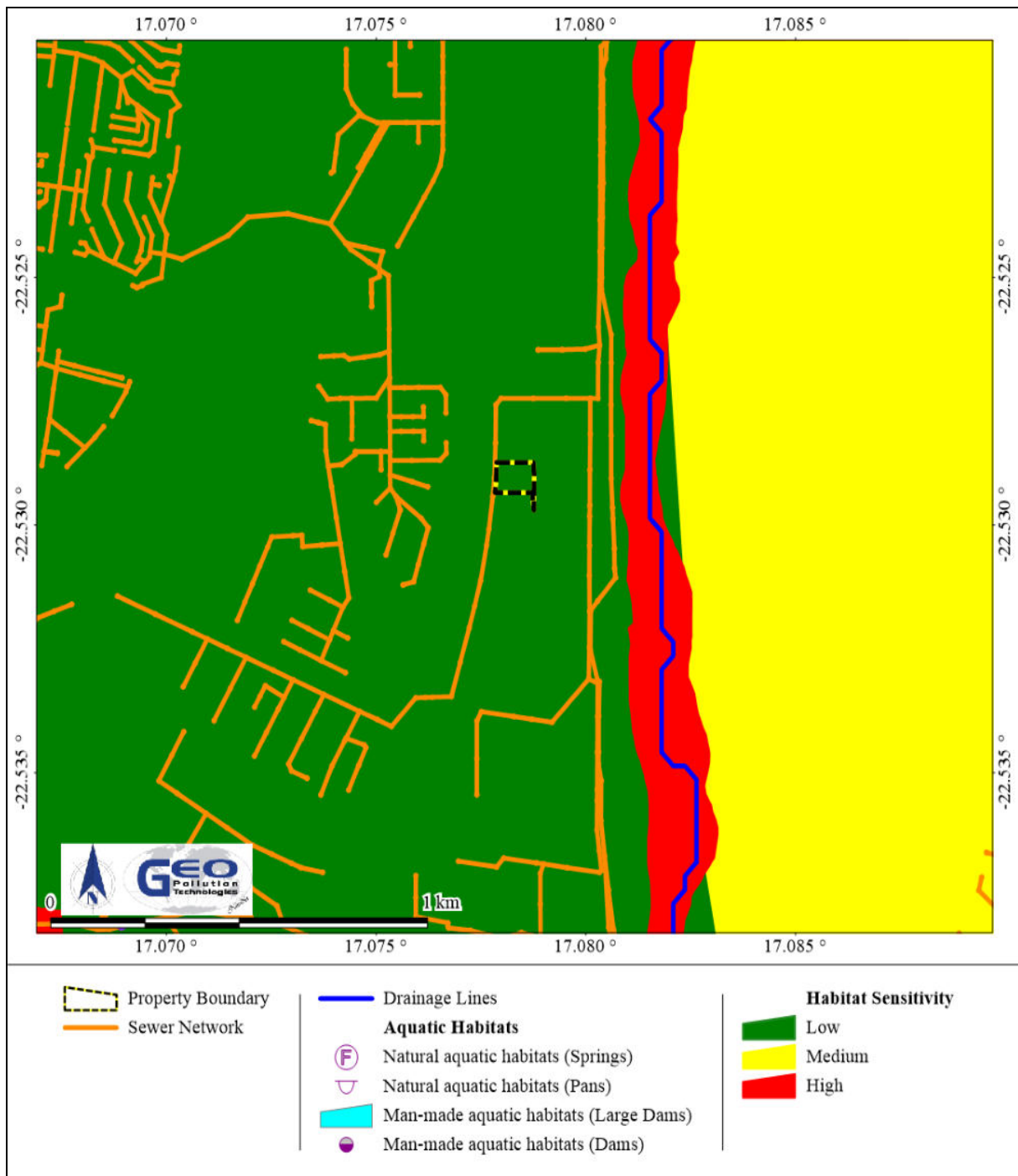


Figure 3-5 Ecological sensitivity of the project area

Implications and Impacts

The bulk fuel storage facility is located within an already disturbed urban area. Thus no immediate threat to biodiversity in the area is expected, however, uncontrolled pollution may and can cause damage to any biodiversity surrounding the site.

3.7 Demographic and Economic Characteristics

The project area falls within the Khomas Region and lies in Windhoek, the capital of Namibia. Windhoek is the largest town in Namibia with more than 300,000 people. It is the economic and business centre of the country. The Hosea Kutako International Airport situated east of Windhoek, links Windhoek with the rest of the world, while the B1, B2 and B6 highways links Windhoek to the rest of Namibia and southern Africa

Implications and Impacts

The facility provides employment to people from the area. Some skills development and training also benefit employees during the operational phase.

3.8 Cultural, Heritage and Archaeological Aspects

Within the industrial area there are no churches, mosques or related buildings and no known archaeological resources or other structures, sites or spheres of heritage of cultural significance.

Implications and Impacts

The facility will not impact on any cultural or historically significant areas or buildings.

4 OBJECTIVES OF THE EMP

The Proponent's environmental management plan (EMP) provides management options to ensure impacts of operations and potential maintenance (construction activities) are minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary. The EMP acts as a stand-alone document, which can be used during the various phases (planning, construction, operational and decommissioning) of any proposed activity or development. All contractors and sub-contractors taking part in the operations and site maintenance of this facility should be made aware of the contents of the EMP, so as to plan the relevant activities accordingly in an environmentally sound manner.

The objectives of the EMP are:

- ◆ to include all components of the various activities;
- ◆ to prescribe the best practicable control methods to lessen the environmental impacts associated with the operations and maintenance of the bulk fuel storage facility;
- ◆ to monitor and audit the performance of operational and maintenance personnel in applying such controls; and
- ◆ to ensure that appropriate environmental training is provided to responsible operational and maintenance personnel.

ENGEN Namibia implements an environmental management system based on the ISO 14001 standard. At the heart of an 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 elements:

- ◆ 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, lines of communication and resources needed to implement the EMS;
- ◆ Identification of environmental, safety and health training needs;
- ◆ An environmental program(s) stipulating environmental objectives and targets to be met, and work instructions and controls to be applied in order to achieve compliance with the environmental policy; and
- ◆ Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS.
- ◆ The EMP

5 THE IMPLEMENTATION OF THE EMP

Table 5-1 outline the management of the environmental elements that may be affected by the different activities, grouped in each phase of development. These groups are as follows:

- ◆ Planning phase
- ◆ Operational phase

- ◆ Maintenance phase
- ◆ Decommissioning phase

The EMP is a living document that must be prepared in detail, and regularly updated, by the Proponent as the project progress and evolve. The tables below act as a guideline for the EMP to be established by the Proponent. Impacts addressed and mitigation measures proposed are seen as minimum requirements which have to be elaborated on. Delegation of mitigation and reporting activities should be determined by the Proponent and included in the EMP.

All monitoring results must be reported on as indicated and submitted to the Ministry of Environment, Forestry and Tourism as per the conditions attached to the environmental clearance certificate. These are required for any future renewals of the environmental clearance certificate.

Table 5-1 Planning for operations, maintenance and future decommissioning of the project

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
Compliance	To comply with all legal requirements for the operations of the bulk fuel storage facility in Namibia.	Apply for or renew all necessary permits from the various ministries, local authorities and any other bodies that governs the bulk storage of fuel in Namibia. Finalise negotiations and resolve any outstanding issues, if any, over the allocation of user rights and zoning of the property on which the bulk fuel storage facility is located.	During normal ongoing operations as well as possible future decommissioning of the facility	All contracts, permits, certificates and other legal documents on file.	Proponent
Appointments	To appoint reputable contractors and operational personnel and establish the EMP, a legal requirement that forms part of the contract with the contractor and employees.	Appoint a contractor and employees and enter into an agreement which includes the EMP. Ensure that the contents of the EMP are understood by the contractor, sub-contractors, employees and all personnel who will be present on site.	During normal ongoing operations as well as possible future decommissioning of the facility	Contracts on file	Proponent; Contractor
Management	Establish a management system to implement and monitor Health, Safety and Environment.	Make provisions to have a Health, Safety and Environmental Coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site. Have the following emergency plans, equipment and personnel in place to deal with all emergencies: <ul style="list-style-type: none"> ● Risk management / Mitigation / EMP/ Emergency Response Plan and HSE Manuals ● Adequate protection and indemnity insurance cover for incidents; ● Comply with the provisions of all relevant safety standards; 	During normal ongoing operations as well as possible future decommissioning of the facility	Documentation on file Personal Protection Equipment (PPE) on site Signage related to restricted areas, dangerous areas, and PPE requirements on site Emergency response material on site	Proponent; Contractor

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
Restoration Fund/Insurance	To establish a fund/insurance for future environmental restoration or pollution remediation if ever required.	<ul style="list-style-type: none"> Procedures, equipment and materials required for emergencies. To establish a fund for future ecological restoration of the project site should project activities cease and the site is decommissioned and environmental restoration or pollution remediation is required.	During normal ongoing operations as well as possible future decommissioning of the facility	Financial statements of restoration fund/insurance	Proponent
Reporting	To establish a reporting system to report on monitoring aspects of construction, operation and decommissioning as outlined in the EMP.	Establish a reporting system to report on aspects of operations, maintenance and decommissioning as outlined in the EMP and prescribed by the environmental clearance certificate.	During normal ongoing operations as well as possible future decommissioning of the facility	Monitoring reports	Proponent; Contractor
Environmental Clearance Renewal	To renew the environmental clearance certificate every three years.	Appoint a specialist environmental consultant to update the EIA and EMP and apply for renewal of the environmental clearance certificate.	Prior to expiry of environmental clearance certificate	Renewed environmental clearance certificate	Proponent; Independent Specialist Consultant

Table 5-2 The operational phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Skills, Technology & Development	Enhanced skills and technology transfer to the Khomas region and subsequent promotion of economic development.	Training must be provided to Namibians to ultimately employ a predominantly Namibian workforce.	Copies of training or managerial references on file. Summary report based on actual training and the enhancement of skills and transfer of technology should be compiled.	Proponent
HIV/AIDS, In-migration, Informal Settlements and Property Prices	Increased spread of HIV/AIDS, increased influx to Windhoek. Increased informal settlements and associated problems with property prices.	Restricted employment for local people only should be practiced. Deviations from this practice should be justified appropriately. Educational programs on HIV/AIDS.	Summary report based on educational programmes and training conducted. Summary report and review of employee demographics.	Proponent
Employment	The facility plays an important role in providing employment to locals.	If skills exist locally Namibians must be employed. Alternatively training must be provided to Namibians to ultimately employ a predominantly Namibian workforce. Deviations from this practice should be justified appropriately.	Summary report based on employee records.	Proponent
Traffic	The bulk fuel storage facility is located within an industrial area. Movement of traffic to and from the site is assessed. Trucks must enter and leave the site for every loading and off-loading event. The distribution of fuel by truck from the bulk fuel storage facility will vary in intensity depending on demand. Limited parking for trucks exists in the streets leading to the entrances. Due to the nature of the neighbouring industries, trucks will frequent the areas around the bulk fuel storage facility.	Uploading of fuel is normally during working hours. However, allowing extended fuelling times after hours may reduce congestion. The Proponent together with the neighbouring industries may have to convene a meeting to discuss a workable solution should traffic congestion become a significant problem. Careful planning and scheduling of truck arrival for uploading events might be required. Furthermore: <ul style="list-style-type: none"> ● Trucks should not be allowed to park in the streets, outside the erven, for extended periods of time. ● Trucks are not allowed outside the depot earlier than one hour prior to the depot opening time, and should leave within an hour after depot closing time. 	A register of trucks arriving and leaving the premises must be kept. A report should be compiled of the daily number of trucks processed at the road gantries. Any complaints received regarding traffic issues should be recorded in the report and corrective action taken noted.	Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	<p>This may cause traffic disruptions, especially during times of increased fuel demand and when trucks are waiting in the street to gain access to the respective industries.</p>	<p>Proper signage to direct traffic should be in place.</p> <ul style="list-style-type: none"> A speed limit of 40 km/h is recommended for the industrial area. 		
<p>Fire and Explosion Hazard</p>	<p>Volatile fuels like unleaded petrol can release considerable vapour at temperatures even below ambient, which readily form flammable mixtures. Vapours settle to ground level and may reach, via drains and other underground passages, ignition sources remote from the point of release. Product can accumulate a static charge, which may cause a fire or explosion.</p> <p>Exposure of the product to the air or ground where it can be ignited could be as a result of the following incidents or actions at the points of receipt, storage and uploading :-</p> <p>Fuel receipt and loading (road and rail gantries):</p> <ul style="list-style-type: none"> Breakage of offloading pipe Coupling malfunction Containment insufficient Pump and pipeline failure Open electrical equipment or electrical installations Valve malfunction Gasket, valves or pump seal leaks Unauthorised entry of rail locomotive entering rail gantry Running of tanker truck engines at gantry (engine suck in fuel vapours, causing truck to misfire and create ignition source) 	<p>Fire Fighting and Fire Prevention:</p> <p>All fire precautions and fire control at the new site must be in accordance with SANS 10089, or better. Firefighting measures as per the Material Safety Data Sheets of the products should be adhered to.</p> <p>SANS 10089 is adopted by the Ministry of Mines and Energy as the national standard. The proposed facility exceeds the SANS safety distances. Safety distances given by SANS work on the premises that if the setting-out of the site and the safety distances to the nearest adjacent property are adhered to, then any development can be safely built on the neighbouring property. It is specifically appropriate to comply with these standards, as the Proponent would have no control on the future placement of facilities around the proposed facility.</p> <p>In addition to this, all personnel have to be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish, dry vegetation, and hydrocarbon-soaked soil from the vicinity of the installation. Regular inspections should be carried out to check for these materials at the site.</p> <p>It must be assured that sufficient water is available for firefighting purposes. The bulk fuel storage facility should ensure that the volume of water remains adequate for fire protection and is according to the SANS 10089 specifications.</p> <p>A holistic fire protection and prevention plan is needed. This plan must include an emergency response plan, firefighting plan and spill recovery plan for dealing with</p>	<p>A report should be compiled of all incidents reported. The report should contain dates when fire drills were conducted and when fire equipment was tested.</p>	<p>Proponent</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	<ul style="list-style-type: none"> ● Grounding and bonding cables defective ● Driving off with offloading pipe and earth cable connected ● Failure to stop pumps from gantry resulting in overfilling of tanks ● Pipe coupling/nozzle popping off tank nozzle ● Drain back facility coupling/nozzle popping out of tank inlet ● Not following procedures ● Working on under pressurised pipelines ● Cell phones and open flames ● Spilled product from leaking valves and nozzles ● Housekeeping ● Leaking tanks ● Leaking pipelines <p>Storage:</p> <ul style="list-style-type: none"> ● Not following procedures for correct storage ● Poor housekeeping (cleanliness and packing) ● Flammable organic material not removed (plants, paper & dirty rags) ● Heat exposure in sun ● Cell phones and open flames ● Reckless driving – infrastructure collision ● Overfilling storage tanks ● Broken or cracked bund walls leaking product to source of ignition off site ● Poorly sealed containment 	<p>Experience has shown that the best chance to rapidly put out a major fire is in the first 5 minutes. It is important to recognise that a responsive fire prevention plan does not solely include the availability of firefighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires. An integrated fire prevention plan should be drafted before “start-up” of the facilities. Special note must be taken of the regulations stipulated in sections 47 and 48 of the Petroleum Products and Energy Act, 1990 (Act No. 13 of 1990).</p>		

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p>Health, Safety & Security</p>	<p>During operational times, all procedures for offloading, storage and loading of fuels can pose a risk to people. These risks are assessed in terms of the predicted impact if they occur. Typical examples are:-</p> <ul style="list-style-type: none"> ● Tripping over an earthing cable ● Falling off the rail tanker or tanker truck ● Breathing in excessive fumes ● Slipping on wet surfaces ● Product contact with eyes and skin ● Staff not wearing protective clothing ● Muscular injury from incorrect lifting techniques ● Working at heights <p>Security risks associated with theft and sabotage.</p>	<p>All Health and Safety standards specified in the Labour Act should be complied with.</p> <p>All staff members to be briefed about the potential risks of exposure to hydrocarbons or injuries on site.</p> <p>Adhere to the following:</p> <ul style="list-style-type: none"> ● Health and Safety Regulations pertaining to personal protective clothing, first aid kits being available on site, warning signs, etc.; ● Selected personnel should be trained in first aid. The contact details of all emergency services must be readily available; ● Permit to work systems and security checks; ● Dermal contact with hydrocarbons must be avoided and all products handled according to their MSDS. 	<p>A report should be compiled of all incidents reported. The report should contain dates when training was conducted and when safety equipment and structures were inspected and maintained.</p>	<p>Proponent</p>
<p>Air Quality</p>	<p>Gases which are detrimental to living organisms are assessed under this section. Many petroleum products are volatile and vapours can accumulate in the environment.</p> <p>Hydrocarbon vapours will normally be released during loading and offloading procedures and if spills occur.</p>	<p>Fuel spills, especially ULP, will quickly vaporize and emissions will disperse quickly downwind and hydrocarbon gasses are heavier than air.</p> <p>Staff and clients should be kept away from areas where large spills occur, resulting in strong vapours, until the vapours have dispersed</p>	<p>Bi-annual testing of air at various points around the storage tanks, pipelines, immediate vicinity of the property and selected distances further away from outside of the property. More frequent testing should be received or if an increase in released gases is suspected.</p> <p>All data to be compiled in a report and reviewed by an independent specialist.</p>	<p>Proponent; Independent Specialist Consultant</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Noise	Noise pollution will exist due to heavy vehicles and trains accessing the site to transport fuel to and from the sites.	The depot is situated in an industrial area so there is no restriction on the times of operation. The Labour Act Health and Safety Regulations pertaining to noise and/or the City of Windhoek's Noise Control Regulations (General Notice No. 77 of 2006) should be adhered to.	Any complaints received regarding excessive noise should be recorded with notes on actions taken. All complaints and additional data, if available, to be compiled in a report.	Proponent
Waste Production	The ability of a product to act as a waste which must be cleaned up. These can be soils that become contaminated with fuel. Domestic waste from bins, offices and ablution facilities. Contamination of fuel through accidental mixing of products results in waste.	Consult the relevant MSDS for handling hazardous substances. Contaminated fuel products that can no longer be used in the market must be transferred to waste oil recycling facilities where possible or disposed of in the hazardous waste section of the municipal dump at Windhoek. Oil-Water Separators must regularly be cleaned. For effluent discharge, the Windhoek Municipality must be consulted to obtain the latest regulations pertaining to allowable sewage input. Contaminated soils can be remediated in accordance with accepted procedures at a site dedicated for this purpose. All other domestic waste should be disposed of regularly.	A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility. Any complaints received regarding waste should be recorded with notes on action taken. All data to be compiled in a report.	Proponent
Groundwater, Surface Water and Soil Contamination	Porous surface substrate can allow hazardous and ecologically detrimental substances to seep down to the water table. Surface runoff from the site could be expected due to heavy rainfall. Runoff of pollutants from the tanks is not expected to reach any nearby surface water due to the bund walls and the design of the facility. Proper containment mechanisms installed should confine any release that might take place from spillages during	The following measures must be employed to prevent spillage into surface water drainage channels and groundwater sources:- <ul style="list-style-type: none"> ● Spill control structures and procedures must be in place according to SANS 10089 standards or better, including impounding around the loading areas by bunding with appropriate slopes of 1:100. ● All fuelling should be carried out on surfaces provided for this purpose. E.g. Concrete slabs with regularly maintained seals between slabs. ● The procedures followed to prevent environmental damage during service and maintenance, and compliance with these procedures, including the correct use of sumps and regular reporting of 	A report should be compiled of all spills or leakages reported. The report should contain the following information: <ul style="list-style-type: none"> ● date and duration of spill ● product spilled ● volume of spill ● remedial action taken ● Comparison of pre-exposure baseline data with post remediation data (e.g. soil 	Proponent, Independent Specialist Consultant

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	<p>operation of the facility.</p>	<p>spillages, must be audited and corrections made where necessary.</p> <ul style="list-style-type: none"> • Proper training of operators must be conducted on a regular basis. • Any spillage of more than 200 l must be reported as per the Petroleum Products License. • Spill clean-up kit must be available on site as per the relevant Material Safety Data Sheets • Proper bund areas at the rail gantry right up to the exit gate will ensure that any product leaked on the premises is collected. • Contingencies for the changes in pressure and temperature between Walvis Bay, where fuel is loaded, and Windhoek must be in place. Overfilling of the tanks in Walvis Bay can cause product loss on route as release valves compensate for volume changes due to lower pressure and higher temperatures at the destination. Rail tankers arriving in the morning could release liquid fuel as temperatures rise. If these tankers are not positioned over bunded areas, soil contamination will occur. During the rainy season, this fuel can be carried away to nearby drainage systems or infiltration towards the water table can ensue. • Regular groundwater monitoring for the presence of hydrocarbons. 	<p>hydrocarbon concentrations)</p> <ul style="list-style-type: none"> • Copy of documentation in which spill was reported to Ministry of Mines and Energy <p>Monitoring holes for groundwater monitoring should be deepened to groundwater depth and bi-annual testing of groundwater for hydrocarbons at various points around the storage tanks and pipelines. More frequent testing should a leak be suspected.</p> <p>All data to be compiled in a report and reviewed by an independent specialist.</p>	
<p>Visual Impact</p>	<p>This is an impact that affects the aesthetic appearance.</p> <p>If properly maintained, the infrastructure will not have a significant effect on the visual horizon as it will be similar to the other structures in the industrial area.</p>	<p>No specific measures need to be implemented to maintain a similar visual impact to other industrial buildings. Routine maintenance on infrastructure will ensure that the longevity of structures is maximised. However, it is important that the real integrity of the structures is considered in the long term and not just appearances.</p>	<p>A report should be compiled every of all complaints reported and remediation action taken.</p>	<p>Proponent</p>
<p>Cumulative Impact</p>	<p>Possible cumulative impacts associated with the operational phase include increase in traffic frequenting the site</p>	<p>Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.</p>	<p>Summary reports based on all other impacts must be assessed to gain an overall</p>	<p>Proponent</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	<p>and along the section of road near the fuel depot due to the number of bulk fuel storage facilities in the area. This will have a cumulative traffic congestion, road wear and tear and noise.</p>	<p>Mitigation Reviewing biannual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts and help in planning, if the existing mitigations are insufficient.</p>	<p>Monitoring assessment of the impact of the operational phase.</p>	

Table 5-3 Maintenance (construction) phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Enhanced skills and technology to transfer to Windhoek and subsequent promotion of economic development	People need skills to perform their jobs. The technology to do something is often not found locally. Development of people and technology are key to economic development.	Training must be provided to Namibians to ultimately employ a predominantly Namibian workforce. Trained personnel to be issued with training certificates or managerial reference letters.	Copies of training or managerial certification or references on file. Summary report based on actual training and the enhancement of skills and transfer of technology should be compiled.	Proponent; Directors & Public Relations personnel.
Increased spread of HIV/AIDS; Increased influx to Windhoek; Increased informal settlement and associated problems; Reduced property values	New and existing developments attract people who seek work. This in turn can increase the extent of informal settlements and its associated problems. The increased trucking and distribution of goods from Windhoek could contribute to the spread of HIV / AIDS.	Restricted employment for local people only should be practiced. Deviations from this practice should be justified appropriately. Educational programs on HIV/AIDS.	Summary report based on educational programmes and training conducted. Report and review of employee demographics.	Proponent; Directors & Public Relations Personnel.
Employment	The construction industry plays an important role in providing employment to locals.	If skills exist locally Namibians must be employed. Alternatively training must be provided to Namibians to ultimately employ a predominantly Namibian workforce. Deviations from this practice should be justified appropriately.	Summary report based on employee records.	Proponent; Directors & Public Relations Personnel.
Traffic	The sites are located within the town's industrial area. Maintenance and construction activities are expected to have some impact on the movement of traffic to the site when construction material and equipment must be transported to the site. Cranes and flatbed trucks may frequent the site.	At the tank farms, diversion of traffic may be required when cranes and flatbed truck vehicles frequent the site when installing the fuel tanks. Should road closure occur, the contractor must liaise with neighbours who might be impacted. The contractor must also liaise with the relevant traffic department to ensure that traffic flow along the affected route is minimally disrupted. Alternative roads should be clearly indicated with signs	Visual observation of impacts on traffic should be made. Any traffic complaints received must be taken up with the relevant authorities and discussed with the Proponent. All information and reporting	Contractor, Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p>Fire</p>	<p>Flammable products like fuel, lubricants, paints used during construction pose a risk of fire and explosion through improper handling.</p>	<p>and/or personnel directing traffic.</p> <p>All equipment and tools must comply with standards which allow certain tools and equipment near flammable sources. Safety distances must be adhered to as well as safe work procedures. Safety talks and job hazard analysis to be done before work starts.</p> <p>Firefighting measures as per the Material Safety Data Sheets of the product should be adhered to.</p> <p>In addition to this, all personnel have to be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish, dry vegetation, and hydrocarbon-soaked soil from the vicinity of the construction. Regular inspections should be carried out to check for these materials at the site.</p> <p>All fuel storage and handling facilities in Namibia must comply with strict safety distances as prescribed by SANS. SANS is adopted by the Ministry of Mines and Energy as the national standard. If the setting-out of the site and the safety distances to the nearest adjacent property were adhered to, then any development can be safely built on the neighbouring property.</p> <p>It must be assured that sufficient firefighting resources are available. A holistic fire protection and prevention plan is needed. This holistic plan must include an emergency response plan and firefighting plan. Regular surveys of the fire-fighting equipment and water supply should be carried out.</p> <p>Experience has shown that the best chance to rapidly put out a major fire is in the first 5 minutes. It is important to recognise that a responsive fire prevention plan does not solely include the availability of fire fighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires. An integrated fire prevention plan should be drafted before construction commences.</p>	<p>to be included in a report.</p> <p>Supervision of work is required and reports of safe and unsafe practice to be brought to the attention of the HSE & SM.</p> <p>Any incidents reported must be recorded together with steps taken to mitigate the impacts.</p> <p>All information and reporting to be included in a report.</p>	<p>Contractor, Proponent</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p>Health, Safety and Security</p>	<p>During maintenance and construction phases contractors access the sites. Different excavation, earthmoving and transport equipment will be onsite. This increases the possibility of injuries. A high risk to site security and personnel health and safety exists during this period.</p>	<p>All Health and Safety standards specified in the Labour Act should be complied with. The responsible contractor must ensure that all staff members are briefed about the potential risks of injuries on site.</p> <p>The contractor should be obliged to adhere to the following:</p> <ul style="list-style-type: none"> ● Adhere to Health and Safety Regulations pertaining to personal protective clothing, first aid kits, warning signs, etc.; ● Ensure that adequate emergency facilities, including first aid kits, are available on site; ● In consultation with the Windhoek Traffic Department, devise and submit a traffic management programme for sections of the roads to be closed or traffic diverted if necessary during the delivery of equipment and excavation of pipeline trenches; ● The contractor must use local media to make the public aware of construction activities that may pose safety risks; ● Proper barricades and signage must be in place to warn and direct pedestrian and vehicle traffic away from construction sites; ● Equipment that must be locked away on site and must be placed in a way that does not encourage criminal activities; ● Induction training for all who enter the site is required; and ● Security personnel to prevent unauthorised entry of the construction site <p>Refer to Emergency Response Guidebook 2008 and associated SANS document, MSDS and management system manuals.</p>	<p>Inventory of necessary information and administrative documentation to be kept.</p> <p>Any incidents must be recorded with action taken to prevent future occurrences.</p> <p>A report should be compiled of all incidents reported. The report should contain dates when training were conducted and when safety equipment and structures were inspected and maintained.</p>	<p>Contractor, Proponent</p>
<p>Underground Utilities</p>	<p>Maintenance and construction may include excavations. Underground utilities like telecommunications, water supply and sewers are at risk of being</p>	<p>Appointing qualified and reputable contractors is essential. Proper training of construction personnel would reduce the possibility of the impact occurring.</p>	<p>Maps and location information of existing underground amenities on file.</p>	<p>Contractor, Proponent</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	<p>damaged.</p> <p>These impacts may result in sections of Windhoek being left without amenities.</p>	<p>The contractor must determine exactly where amenities and pipelines are situated before construction commences, e.g. ground penetrating radar surveys or similar to reduce the risk. Liaison with the Municipality and suppliers of services is essential.</p> <p>Emergency procedures and contact details of emergency response teams for dealing with the possible consequences of this impact must be in place before construction commences.</p>	<p>A register of all incidents must be maintained. This should include measures taken to ensure that such incidents are not repeated.</p> <p>All information and reporting to be included in a report.</p>	
Dust	<p>Dust may be generated during the maintenance and construction activities. This might be aggravated during periods of strong winds.</p> <p>The dust impact would thus be limited to periods of strong winds when larger sand particles can be transported.</p>	<p>It is recommended that regular dust suppression be included during construction when dust becomes an issue. Personnel are to be issued with dust masks for health reasons when needed.</p>	<p>Regular visual inspection.</p> <p>A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.</p> <p>All information and reporting to be included in a report.</p>	Contractor, Proponent
Noise	<p>Noise pollution will exist due to heavy vehicles accessing the sites with maintenance and construction materials. Cement mixing, drilling and excavating may be some additional noise producing activities.</p>	<p>The depot is situated in an industrial area so there is no restriction on the times of operation. Adhere to the Labour Act Health and Safety Regulations pertaining to noise and/or the City of Windhoek's Noise Control Regulations (General Notice No. 77 of 2006).</p>	<p>A complaints register must be maintained in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.</p> <p>All information and reporting to be included in a report.</p>	Contractor, Proponent
Waste Production	<p>The ability of products and building rubble to act as a waste which must be cleaned up or removed off-site.</p> <p>Maintenance and construction activities will produce waste in the form of domestic waste, building rubble or any</p>	<p>Due to the nature of some hazardous materials, they should be disposed of in an appropriate way at an appropriately classified waste disposal facility e.g. asbestos containing material. See the Material Safety Data Sheets available from suppliers if the user is not sure how to dispose of the substance. Liaise with the municipality regarding waste</p>	<p>A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility.</p> <p>Any complaints received</p>	Contractor, Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	<p>other waste as a result of spillage or leakage from cleaning and painting materials.</p>	<p>and appropriate handling of hazardous waste. Temporary waste disposal facilities should be present on site. This should include separate containers for products that can be re-used or recycled. Removal of waste should be at regular (weekly) intervals, or sooner if necessary, to maintain visual orderliness, but more so to not give time for liquid waste to enter the soil substrate. Dry waste is at risk of increasing the dust / litter impact so should be removed regularly.</p>	<p>regarding waste should be recorded with notes on action taken. All information and reporting to be included in a report.</p>	
<p>Groundwater / Surface Water Contamination</p>	<p>Porous surface substrate can allow hazardous and ecologically detrimental substances to seep down to the water table either at the location of the spillage or after being washed away by surface flow. Leakages from construction vehicles, accidental spills of fuel, paints and other chemicals might occur. Groundwater might spread pollutants to neighbouring receptors and may create an impact on underground infrastructure.</p>	<p>All precautions are to be taken to prevent contamination of the soil as this could enter the ecosystem. Appointing qualified and reputable contractors is essential. Proper training of construction personnel would reduce the possibility of the impact occurring. Any spill of fuel of 200 l or more must be reported and remediation must take place as soon as possible. Polluted soil and building rubble must be transported away from the site to an approved, appropriately classified waste disposal site. Hydrocarbon polluted soil may be remediated. Confirm MSDS information for any fuels, oils, lubricants or chemicals that must be discarded.</p>	<p>A report form for all spills or leaks during construction is to be completed by Contractor and submitted to the Proponent. All information and reporting to be included in a report.</p>	<p>Contractor, Proponent, Independent Specialist Consultant</p>
<p>Heritage Impact</p>	<p>Protection of cultural resources falls under the National Heritage Act (Act 27 of 2004).</p>	<p>If any archaeological remains such as treasures, accumulations of bones or shells and ash dumps are uncovered at any stage, the contractor shall stop work immediately and contact the relevant authorities. If human remains or burial sites are uncovered, the matter has to be immediately reported to the nearest Namibian Police Office. No work may continue at the site until the relevant authority has issued permission to do so.</p>	<p>Record of any discoveries and proof of notifications to authorities on file. All information and reporting to be included in a report.</p>	<p>Contractor; Proponent</p>

<p>Criteria Cumulative Impact</p>	<p>Nature Possible cumulative impacts associated with the construction phase include increase in traffic frequenting the site. This impact will however be short lived. This will also aggravate noise levels when combined with the noise generated by construction. Construction sites tend to draw people looking for employment. Increased traffic together with increased movement of people around the constructions site may lead to amplified health and safety risks.</p>	<p>Mitigation Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.</p>	<p>Monitoring Summary reports on all other impacts must be assessed to gain an overall assessment of the impact of the construction phase.</p>	<p>Responsible Body Contractor; Proponent</p>
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Table 5-4 Decommissioning phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Waste Production	<p>The ability of product to act as a waste which must be cleaned up.</p> <p>Upon decommissioning waste will be produced in the form of building rubble, obsolete equipment and structures, obsolete or residual products and equipment or structures that can be used elsewhere or sold as scrap.</p>	<p>To reduce the amount of waste all re-usable pipelines, pumps, tanks, valves and other equipment must be removed to another site owned by ENGEN Namibia or sold.</p> <p>Those items that cannot be used again must be scrapped in the appropriate manner.</p> <p>Upon demolition of the buildings and concrete the rubble must be removed from the property and taken to an approved dumpsite designated by the Windhoek Municipality.</p> <p>Rehabilitation if necessary are to be done using funds designated for the purpose.</p>	<p>Regular visual inspection.</p> <p>A register of waste produced and disposal methods should be maintained.</p>	Proponent; Contractor
Ecological Impact	<p>Operations spanning many years may create new habitat for fauna and flora.</p> <p>Upon decommissioning these habitats will be destroyed.</p>	<p>ENGEN Namibia would have to ensure that no new habitat is created for flora and fauna. Before decommissioning the HSE would need to inspect every structural facility to ensure that the dismantling and removal of any structure would not affect any organism that has become dependent on those structures for survival, shelter or breeding.</p> <p>Where new habitats were created, that is now occupied by fauna or flora, ENGEN Namibia must contact Ministry of Environment, Forestry and Tourism or other appropriate organizations to establish the conservation status of it.</p> <p>The possibility of relocating the fauna or flora must be investigated and executed. Should the species be listed as vulnerable to extinction, or worse, a meeting should be held with Ministry of Environment, Forestry and Tourism in order to determine the appropriate handling of the situation.</p>	<p>A report should be compiled of any fauna and flora that established itself on the premises. The report should include all actions taken to relocate or deal with the situation.</p>	Proponent; Contractor
Employment & Secure Fuel Supply	<p>Decommissioning of the bulk fuel storage facility may lead to retrenchments or re-location of staff no longer required.</p> <p>Fuel supply to the region may be negatively influenced if alternative bulk fuel storage facilities cannot handle the demand.</p>	<p>Plan in advance for meeting the Labour Acts requirements for retrenching of staff if required.</p> <p>Where possible staff can be relocated to another facility or town where business continues in the same way.</p> <p>Alternative fuel companies must be informed of the decommissioning plans to allow them to adequately plan for</p>	<p>During normal operations of the depot a summary report must be compiled that includes the appropriate plans for handling of employees should the depot be decommissioned. The report should include</p>	Proponent; Directors & Public Relations personnel or Human Resource Department.

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Dust	Dust will be generated during the decommissioning phase and might be aggravated during periods of strong winds.	It is recommended that regular dust suppression be included in the decommissioning phase, when dust becomes an issue. Personnel should be issued with dust masks for health and safety reasons. Accumulation of rubble should not be allowed and must be taken to the dumpsite within reasonable time.	Regular visual inspection. A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.	Proponent; Contractor
Noise	Noise pollution will exist due to heavy vehicles accessing the site to collect rubble from demolished building materials. Cranes may be erected for removing the huge storage tanks. Hammers, diggers and drills will be used.	The depot is situated in an industrial area so there is no restriction on the times of operation. Adhere to the Labour Act Health and Safety Regulations pertaining to noise and/or the City of Windhoek's Noise Control Regulations (General Notice No. 77 of 2006). During decommissioning noise levels might be higher. This will however be short lived. All personnel must be issued with hearing protectors and neighbours must be notified of the time and duration of decommissioning. Notice of the start of the decommissioning should be given to the local authorities with an invitation to give feedback at any time with regards the noise impact.	A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.	Proponent; Contractor
Visual Impact	This is an impact that affects the aesthetic appearance	Visual impact could pose one of the most significant impacts. Visual impacts could be limited through keeping all decommissioned areas clean and orderly at all times. Good housekeeping also reduces the risk of injuries. Notice of the start of the decommissioning should be given to the local authorities with an invitation to give feedback at any	A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if	Proponent; Contractor

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Groundwater, Surface Water and Soil Contamination	Porous surface substrate can allow unwanted hazardous and ecologically detrimental substances to seep down to the water table.	<p>time with regards the visual impact.</p> <p>All precautions are to be taken to prevent contamination of the soil as this could enter the ecosystem. Leakages from vehicles might occur especially if they are serviced on site. Care must be taken to avoid contamination of soil and groundwater. Groundwater might spread pollutants to neighbouring receptors and may create an impact on underground utilities (i.e. fresh water supply to buildings, sewerage system). Pollutants in the soil and building rubble must be transported away from the site to an approved, appropriately classified waste disposal site.</p> <p>Confirm MSDS information for any remaining fuels, oils or lubricants that must be discarded.</p> <p>Regulations on sewerage discharge and the chemicals that may and may not be put into the sewerage system must be followed.</p>	<p>appropriate, acted upon.</p> <p>Report form for all spills or leaks is to be completed by Contractor for ENGEN Namibia and submitted to the HSE.</p> <p>A baseline study must be carried out after the decommissioning. This is to assess the condition of soil substrate and any groundwater present. Comparisons with pre-construction baseline data is to be made and any discrepancies must be addressed before the site can be signed over.</p>	Proponent; Contractor
Health, Safety and Security	During the decommissioning phase similar risks to human beings as with previous phases will be present. Once the tanks and pipelines have been emptied completely of their contents residual amounts of fuel might exist. All other risks associated with demolitions must be considered.	<p>The decommissioning of a bulk fuel storage facility can cause serious health and safety risks to workers on site. Occupational exposures are normally related to dermal contact with fuels and inhalation of fuel vapours during handling of such products. For this reason adequate measures must be brought in place to ensure safety of staff on site, and includes: (Provide forms for all end users who monitor)</p> <ul style="list-style-type: none"> ● Proper training of operators; ● First aid treatment; ● Medical assistance; ● Emergency treatment; ● Prevention of inhalation of fumes (fuel); ● Protective clothing, footwear, gloves and belts; safety goggles and shields; ● Manuals and training regarding the correct handling of materials and packages should be in place and updated as new or updated MSDS' become available; Risks might be lower but still exist especially if tanks must be 	<p>A register of all incidents must be maintained. This should include measures taken to ensure that such incidents do not repeat it self.</p>	Proponent; Contractor

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Fire and Explosion Hazard	Residual hydrocarbons could be present and might pose a risk to the teams dismantling the various structures. Fire and/or explosion events are still possible.	<p>entered for inspections. Confined Space Training will be required.</p> <ul style="list-style-type: none"> 24-hour security surveillance in case of opportunistic activities. <p>Various international occupational health and safety performances should be consulted for specific regulations regarding the decommissioning of the facility to ensure all risks are mitigated. All relevant regulations and precautions should be in place as it was during the operational phase. In addition to this, all personnel have to be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish, dry vegetation, and hydrocarbon-soaked soil from the vicinity of the fuel storage facility. Regular inspections should still be carried out to inspect and test fire fighting equipment and pollution control materials at the fuel storage facility. All fire precautions and fire control at the fuel storage facility must be in accordance with SANS, or better. The holistic fire protection and prevention plan should still be utilised. Experience has shown that the best chance to rapidly put out a major fire is in the first 5 minutes. It is important to recognise that a responsive fire prevention plan does not solely include the availability of fire fighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires.</p>	A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that such incidents do not repeat it self.	Proponent; Contractor

6 CONCLUSIONS

The above EMP, if properly implemented, will help minimise adverse impacts on the environment. Where impacts occur, immediate action must be taken to reduce the escalation of effects associated with these impacts. To ensure the relevance of this document to the specific stage of project, it needs to be reviewed throughout all phases.

The EMP should be used as an on-site reference document during all phases of the proposed project, and auditing should take place in order to determine compliance with the EMP for the proposed site, and Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken.

Monitoring reports must be kept on file and submitted to the Ministry of Environment, Forestry and Tourism to allow for future environmental clearance certificate renewal applications.

7 REFERENCES

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