OPERATIONS OF THE EXISTING NAMIBIA BREWERIES LIMITED CONSUMER FUEL INSTALLATION IN WINDHOEK

ENVIRONMENTAL ASSESSMENT SCOPING REPORT

Assessed by: **Assessed for:** **Client:**

October 2020

Project:	**OPERATIONS OF THE EXISTING NAMIBIA BREWERIES LIMITED CONSUMER FUEL INSTALLATION IN WINDHOEK: ENVIRONMENTAL ASSESSMENT SCOPING REPORT**	
Report: Version/Date:	Final October 2020	
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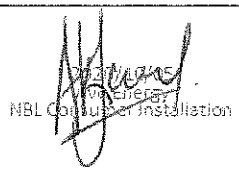
Report Approval	 **André Faul** Environmental Assessment Practitioner	

I EDWARD WALUGEMBE acting on behalf of Vivo Energy Namibia Ltd hereby approve this report and confirm that the project description contained in herein is a true reflection of the information which the proponent has 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.

Signed at Windhoek on the 16 day of October 2020.

Vivo Energy Namibia Ltd

F/75/14 (1214315)
Company Registration / ID

EXECUTIVE SUMMARY

Vivo Energy Namibia Ltd requested Geo Pollution Technologies (Pty) Ltd to undertake an environmental assessment for the operations of an **existing** consumer fuel installation, for heavy fuel oil, situated on erf 7444, within the Northern Industrial Area of Windhoek. The consumer installation forms part of the support infrastructure of Namibia Breweries Limited. Operations of the consumer fuel installation include filling of the above ground storage tanks from road transport tankers; dispensing of fuel to boilers; and general operational activities and maintenance procedures associated with a consumer fuel installation.

The environmental assessment is conducted to determine all environmental, safety, health and socio-economic impacts associated with the operations of the facility. Relevant environmental data was compiled by making use of secondary data and from a reconnaissance site visit. Potential environmental impacts and associated social impacts were identified and are addressed in this report.

The facility is surrounded by industrial type businesses, some with their own consumer fuel installations. Due to the nature and location of the facility, limited impacts can be expected on the surrounding environment, see summary impacts table below. It is however recommended that environmental performance be monitored regularly to ensure regulatory compliance and that corrective measures be taken if necessary.

The major concerns related to the operations of the facility are that of potential groundwater, surface water and soil contamination and the possibility of fire. These will however be limited by adherence to South African National Standards and Material Safety Data Sheet instructions. Furthermore, noise levels should meet the minimum requirements of the City of Windhoek to prevent nuisance and hearing loss. By appointing local contractors and employees and implementing educational programs the positive socio-economic impacts can be maximised while mitigating any negative impacts.

The environmental management plan included in Section 9 of this document should be used as an on-site reference document during all phases (planning, construction (care and maintenance), operations and decommissioning) of the facility. All monitoring and records kept should be included in a report to ensure compliance with the environmental management plan. Parties responsible for transgression of the environmental management plan should be held responsible for any rehabilitation that may need to be undertaken. A Health, Safety, Environment and Quality policy as well as Environmental Policy could be used in conjunction with the environmental management plan. Operators and responsible personnel must be taught the contents of these documents. Municipal or national regulations and guidelines must be adhered to and monitored regularly as outlined in the environmental management plan.

Impact Summary Class Values

Impact Category	Impact Type	Construction	Operations
	Positive Rating Scale: Maximum Value	5	5
	Negative Rating Scale: Maximum Value	-5	-5
EO	Skills, Technology and Development	2	2
EO	Revenue Generation and Employment	2	3
SC	Demographic Profile and Community Health	-1	-2
EO	Fuel Supply		3
SC	Traffic	-1	-1
SC	Health, Safety and Security	-2	-2
PC	Fire	-2	-3
PC	Air Quality	-1	-1
PC	Noise	-1	-1
PC	Waste Production	-2	-2
BE	Ecosystem and Biodiversity Impact	-1	-1
PC	Groundwater, Surface Water and Soil Contamination	-2	-2
SC	Visual Impact	-1	-1
	Cumulative Impact		-3

BE = Biological/Ecological EO = Economical/Operational PC = Physical/Chemical SC = Sociological/Cultural

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BE	Biological/Ecological
DWA	Department of Water Affairs
DEA	Directorate of Environmental Affairs
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMA	Environmental Management Act No 7 of 2007
EMP	Environmental Management Plan
EMS	Environmental Management System
EO	Economic/Operational
ES	Environmental Classification
GPT	Geo Pollution Technologies
HIV	Human Immunodeficiency Virus
IAPs	Interested and Affected Parties
IUCN	International Union for Conservation of Nature
m/s	Meter per second
MET	Ministry of Environment and Tourism
mm/a	Millimetres per annum
MSDS	Material Safety Data Sheet
PC	Physical/Chemical
PPE	Personal Protective Equipment
ppm	Parts per million
SANS	South African National Standards
SC	Sociological/Cultural
UNCCD	United Nations Convention to Combat Desertification
ULP	Unleaded Petrol
WHO	World Health Organization

GLOSSARY OF TERMS

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

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

Competent Authority - means a body or person empowered under the local authorities act or Environmental Management Act to enforce the rule of law.

Construction - means the building, erection or modification of a facility, structure or infrastructure that is necessary for the undertaking of an activity, including the modification, alteration, upgrading or decommissioning of such facility, structure or infrastructure.

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

Environment - As defined in the Environmental Assessment Policy and Environmental Management Act - "land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, palaeontological or social values".

Environmental Impact Assessment (EIA) - process of assessment of the effects of a development on the environment.

Environmental Management Plan (EMP) - A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.

Environmental Management System (EMS) - An Environment Management System, or EMS, is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of business management. An EMS ensures environmental considerations are a priority, along with other concerns such as costs, product quality, investments, PR productivity and strategic planning. An EMS generally makes a positive impact on a company's bottom line. It increases efficiency and focuses on customer needs and marketplace conditions, improving both the company's financial and environmental performance. By using an EMS to convert environmental problems into commercial opportunities, companies usually become more competitive.

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

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

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

Mitigate - The implementation of practical measures to reduce adverse impacts.

Proponent (Applicant) - Any person who has submitted or intends to submit an application for an authorisation, as legislated by the Environmental Management Act no. 7 of 2007, to undertake an

activity or activities identified as a listed activity or listed activities; or in any other notice published by the Minister or Ministry of Environment & Tourism.

Public - Citizens who have diverse cultural, educational, political and socio-economic characteristics. The public is not a homogeneous and unified group of people with a set of agreed common interests and aims. There is no single public. There are a number of publics, some of whom may emerge at any time during the process depending on their particular concerns and the issues involved.

Scoping Process - process of identifying: issues that will be relevant for consideration of the application; the potential environmental impacts of the proposed activity; and alternatives to the proposed activity that are feasible and reasonable.

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

Stakeholder Engagement - The process of engagement between stakeholders (the proponent, authorities and IAPs) during the planning, assessment, implementation and/or management of proposals or activities. The level of stakeholder engagement varies depending on the nature of the proposal or activity as well as the level of commitment by stakeholders to the process. Stakeholder engagement can therefore be described by a spectrum or continuum of increasing levels of engagement in the decision-making process. The term is considered to be more appropriate than the term "public participation".

Stakeholders - A sub-group of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term therefore includes the proponent, authorities (both the lead authority and other authorities) and all interested and affected parties (IAPs). The principle that environmental consultants and stakeholder engagement practitioners should be independent and unbiased excludes these groups from being considered stakeholders.

Sustainable Development - "Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs and aspirations" – the definition of the World Commission on Environment and Development (1987). "Improving the quality of human life while living within the carrying capacity of supporting ecosystems" – the definition given in a publication called "Caring for the Earth: A Strategy for Sustainable Living" by the International Union for Conservation of Nature (IUCN), the United Nations Environment Programme and the World Wide Fund for Nature (1991).

1 BACKGROUND AND INTRODUCTION

Geo Pollution Technologies (Pty) Ltd was appointed by Vivo Energy Namibia Ltd (the proponent) to undertake an environmental scoping assessment for the operations and possible future decommissioning of an existing consumer fuel installation operated by Namibia Breweries Limited, on erf 7444, Northern Industrial, Windhoek (Figure 1). The consumer installation is mainly used to supply three boilers with heavy fuel oil (HFO) as part of the operational procedures of the Namibia Breweries Limited factory. In general, operations of the consumer fuel installation involve:

- Filling of the storage tanks with HFO from road transport tankers;
- Dispensing of fuel to boilers;
- General operational activities and maintenance procedures associated with the consumer fuel installation.

A risk assessment was undertaken to determine the potential impact of the operational and possible decommissioning phases of the project on the environment. The environment being defined in the Environmental Assessment Policy and Environmental Management Act as "land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, paleontological or social values".

The environmental assessment was conducted to apply for an environmental clearance certificate in compliance with Namibia's Environmental Management Act (Act No 7 of 2007).

Project Justification – Windhoek is the capital and main hub for commerce and industry in Namibia. A secure and reliable supply of fuel is essential to support these sectors. The operations of the consumer fuel installation contributes to the effective day to day operations of Namibia Breweries, who plays a major role in the production and export of beverages in Namibia.

Benefits of the consumer fuel installation include:

- Reliable and easily accessible supply of HFO for boiler operations at Namibia Breweries.
- Indirect employment and economic benefits as a result of the continued effective business activities of Namibia Breweries.
- Indirect support for potential additional investments and development in the town and country as a whole.

2 SCOPE

The scope of the environmental scoping assessment is to:

1. Determine the potential environmental impacts emanating from the operational and possible decommissioning activities of the consumer fuel installation,
2. Identify a range of management actions which could mitigate the potential adverse impacts to acceptable levels,
3. Comply with Namibia's Environmental Management Act (2007),
4. Provide sufficient information to the Ministry of Environment and Tourism to make an informed decision regarding the operations and possible decommissioning of the facility.

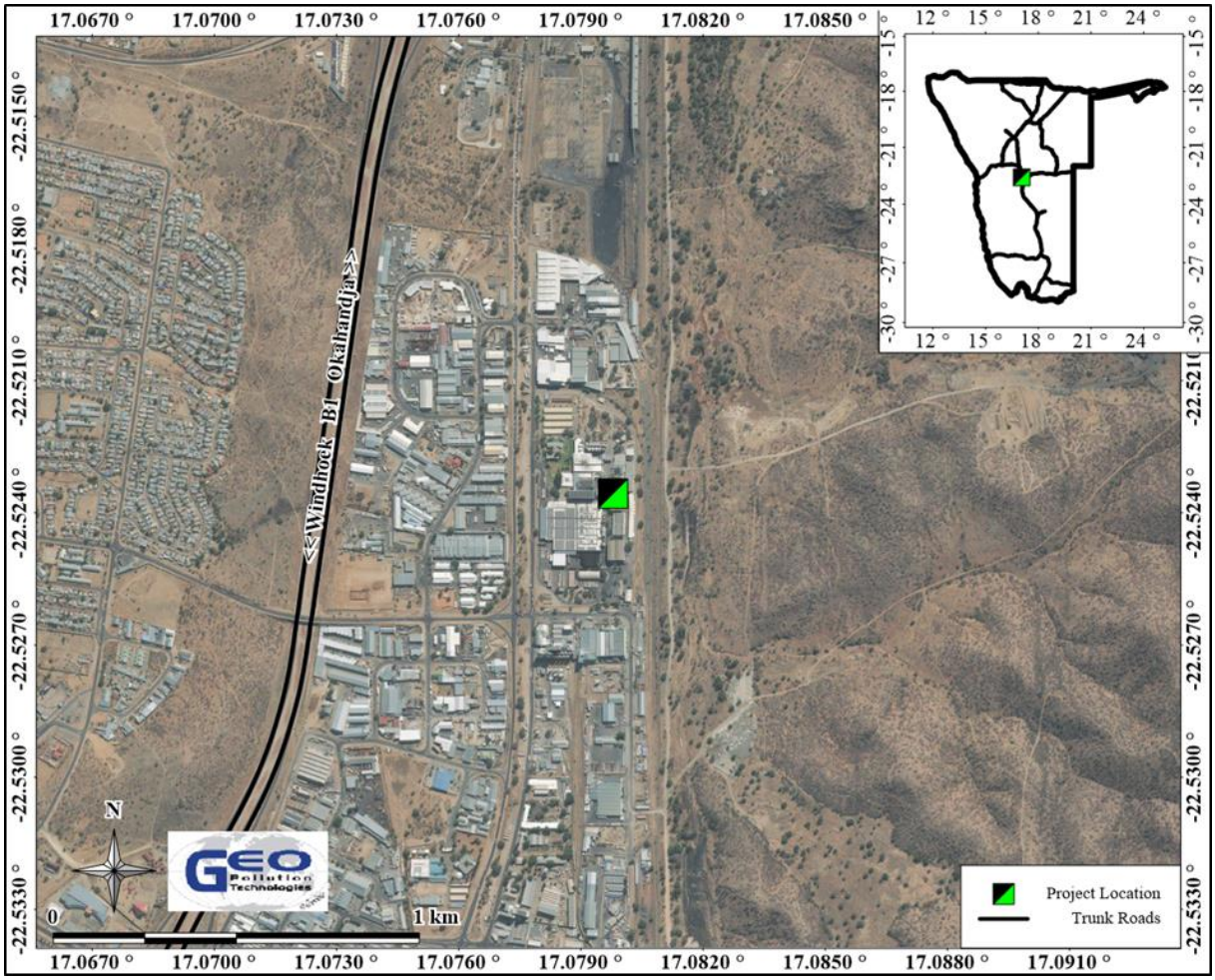


Figure 1. Project location

3 METHODOLOGY

Baseline information about the site and its surroundings was obtained from existing secondary information as well as from a reconnaissance site visit. The information was used to determine the potential impacts on the social and natural environment due to the operations of the facility. An environmental management plan was drafted for the facility.

4 FACILITY OPERATIONS AND RELATED ACTIVITIES

The consumer fuel installation infrastructure was supplied and installed by Vivo Energy Namibia (Shell) for the operations of Namibia Breweries Limited. The installation is operated by Namibia Breweries mainly to supply three boilers with fuel.

4.1 EXISTING INFRASTRUCTURE

The consumer fuel installation is an existing site which hosts two 83 m^3 aboveground steel storage tanks. The tanks are used for the storage of HFO only. The tanks are filled by road tankers and approximately two deliveries are made per month, but this varies according to demand as usage can be around 12 m^3 per day during peak operations. The area adjacent to the tanks are no accessible by heavy vehicles. Thus, underground reticulation is installed for the transfer of HFO from the road tankers to the storage tanks (Photo 4). The HFO offloading area is covered with concrete surfaces and interlocked paving. The tanks are situated within a bunded area and spill control infrastructure is installed at the tanks, dispensing area and refilling area (Photo 2 and Photo 3). Firefighting equipment is present and is readily available to operators of the facility.

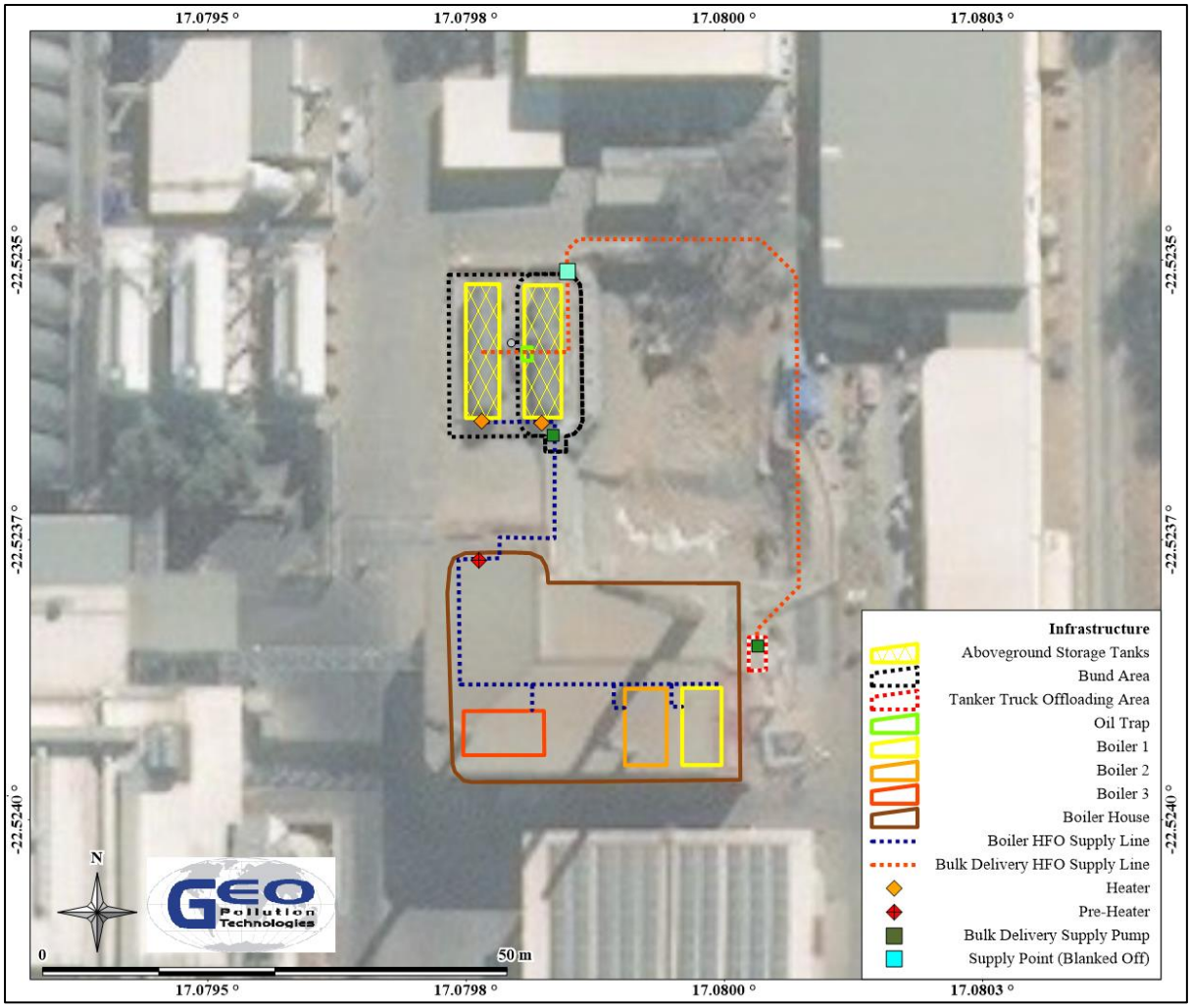


Figure 2. Site layout

Photo 1. Consumer fuel installation and warning signage

Photo 2. Tank refilling area and hoses

Photo 3. Tank bunding and operational signage

Photo 4. Underground reticulation

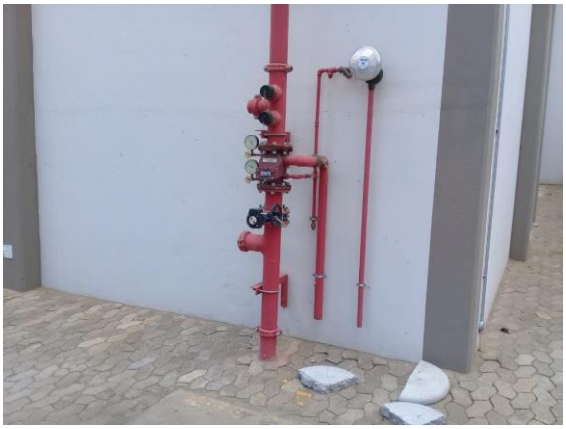


Photo 5. Firefighting infrastructure

Photo 6. Bunding divide

4.2 OPERATIONAL ACTIVITIES

HFO is received from tanker trucks and stored in the aboveground storage tanks. Fuel is mainly dispensed to three boilers via aboveground reticulation by an electronic management system when required. HFO is heated as part of the dispensing process to reduce viscosity and allow for flow through the pipelines.

Employees are provided with in-house training for operations, as well as with firefighting and first aid training.

5 ALTERNATIVES TO THE PROPOSED FACILITY

The facility is an existing consumer fuel installation. Since the facility adhere to South African National Standards (SANS), no alternatives in design parameters adhering to SANS is proposed. From an environmental perspective the environmental assessment did not find any reason why the facility may not continue at this site on condition that it continue to comply with local legislation and best practice.

6 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 1 to Table 4 govern the environmental assessment process in Namibia and/or are relevant to the facility.

Table 1. Namibian law applicable to the facility

Law	Key Aspects
The Namibian Constitution	♦ 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	♦ 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	♦ Commencement of the Environmental Management Act ♦ List activities that requires an environmental clearance certificate ♦ Provide Environmental Impact Assessment Regulations
Petroleum Products and Energy Act Act No. 13 of 1990, Government Notice No. 45 of 1990	♦ Regulates petroleum industry ♦ Makes provision for impact assessment ♦ Petroleum Products Regulations (Government Notice No. 155 of 2000) o 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	♦ 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	♦ 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	♦ Define the powers, duties and functions of local authority councils ♦ Regulates discharges into sewers
Public Health Act Act No. 36 of 1919	♦ Provides for the protection of health of all people
Public and Environmental Health Act Act No. 1 of 2015, Government Notice No. 86 of 2015	♦ 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.

Law	Key Aspects
Labour Act Act No 11 of 2007, Government Notice No. 236 of 2007	♦ 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	♦ 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	♦ 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)	♦ Not in force yet ♦ Provides for prevention and control of pollution and waste ♦ Provides for procedures to be followed for licence applications

Table 2. Municipal By-laws, Guidelines and Regulations

Municipal By-laws, Guidelines or Regulations	Key Aspects
Groundwater Protection Regulations	♦ 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	♦ Integrates spatial planning decision-making, environmental planning and environmental impact management
Town Planning Scheme	♦ Enables the comprehensive management of all property and related public sector functions across the city. ♦ Provides for the protection of groundwater and the environment.

Table 3. Relevant Multilateral Environmental Agreements for Namibia and the Facility

Agreement	Key Aspects
Stockholm Declaration on the Human Environment, Stockholm 1972.	♦ 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	♦ 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)	♦ 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	♦ Under article 14 of The Convention, EIAs must be conducted for projects that may negatively affect biological diversity.

Table 4. Standards or Codes of Practise

Standard or Code	Key Aspects
South African National Standards (SANS)	♦ The Petroleum Products and Energy Act prescribes SANS standards for the construction, operations and demolition of petroleum facilities. ♦ SANS 10089-3:2010 is specifically aimed at storage and distribution of petroleum products at fuel retail facilities and consumer installations. o 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.”

7 ENVIRONMENTAL CHARACTERISTICS

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

7.1 LOCALITY AND SURROUNDING LAND USE

The facility is located on erf 7444, on the corner of Dortmund and Iscor street, in the Northern Industrial Area of Windhoek (22.5235°S, 17.0797°E) (Figure 1). The site is in an area with multiple industrial businesses, some of which host their own consumer fuel installations (Figure 3). The property is neighboured to the east by open farm land. The property is situated within the

City of Windhoek townlands. There are no known heritage or cultural sites located on or in close proximity to the site.

Implications and Impacts

The site is situated in an area where industrial and business activities are increasing. Being a relatively low impact establishment, no significant land use impact is expected on nearby establishments.

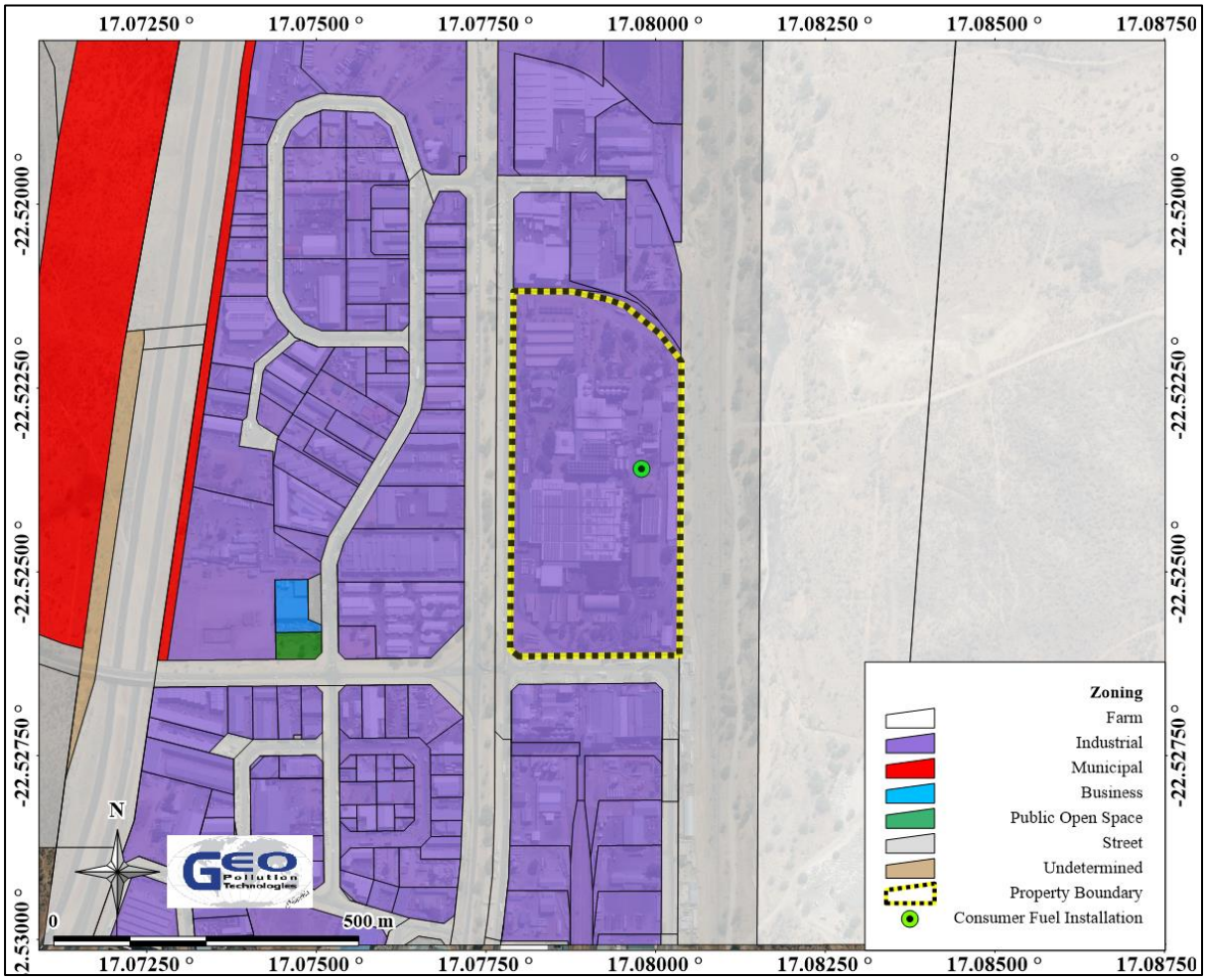


Figure 3. Surrounding land use

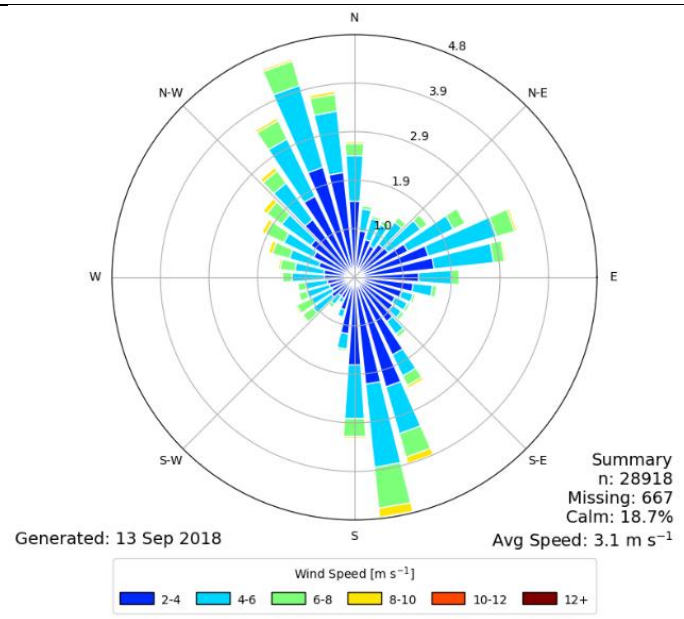
Implications and Impacts

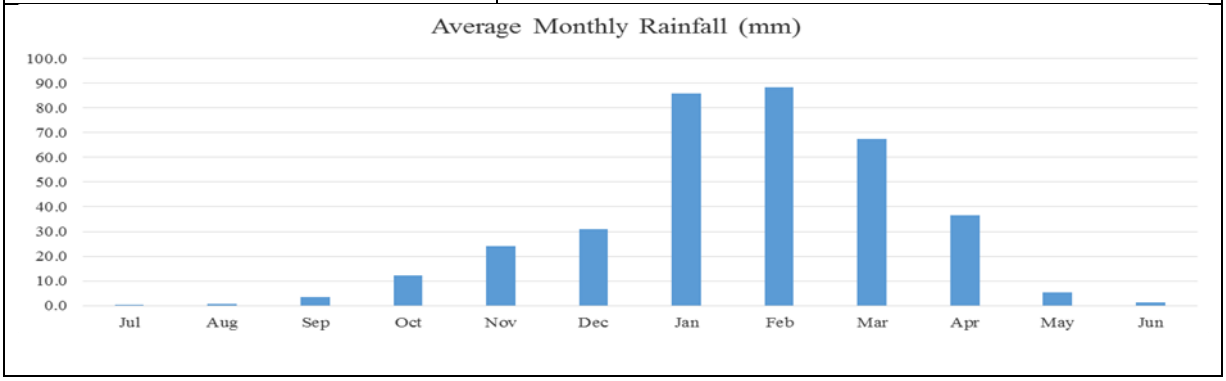
Rainfall events are typically thunderstorms with heavy rainfall that can occur in short periods of time (cloud bursts) which may result in floods. Heavy rainfall events may result in the leaching of pollutants or hazardous substances into groundwater as well as runoff into surface waters. The extreme variability in seasonal rainfall makes water an extremely vulnerable resource

7.2 CLIMATE

The project location is part of a semi-arid highland savannah region. Heavy rainfall in this region is mostly common between January and March, peaking mostly in January, whilst May to September have little or no rainfall. The aridity of the region causes water resources to be a scarce commodity that has to be conserved and protected from pollution. A general summary of climatic conditions for the area is provided in Table 5.

Table 5. Summary of Climate Data (Digital Atlas of Namibia)

Average annual rainfall (mm/a)	300-350
Variation in annual rainfall (%)	30-40
Average annual evaporation (mm/a)	3,000-3,200
Water deficit (mm/a)	1,701-1,900
Average annual temperatures (°C)	19-20
Windrose -Wind Direction and Speed: Period 2011 to 2018 (Mesonet, 2018)	



7.3 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 tend to be in a northern direction. The site is located on 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 an eastern direction from the site (Figure 4). The site has a low relief with a slope of < 5°.

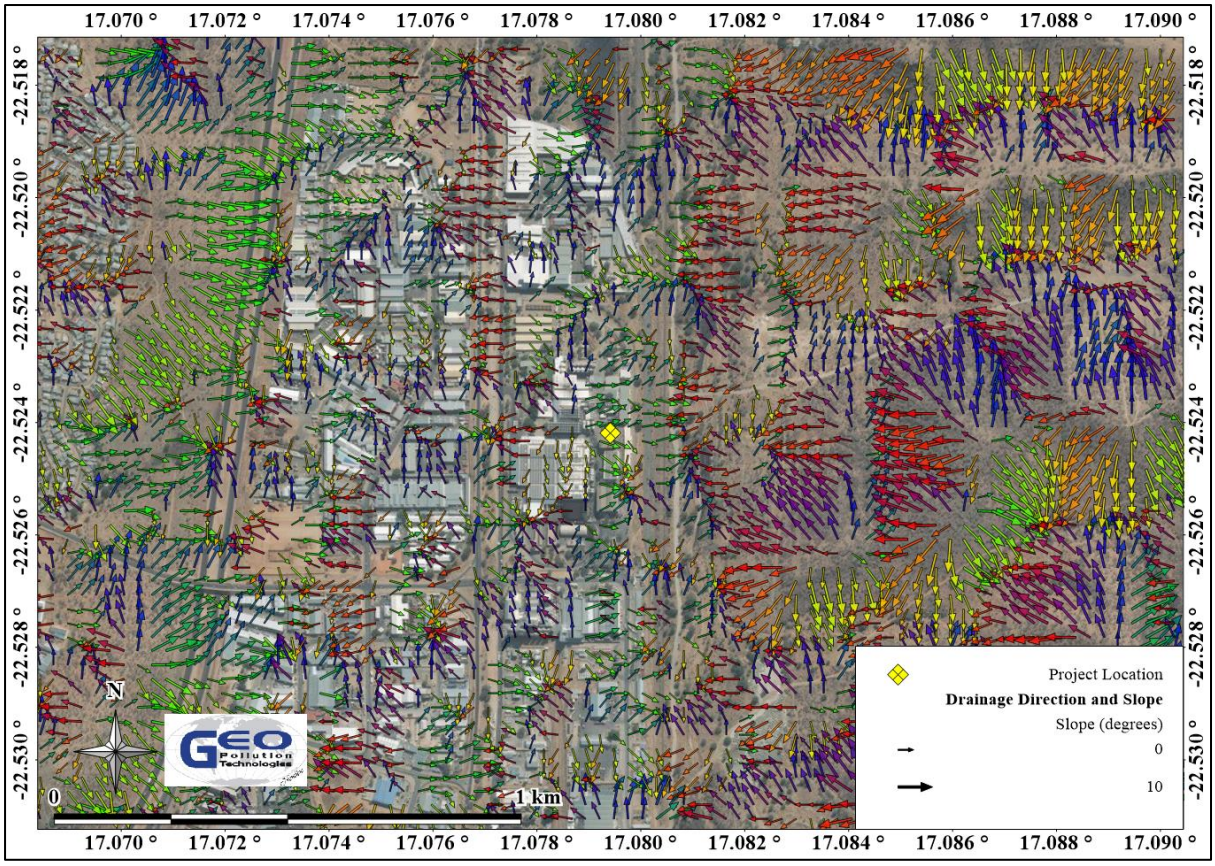


Figure 4. Topography and drainage direction of the study area

Implications and Impacts

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

7.4 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 5 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 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 (Figure 6). Local flow patterns may vary due to groundwater

abstraction. Water is utilized in the area, with at least 13 boreholes known of within a 5 km radius. Table 6 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, the facility is located north of the aquifer management divide, in an area where less strict control on potential pollution sources are placed (Africon et al. 2004) (Figure 6). 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.

Table 6. Groundwater statistics

Query Centre:	Namibia Breweries HFO; -22.5236°S; 17.0798°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	**13**			8	7	6	4	10	10	10	10
Minimum		-22.478604	17.031088	38	2	8	24	164	5	0	0
Average				92	21	18	42	838	134	4	1
Maximum		-22.568596	17.128512	246	50	46	64	2567	510	24	4
Group A				25.00%	42.86%	50.00%	0.00%	70.00%	80.00%	90.00%	70.00%
Limit				50	>10	10	10	1000	200	10	1.5
Group B				50.00%	14.29%	50.00%	50.00%	20.00%	20.00%	0.00%	10.00%
Limit				100	>5	50	50	1500	600	20	2.0
Group C				12.50%	42.86%	0.00%	50.00%	0.00%	0.00%	10.00%	0.00%
Limit				200	>0.5	100	100	2000	1200	40	3.0
Group D				12.50%	0.00%	0.00%	0.00%	10.00%	0.00%	0.00%	20.00%
Limit				>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.

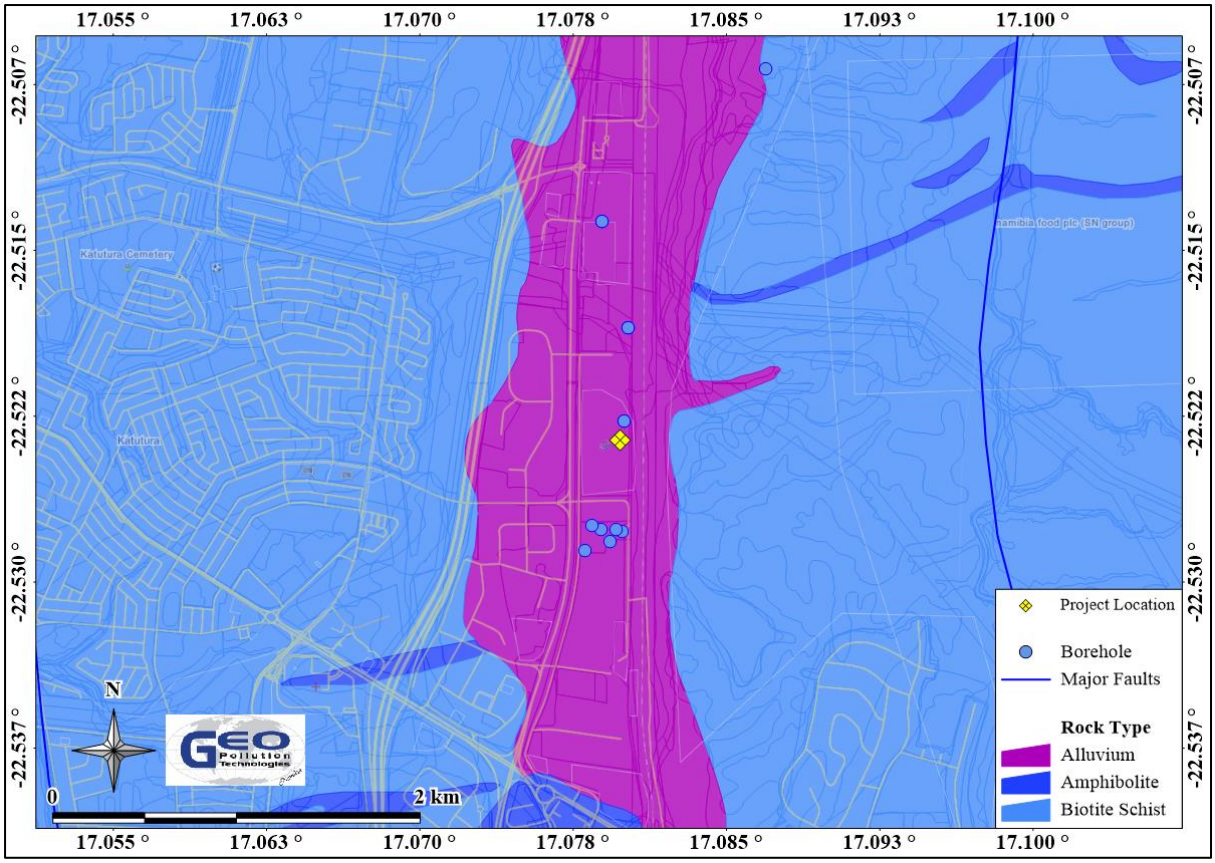


Figure 5. Hydrogeology

Implications and Impacts

A low risk to groundwater is expected due to the low geological sensitivity of the area. This is mainly due to the subsurface geology of less permeable mica schist. Furthermore, the high viscosity of HFO further reduce the potential of groundwater pollution. However, groundwater remains an important resource and would be a risk if fuel spills are not contained, cleaned and disposed of properly.

7.5 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 soaring influx of people to the city.

Listed in order of resource development, Windhoek receives 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. The city 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. The project is located within the Swakoppoort Dam catchment which is important in terms of public water supply for the central areas of Namibia. The Swakoppoort Dam forms one of the three dams that supply water to the central areas of Namibia.

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.

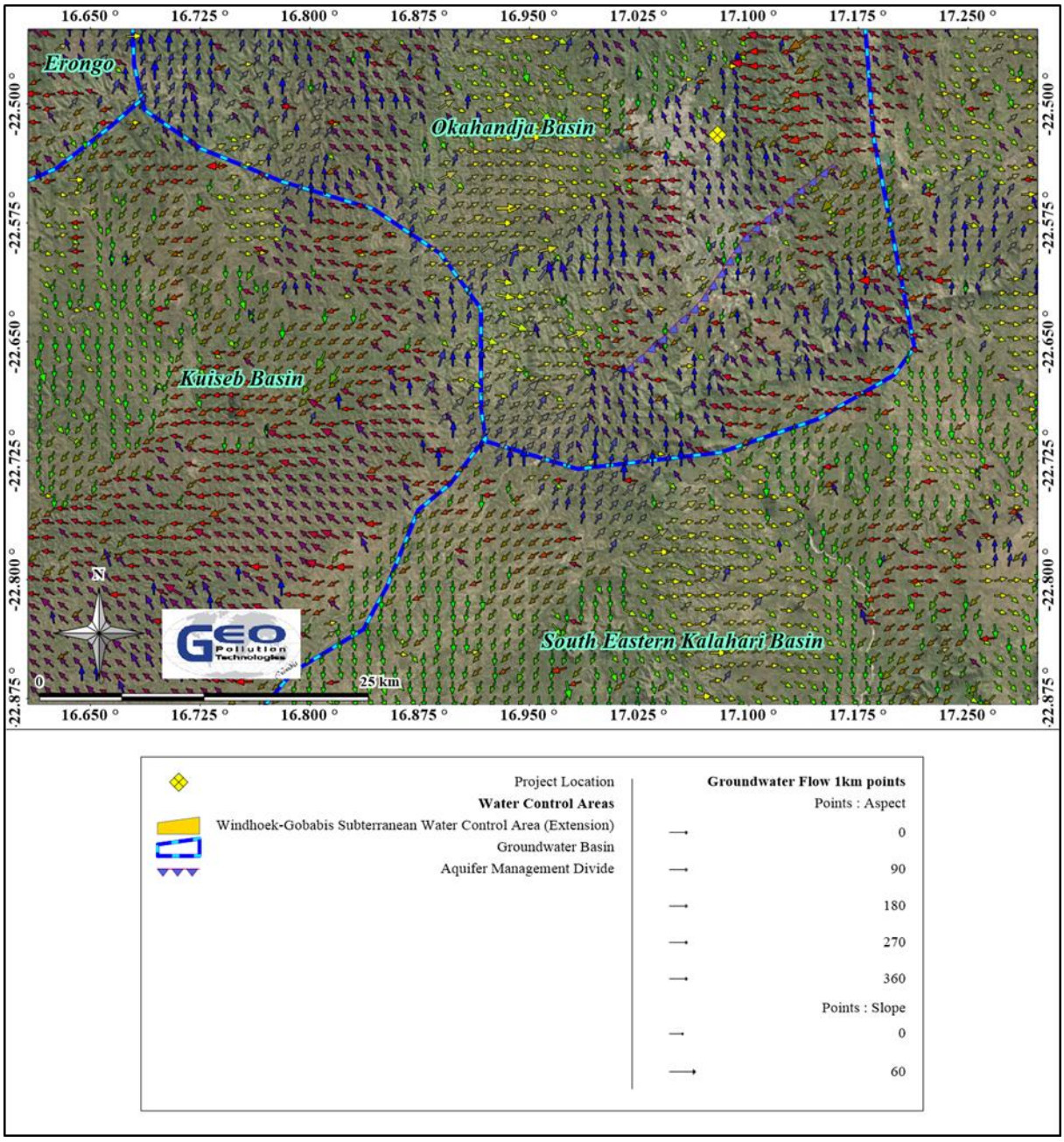


Figure 6. Inferred groundwater flow and groundwater basins

7.6 FAUNA AND FLORA

Windhoek lies in the centre of the Savanna vegetation zone. Trees such as *Acacia mellifera, A. reficiens* and *A. fleckii* and a variety of other acacia trees are characteristic of this zone. Table 7 and Table 8 present a summary of the general fauna and flora of the area.

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 7. General Flora Data (Atlas of Namibia)

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	*Acacia mellifera*
Dominant plant species 2	*Acacia reficiens*
Dominant plant species 3	*Acacia fleckii*
Dominant plant species 4	*Boscia albitrunca*
Dominant plant species 5	*Lonchocarpus nelsii*
Dominant plant species 6	*Acacia erioloba*

Table 8. General Fauna Data (Atlas of Namibia)

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

Implications and Impacts

The consumer fuel installation is an existing facility located on a developed property. No immediate threat to biodiversity in the area is expected, however, uncontrolled pollution may and can cause damage to any biodiversity surrounding the site.

7.7 DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

The project area falls within capital city of Namibia, Windhoek, situated within the Khomas Region. Windhoek is the largest and most densely populated town in Namibia and is the main hub of commerce and industry. As a result, a continuous influx of job seekers into Windhoek occur, which in turn increases the size of informal settlements in the area. See Table 9 for a summary of the main demographic statistics of Windhoek, the region and nationally. The industrial area has established businesses and industries and plays an important part in the economic sector of Windhoek and Namibia as a whole.

Implications and Impacts

Namibia Breweries Limited sustain employment of people from the area. Some skills development and training also benefit employees during operations of the facility.

Table 9. Demographic characteristics of Windhoek the Khomas Region and Nationally (Namibia Statistics Agency, 2011)

	Windhoek	Khomas Region	Namibia
Population (Males)	159,600*	164,600	1,021,912
Population (Females)	162,800*	167,700	1,091,165
Population (Total)	322,500	332,300	2,113,077
Unemployment (15+ years)	N/A	21.7%	33.8%
Literacy (15+ years)	N/A	95.7%	87.7%
Education at secondary level (15+ years)	N/A	60.4%	51.2%
Households considered poor	N/A	5.8%	19.5%

**Data available from preliminary results only (National Planning Commission, 2012)*

7.8 HERITAGE, CULTURAL AND ARCHAEOLOGICAL ASPECTS

There are no churches, mosques or related buildings within the industrial area. No known archaeological resources have been noted in the vicinity since the establishment of the facility. No other structures, sites or spheres of heritage of cultural significance was determined to be in close proximity to the site.

8 MAJOR IDENTIFIED IMPACTS

During the scoping exercise a number of potential environmental impacts have been identified. The following section provides a brief description of the most important of these impacts.

8.1 HYDROCARBON POLLUTION

Groundwater, surface water and soil pollution from hydrocarbon products are major issues associated with the storage and handling of such products. All forms of pollution are prohibited in Namibia. Water and soil contamination may take place when hydrocarbon products are spilled as a result of leaking pipes, incorrect refilling procedures, etc. HFO under normal room temperatures has a very high viscosity, therefore is not expected to infiltrate into the ground surface under normal conditions. Heated HFO however has a lower viscosity and might contaminate the natural environment if spilled.

8.2 NOISE IMPACTS

Some noise will exist due to heavy motor vehicles accessing the site for delivery of fuel during operations. This is however a typical impact in industrial areas, and is not expected to impact negatively on surrounding properties.

8.3 FIRE

Only HFO is currently stored on site. HFO is not as flammable as more volatile fuels. The risk of fire is thus low under normal conditions.

8.4 HEALTH

Hydrocarbons are carcinogenic and dermal contact and inhalation of fumes should be prevented. During operational and construction / maintenance activities a risk of injury and falling from heights exist.

8.5 SOCIO-ECONOMIC IMPACTS

Construction activities, for example routine maintenance, at the consumer fuel installation will provide employment opportunities and some training and skills development may ensue. The consumer fuel installation indirectly contributes to sustaining the daily operations of Namibia Breweries Limited and thus its employee base of around 800 employees.

9 ASSESSMENT AND MANAGEMENT OF IMPACTS

The purpose of this section is to assess and identify the most pertinent environmental impacts that are expected from the operational, construction (upgrades, maintenance, etc. – see glossary for "construction") and potential decommissioning activities of the facility. An environmental management plan based on these identified impacts are also incorporated into this section.

For each impact an environmental classification was determined based on an adapted version of the Rapid Impact Assessment Method (Pastakia, 1998). Impacts are assessed according to the following categories: Importance of condition (A1); Magnitude of Change (A2); Permanence (B1); Reversibility (B2); and Cumulative Nature (B3) (see Table 10)

Ranking formulas are then calculated as follow:

Environmental Classification = A1 x A2 x (B1 + B2 + B3)

The environmental classification of impacts is provided in Table 11.

The probability ranking refers to the probability that a specific impact will happen following a risk event. These can be improbable (low likelihood); probable (distinct possibility); highly probable (most likely); and definite (impact will occur regardless of prevention measures).

Table 10. Assessment criteria

Criteria	Score
Importance of condition (A1) – assessed against the spatial boundaries of human interest it will affect	
Importance to national/international interest	4
Important to regional/national interest	3
Important to areas immediately outside the local condition	2
Important only to the local condition	1
No importance	0
Magnitude of change/effect (A2) – measure of scale in terms of benefit / disbenefit of an impact or condition	
Major positive benefit	3
Significant improvement in status quo	2
Improvement in status quo	1
No change in status quo	0
Negative change in status quo	-1
Significant negative disbenefit or change	-2
Major disbenefit or change	-3
Permanence (B1) – defines whether the condition is permanent or temporary	
No change/Not applicable	1
Temporary	2
Permanent	3
Reversibility (B2) – defines whether the condition can be changed and is a measure of the control over the condition	
No change/Not applicable	1
Reversible	2

Irreversible	3
Cumulative (B3) – reflects whether the effect will be a single direct impact or will include cumulative impacts over time, or synergistic effect with other conditions. It is a means of judging the sustainability of the condition – not to be confused with the permanence criterion.	
Light or No Cumulative Character/Not applicable	1
Moderate Cumulative Character	2
Strong Cumulative Character	3

Table 11. Environmental classification (Pastakia 1998)

Environmental Classification	Class Value	Description of Class
72 to 108	5	Extremely positive impact
36 to 71	4	Significantly positive impact
19 to 35	3	Moderately positive impact
10 to 18	2	Less positive impact
1 to 9	1	Reduced positive impact
0	-0	No alteration
-1 to -9	-1	Reduced negative impact
-10 to -18	-2	Less negative impact
-19 to -35	-3	Moderately negative impact
-36 to -71	-4	Significantly negative impact
-72 to -108	-5	Extremely Negative Impact

9.1 RISK ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

The EMP provides management options to ensure impacts of the facility 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 environmental management measures are provided in the tables and descriptions below. These management measures should be adhered to during the various phases of the operation of the facility. This section of the report can act as a stand-alone document. All personnel taking part in the operations of the facility should be made aware of the contents in this section, so as to plan the operations accordingly and in an environmentally sound manner.

The objectives of the EMP are:

- to include all components of construction activities (upgrades, maintenance, etc.) and operations of the facility;
- to prescribe the best practicable control methods to lessen the environmental impacts associated with the project;
- to monitor and audit the performance of operational personnel in applying such controls; and
- to ensure that appropriate environmental training is provided to responsible operational personnel.

Various potential and definite impacts will emanate from the operations and decommissioning phases. The majority of these impacts can be mitigated or prevented. The impacts, risk rating of impacts as well as prevention and mitigation measures are listed below.

As depicted in the tables below, impacts related to the operational phase are expected to mostly be of medium to low significance and can mostly be mitigated to have a low significance. The extent of impacts are mostly site specific to local and are not of a permanent nature. Due to the nature of the surrounding areas, cumulative impacts are possible and include groundwater contamination and traffic impacts.

9.1.1 Planning

During the phase of planning for future operations, construction and decommissioning of the facility, it is the responsibility of proponent to ensure they are and remain compliant with all legal requirements. The proponent must also ensure that all required management measures are in place prior to and during all phases, to ensure potential impacts and risks are minimised. The following actions are recommended for the planning phase and should continue during various other phases of the project:

- Ensure that all necessary permits from the various ministries, local authorities and any other bodies that governs the construction (maintenance) activities and operations of the project remains valid.
- Ensure all appointed contractors and employees enter into an agreement which includes the EMP. Ensure that the contents of the EMP are understood by the contractors, sub-contractors, employees and all personnel present or who will be present on site.
- 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 on site where reasonable to deal with all potential emergencies:
    - 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;
    - Procedures, equipment and materials required for emergencies.
- If one has not already been established, establish and maintain 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.
- Establish and / or maintain a reporting system to report on aspects of construction activities, operations and decommissioning as outlined in the EMP.
- Keep monitoring reports on file for bi-annual submission to allow for environmental clearance certificate renewal as required by the Ministry of Environment and Tourism.
- Appoint a specialist environmental consultant to update the EA and EMP and apply for renewal of the environmental clearance certificate prior to expiry.

9.1.2 Skills, Technology and Development

This is mostly an indirect impact which is related to the maintenance of the installation and the operations associated with Namibia Breweries. During various phases of the various activities, training is provided to a portion of the workforce. Skills are transferred to an unskilled workforce for general tasks. Development of people and technology are key to economic development.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Employment, technological development and transfer of skills	2	1	2	3	1	12	2	Probable
Daily Operations	Employment, technological development and transfer of skills	2	1	2	3	2	14	2	Definite
Indirect Impacts	Transfer of skills and technological development	2	1	2	3	3	16	2	Definite

Desired Outcome: To see an increase in skills of local Namibians, as well as development and technology advancements in the fuel industry.

Actions

Mitigation:

- If the skills exist locally, contractors must first be sourced from the town, then the region and then nationally. Deviations from this practice must be justified.
- Skills development and improvement programs to be made available as identified during performance assessments.
- Employees to be informed about parameters and requirements for references upon employment.
- The proponent must employ Namibians where possible. Deviations from this practise should be justified appropriately.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Record should be kept of training provided.
- Ensure that all training is certified or managerial reference provided (proof provided to the employees) inclusive of training attendance, completion and implementation.
- Bi-annual summary report on all training provided.

9.1.3 Revenue Generation and Employment

The change in land use has led to changes in the way revenue is generated and paid to the national treasury. An increase of skilled and professional labour has and will continue to take place due to the operations of Namibia Breweries which in turn rely on fuel supplied by Vivo Energy at their consumer fuel installation to remain effective. Employment is sourced locally while skilled labour/contractors may be sourced from other regions.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Employment and contribution to local economy	2	1	2	2	2	12	2	Definite
Daily Operations	Employment contribution to local economy	3	1	3	3	2	24	3	Definite
Indirect Impacts	Decrease in unemployment, contribution to local economy	3	1	3	3	3	27	3	Definite

Desired Outcome: Contribution to national treasury and provision of employment to local Namibians.

Actions

Mitigation:

- The proponent must employ local Namibians where possible.
- If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.
- Deviations from this practice must be justified.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Bi-annual summary report based on employee records.

9.1.4 Demographic Profile and Community Health

The project is reliant on labour during the operational phase. The scale of the project is limited and it is not believed to have created a change in the demographic profile of the local community. Community health may be exposed to factors such as communicable disease like HIV/AIDS and alcoholism/drug abuse, associated with trucking of fuel. An increase in foreign people in the area may potentially increase the risk of criminal and socially/culturally deviant behaviour. However, such trends have not been observed since the site became operational. Spills and leaks may present risks to employees.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	In-migration and social ills related to unemployment	2	-1	1	1	2	-8	-1	Improbable
Daily Operations	In-migration and social ills related to unemployment	2	-1	1	2	2	-10	-2	Improbable
Indirect Impacts	The spread of disease	2	-1	2	2	2	-12	-2	Improbable

Desired Outcome: To prevent the in-migration and growth in informal settlements, prevent the spread of communicable disease and prevent / discourage socially deviant behaviour.

Actions:

Prevention:

- Employ only local people from the area, deviations from this practice should be justified appropriately.
- Adhere to all municipal by-laws relating to environmental health which includes but is not limited to sanitation requirements where applicable.

Mitigation:

- Educational programmes for employees on HIV/AIDs and general upliftment of employees' social status.
- Appointment of reputable contractors.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Facility inspection sheet for all areas which may present environmental health risks, kept on file.
- Bi-annual summary report based on educational programmes and training conducted.

9.1.5 Fuel Supply

The operation of the facility will aid in securing fuel supply to the operations of Namibia Breweries.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Contribution to economy, contribution to the fuel supply in the region and Namibia	3	1	3	2	2	21	3	Definite
Indirect Impacts	Secure supply in fuel allowing travel, industry and trade	2	1	2	2	2	12	2	Definite

Desired Outcome: Ensure a secure fuel supply remains available.

Actions

Mitigation:

- Ensure compliance to the petroleum regulations of Namibia.
- Proper management to ensure constant supply.
- Record supply problems and take corrective actions.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Record fuel volumes and supply problems and corrective actions taken and compile a bi-annual summary report.

9.1.6 Traffic

Namibia Breweries may have increased traffic flow to the site, however the consumer fuel installation itself is not expected to result in traffic impacts since it is located on the Namibia Breweries premises and fuel deliveries are infrequent.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Delivery of equipment and building supplies	1	-1	2	2	2	-6	-1	Improbable
Daily Operations	Increase traffic, road wear and tear and accidents	1	-1	2	2	2	-6	-1	Improbable

Desired Outcome: Minimum impact on traffic and no transport or traffic related incidents.

Actions

Prevention:

- Erect clear signage regarding access and exit points at the facility.

Mitigation:

- If any traffic impacts are expected, traffic management should be performed to prevent these.
- The placement of signs to warn and direct traffic will mitigate traffic impacts.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Any complaints received regarding traffic issues should be recorded together with action taken to prevent impacts from repeating itself.
- A bi-annual report should be compiled of all incidents reported, complaints received, and actions taken.

9.1.7 Health, Safety and Security

Every activity associated with the operational phase is reliant on human labour and therefore exposes them to health and safety risks. Activities such as the operation of machinery and handling of hazardous chemicals (inhalation and carcinogenic effect of some hydrocarbon products), poses the main risks to employees. Security risks are related to unauthorized entry, theft and sabotage.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Physical injuries, exposure to chemicals and criminal activities	1	-2	3	3	1	-14	-2	Probable
Daily Operations	Physical injuries, exposure to chemicals and criminal activities	1	-2	3	3	2	-16	-2	Probable

Desired Outcome: To prevent injury, health impacts and theft.

Actions

Prevention:

- Clearly label dangerous and restricted areas as well as dangerous equipment and products.
- Equipment that will be locked away on site must be placed in a way that does not encourage criminal activities (e.g. theft).
- Provide all employees with required and adequate personal protective equipment (PPE).
- Ensure that all personnel receive adequate training on operation of equipment / handling of hazardous substances.
- All Health and Safety standards specified in the Labour Act should be complied with.

Mitigation:

- Selected personnel should be trained in first aid and a first aid kit must be available on site. The contact details of all emergency services must be readily available.
- Implement and maintain an integrated health and safety management system, to act as a monitoring and mitigating tool, which includes: operational, safe work and medical procedures, emergency response plans, housekeeping rules, MSDS's and signage requirements (PPE, flammable etc.).
- Security procedures and proper security measures must be in place to protect workers.
- Strict security that prevents unauthorised entry.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Any incidents must be recorded with action taken to prevent future occurrences.
- A bi-annual 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.

9.1.8 Fire

The facility currently only stores HFO which is not as flammable as more volatile fuels. Operational and construction activities may increase the risk of the occurrence of fires. The site is located next to built-up areas which increases the difficulty of fighting fires.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Fire and explosion risk	1	-2	2	2	1	-10	-2	Probable
Daily Operations	Fire and explosion risk	2	-2	2	2	1	-20	-3	Probable

Desired Outcome: To prevent property damage, possible injury and impacts caused by uncontrolled fires.

Actions:

Prevention:

- Ensure all fuel are stored and handled according to MSDS and SANS instructions.
- Maintain regular site, mechanical and electrical inspections and maintenance.
- Clean all spills / leaks.

Mitigation:

- A holistic fire protection and prevention plan is needed. This plan must include an emergency response plan, firefighting plan and spill recovery plan.
- Maintain firefighting equipment, good housekeeping and personnel training (firefighting, fire prevention and responsible housekeeping practices).

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- 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 themselves.
- A bi-annual report should be compiled of all incidents reported. The report should contain dates when fire drills were conducted and when fire equipment was tested and training given.

9.1.9 Air Quality

Fuel vapours, although minimal when compared to more volatile fuels, may be released into the air during refuelling of bulk storage tanks. Prolonged exposure may have carcinogenic effects. Dust may be generated should any construction take place.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Excessive dust generated from maintenance and upgrade activities	1	-1	2	2	2	-6	-1	Probable
Daily Operations	Fuel vapours	1	-1	2	2	1	-5	-1	Probable

Desired Outcome: To prevent health impacts and minimise the dust generated.

Actions

Mitigation:

- Personnel issued with appropriate masks where excessive dust or vapours are present.
- A complaints register should be kept for any dust related issues and mitigation steps taken to address complaints where necessary e.g. dust suppression.
- Employees should be coached on the dangers of fuel vapours.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Any complaints received regarding dust or fuel vapours should be recorded with notes on action taken.
- All information and reporting to be included in a bi-annual report.

9.1.10 Noise

Noise pollution will exist due to heavy motor vehicles accessing the site to offload fuel. Construction (maintenance and upgrade) may generate excessive noise.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Excessive noise generated from construction activities – nuisance and hearing loss	1	-1	2	2	1	-5	-1	Probable
Daily Operations	Noise generated from the operational activities – nuisance	1	-1	2	2	2	-6	-1	Probable

Desired Outcome: To prevent any nuisance and hearing loss due to noise generated.

Actions

Prevention:

- Follow the City of Windhoek guidelines for limits on noise pollution (Council Resolution 215/09/2006). The facility is situated in an industrial area. Noise should be limited to 70 decibels (limit for industrial properties).
- All machinery must be regularly serviced to ensure minimal noise production.

Mitigation:

- Hearing protectors as standard PPE for workers in situations with elevated noise levels.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- City of Windhoek guidelines.
- Maintain a complaints register.
- Bi-annual report on complaints and actions taken to address complaints and prevent future occurrences.

9.1.11 Waste production

Various waste streams are produced during the operational phase. Waste may include hazardous waste associated with the handling of hydrocarbon products etc. Domestic waste is generated by the facility and related operations. Waste presents a contamination risk and when not removed regularly may become a fire hazard. Construction waste may include building rubble and discarded equipment contaminated by hydrocarbon products. Contaminated soil and water is considered as a hazardous waste.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Excessive waste production, littering, illegal dumping, contaminated materials	1	-2	2	2	2	-12	-2	Definite
Daily Operations	Excessive waste production, littering, contaminated materials	1	-2	2	2	2	-12	-2	Definite

Desired Outcome: To reduce the amount of waste produced, and prevent pollution and littering.

Actions

Prevention:

- Waste reduction measures should be implemented and all waste that can be re-used / recycled must be kept separate.
- Ensure adequate disposal storage facilities are available.
- Ensure waste cannot be blown away by wind.
- Prevent scavenging (human and non-human) of waste storage.
- All regulation and by-laws relating to environmental health should be adhered to.

Mitigation:

- Waste should be disposed of regularly and at appropriately classified disposal facilities, this includes hazardous material (empty chemical containers, contaminated rugs, paper water and soil).
- See the material safety data sheets available from suppliers for disposal of contaminated products and empty containers.
- Liaise with the municipality regarding waste and handling of hazardous waste.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- 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 information and reporting to be included in a bi-annual report.

9.1.12 Ecosystem and Biodiversity Impact

The nature of the operational activities is such that the probability of creating a habitat for flora and fauna to establish is low. No significant impact on the biodiversity of the area is predicted as operations is ongoing on the site and limited natural fauna and flora is present. Impacts are therefore mostly related to pollution of the environment.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Impact on fauna and flora. Loss of biodiversity	1	-1	3	2	2	-7	-1	Improbable
Daily Operations	Impact on fauna and flora. Loss of biodiversity	1	-1	3	2	2	-7	-1	Improbable

Desired Outcome: To avoid pollution of and impacts on the ecological environment.

Actions.

Mitigation:

- Report any extraordinary animal sightings to the Ministry of Environment and Tourism.
- Mitigation measures related to waste handling and the prevention of groundwater, surface water and soil contamination should limit ecosystem and biodiversity impacts.
- Avoid scavenging of waste by fauna.
- The establishment of habitats and nesting sites at the facility should be avoided where possible.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- All information and reporting to be included in a bi-annual report.

9.1.13 Groundwater, Surface Water and Soil Contamination

Operations entail the storage and handling of hydrocarbons which present a contamination risk. Contamination may either result from failing storage facilities, pumps and pipelines, or spills and leaks associated with overfilling or human error. Such spills may contaminate surface water, soil and groundwater.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Contamination from hazardous material spillages and hydrocarbon leakages	2	-1	2	2	1	-10	-2	Probable
Daily Operations	Contamination from hazardous material spillages and hydrocarbon leakages	2	-1	2	2	1	-10	-2	Probable

Desired Outcome: To prevent the contamination of water and soil.

Actions

Prevention:

- Spill control structures and procedures must be in place according to SANS standards or better and connection of all surfaces where fuel is handled with spill traps.
- All fuelling should be conducted 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, must be audited and corrections made where necessary.
- Proper training of operators must be conducted on a regular basis (fuel handling, spill detection, spill control).
- All drains leading directly into sewers must be closed off, and locked where possible, to prevent any unwanted products from entering sewers should an accidental spill, pipe burst, valve malfunction, etc. occur. Where drains are present to drain wash water, these should only be opened during times of washing and closed immediately thereafter.
- Ensure tank vents do not become blocked due to the high viscosity of HFO as this can lead to tank failure during filling.

Mitigation:

- Any spillage of more than 200 litre must be reported to the Ministry of Mines and Energy as per permit conditions.
- Spill clean-up means must be readily available on site as per the relevant MSDS.
- Any spill must be cleaned up immediately.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A report should be compiled bi-annually of all spills or leakages reported. The report should contain the following information: date and duration of spill, product spilled, volume of spill, remedial action taken, comparison of pre-exposure baseline data (previous pollution conditions survey results) with post remediation data (e.g. soil/groundwater hydrocarbon concentrations) and a copy of documentation in which spill was reported to Ministry of Mines and Energy.

9.1.14 Visual Impact

This is an impact that not only affects the aesthetic appearance, but also the integrity of the facility.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Aesthetic appearance and integrity of the site	1	-1	2	2	2	-6	-1	Probable
Daily Operations	Aesthetic appearance and integrity of the site	1	-1	2	2	2	-6	-1	Probable

Desired Outcome: To minimise aesthetic impacts associated with the facility.

Actions

Mitigation:

- Regular waste disposal, good housekeeping and routine maintenance on infrastructure will ensure that the longevity of structures are maximised and a low visual impact is maintained.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A maintenance record should be kept.
- A bi-annual report should be compiled of all complaints received and actions taken.

9.1.15 Cumulative Impact

Possible cumulative impacts associated with the operational phase include increased traffic in the area and potential water contamination.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	The build-up of minor impacts to become more significant	2	-2	2	2	2	-24	-3	Probable

Desired Outcome: To minimise cumulative all impacts associated with the facility.

Actions

Mitigation:

- Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.
- 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.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Bi-annual report on all other impacts must be created to give an overall assessment of the impact of the operational phase.

9.2 DECOMMISSIONING AND REHABILITATION

Decommissioning is not foreseen during the validity of the environmental clearance certificate. Decommissioning was however assessed as construction activities include modification and decommissioning. Should decommissioning occur at any stage, rehabilitation of the area may be required. Decommissioning will entail the complete removal of all infrastructure including buildings and underground infrastructure. Any pollution present on the site must be remediated. The impacts associated with this phase include noise and waste production as structures are dismantled. Noise must be kept within City of Windhoek standards and waste should be contained and disposed of at an appropriately classified and approved waste facility and not dumped in the surrounding areas. Future land use after decommissioning should be assessed prior to decommissioning and rehabilitation initiated if the land would not be used for future purposes. The Environmental Management Plan for the facility will have to be reviewed at the time of decommissioning to cater for changes made to the site and implement guidelines and mitigation measures.

9.3 ENVIRONMENTAL MANAGEMENT SYSTEM

The proponent could implement an Environmental Management System (EMS) for their operations. An EMS is an internationally recognized and certified management system that will ensure ongoing incorporation of environmental constraints. 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 Environmental Management Plan

10 CONCLUSION

The consumer fuel installation has a positive impact on the business sector operational in Namibia by providing a service to Namibia Breweries in order to allow its daily operations and functions, see Table 12. In addition to a reliable fuel supply, the facility indirectly contributes locally to skills transfer and training which in turn develops the local workforce.

Negative impacts can successfully be mitigated. SANS standards relating to the petroleum industry and prescribed by Namibian law must be followed during all operations of the consumer fuel installation. Noise pollution should at all times meet the prescribed City of Windhoek guidelines for limits on noise pollution (Council Resolution 215/09/2006). Fire prevention should be adequate, and health and safety regulations should be adhered to in accordance with the regulations pertaining to relevant laws and internationally accepted standards of operation. Any waste produced must be removed from site and disposed of at an appropriate facility or re-used or recycled where possible. Hazardous waste must be disposed of at an approved hazardous waste disposal site.

The environmental management plan (Section 9) should be used as an on-site reference document for the operations of the facility. Parties responsible for transgressing of the environmental management plan should be held responsible for any rehabilitation that may need to be undertaken. The proponent could use an in-house Health, Safety, Security and Environment Management System in conjunction with the environmental management plan. All operational personnel must be taught the contents of these documents.

Should the Directorate of Environmental Affairs (DEA) find that the impacts and related mitigation measures, which have been proposed in this report, are acceptable, an environmental clearance certificate may be granted to Vivo Energy Namibia. The environmental clearance certificate issued, based on this document, will render it a legally binding document which should be adhered to. Focus could be placed on Section 9, which includes an EMP for this project. It should be noted that the assessment process's aim is not to stop the proposed activity, or any of its components, but to rather determine its impact and guide sustainable and responsible development as per the spirit of the EMA.

Table 12. Impact Summary Class Values

Impact Category	Impact Type	Construction		Operations	
	Positive Rating Scale: Maximum Value	5		5	
	Negative Rating Scale: Maximum Value		-5		-5
EO	Skills, Technology and Development	2		2	
EO	Revenue Generation and Employment	2		3	
SC	Demographic Profile and Community Health		-1		-2
EO	Fuel Supply			3	
SC	Traffic		-1		-1
SC	Health, Safety and Security		-2		-2
PC	Fire		-2		-3
PC	Air Quality		-1		-1
PC	Noise		-1		-1
PC	Waste Production		-2		-2
BE	Ecosystem and Biodiversity Impact		-1		-1
PC	Groundwater, Surface Water and Soil Contamination		-2		-2
SC	Visual Impact		-1		-1
	Cumulative Impact				-3

BE = Biological/Ecological EO = Economical/Operational PC = Physical/Chemical SC = Sociological/Cultural

11 REFERENCES

Africon. 2004. Windhoek Environmental Structure Plan & Environmental Policy. Final Report 100382/1/2004.

Digital Atlas of Namibia Unpublished Report. Ministry of Environment & Tourism

Directorate of Environmental Affairs, 2008. Procedures and Guidelines for Environmental Impact Assessment (EIA) and Environmental Management Plans (EMP), Directorate of Environmental Affairs, Ministry of Environment and Tourism, Windhoek.

https://mesonet.agron.iastate.edu/sites/site.php?network=NA__ASOS&station=FYWW accessed 13 September 2018

Namibia Statistics Agency. Namibia household Income and Expenditure Survey 2009/2010.

Namibia Statistics Agency. Namibia 2011 Population and Housing Census Main Report.

Pastakia, C.M.R.; 1998; The Rapid Impact Assessment Matrix (RIAM) – A new tool for Environmental Impact Assessment.

Appendix A: Consultants' Curriculum Vitae

ENVIRONMENTAL SCIENTIST **André Faul**

André entered the environmental assessment profession at the beginning of 2013 and since then has worked on more than 120Environmental Impact Assessments including assessments of the petroleum industry, harbour expansions, irrigation schemes, township establishment and power generation and transmission. André's post graduate studies focussed on zoological and ecological sciences and he holds a M.Sc. in Conservation Ecology and a Ph.D. in Medical Bioscience. His expertise is in ecotoxicological related studies focussing specifically on endocrine disrupting chemicals. His Ph.D. thesis title was The Assessment of Namibian Water Resources for Endocrine Disruptors. Before joining the environmental assessment profession he worked for 12 years in the Environmental Section of the Department of Biological Sciences at the University of Namibia, first as laboratory technician and then as lecturer in biological and ecological sciences.

CURRICULUM VITAE ANDRÉ FAUL

Name of Firm	:	Geo Pollution Technologies (Pty) Ltd.
Name of Staff	:	ANDRÉ FAUL
Profession	:	Environmental Scientist
Years' Experience	:	17
Nationality	:	Namibian
Position	:	Environmental Scientist
Specialisation	:	Environmental Toxicology
Languages	:	Afrikaans – speaking, reading, writing – excellent English – speaking, reading, writing – excellent

EDUCATION AND PROFESSIONAL STATUS:

B.Sc. Zoology	:	University of Stellenbosch, 1999
B.Sc. (Hons.) Zoology	:	University of Stellenbosch, 2000
M.Sc. (Conservation Ecology)	:	University of Stellenbosch, 2005
Ph.D. (Medical Bioscience)	:	University of the Western Cape, 2018

First Aid Class A	EMTSS, 2017
Basic Fire Fighting	EMTSS, 2017

PROFESSIONAL SOCIETY AFFILIATION:
Environmental Assessment Professionals of Namibia (Learner Practitioner)

AREAS OF EXPERTISE:
Knowledge and expertise in:
- Water Sampling, Extractions and Analysis
- Biomonitoring and Bioassays
- Biodiversity Assessment
- Toxicology
- Restoration Ecology

EMPLOYMENT:

2013-Date	:	Geo Pollution Technologies – Environmental Scientist
2005-2012	:	Lecturer, University of Namibia
2001-2004	:	Laboratory Technician, University of Namibia

PUBLICATIONS:

Publications:	5 + 1 in preparation
Contract Reports	+120
Research Reports & Manuals:	5
Conference Presentations:	1

ENVIRONMENTAL GEOLOGIST **Wikus Coetzer**

Wikus Coetzer is newly appointed at Geo Pollution Technologies and holds an honours degree in Environmental Sciences – Environmental Geology from the Northwest-University Potchefstroom (NWU) South Africa. He first completed a B.Sc. degree in Geology and Botany in the required time also from the Northwest University Potchefstroom, South Africa. His honours project focused of the rehabilitation and phytoremediation of tailings and soils.

He has recent work experience as an environmental monitor / assisting environmental officer at Petra Diamonds, Cullinan Diamond Mine (CDM) where he gained a proper understanding of environmental monitoring responsibilities as well as legislations, regulations and the implementation of EMS/ISO14001.

CURRICULUM VITAE WIKUS COETZER

Name of Firm	:	Geo Pollution Technologies (Pty) Ltd.
Name of Staff	:	WIKUS COETZER
Profession	:	Environmental Geologist
Nationality	:	South African
Position	:	Environmental Geologist
Specialisation	:	Environmental Geology/ Geochemistry
Languages	:	Afrikaans – speaking, reading, writing English – speaking, reading, writing

EDUCATION AND PROFESSIONAL STATUS:

B.Sc. Environmental and Biological Sciences – Geology & Botany	: NWU Potchefstroom 2013
B.Sc. (Hons.) Environmental Sciences – Environmental Geology	: NWU Potchefstroom 2014

First Aid Class A	EMTSS, 2017
Basic Fire Fighting	EMTSS, 2017

AREAS OF EXPERTISE:

Knowledge and expertise in:

- Phytoremediation
- Environmental Geology / Geochemistry
- Environmental Monitoring
- Environmental Compliance

EMPLOYMENT:

2017 -	:	Geo Pollution Technologies
2015 - 2016	:	Petra Diamonds CDM – Environmental monitor / Assisting environmental officer
2015	:	Petra Diamonds CDM – Graduate program: Environmental Officer
2014	:	NWU Potchefstroom department of Geo and Spatial Sciences – Research assistant

PUBLICATIONS:

Contract Reports: +20