

**ENVIRONMENTAL SCOPING AND MANAGEMENT PLAN
REPORT FOR THE PROPOSED FUEL STATION AND
ASSOCIATED FACILITIES AT OTJINENE VILLAGE
OMAHEKE REGION, NAMIBIA**



Prepared For

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- ENVIRONMENTAL EDUCATION AND AWARENESS
- DRAFTING AND REVIEWING OF ENVIRONMENTAL POLICIES
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- ENVIRONMENTAL SAFETY, HEALTH AND MANAGEMENT
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EXECUTIVE SUMMARY

GENERAL INTRODUCTION

Unanisa Hei Investment cc (UHI-CC) is a fully registered, 100% Namibian owned company. Their aim is to provide petroleum retail services including distribution of fuel (Petrol and Diesel) and related products to the Namibian remote communities. The business model is based on the sourcing and supply of high quality and affordable petroleum products.

UHI-CC have determined through extensive market research that Windhoek is experiencing a shortage of sand for construction purposes, subsequently rendering some capital projects under review in terms of time completion agreements and in some instances projects are behind schedule with up to 4 months. In addition, UHI-CC has secured provisional commercial agreement to acquire a piece of land already allocated in the Otjinene Village in order to construct and operate a fuel station and associated facilities.

The main activity will be the proposed service station shall be to construct and operate a service station with the following associated infrastructure: Tuck Shop, Truck port, Car Wash and Fueling Bay area. This will be covering an area of 0.5 Hectare, which equate to less than a quarter of the land allocated to Unanisa Hei Investment cc.

SCOPE OF THIS WORK AND ASSESSMENT APPROACH

In line with the environmental regulatory requirements and project registration, EnviroLeap Consulting cc was appointed by UHI-CC to carry out an environmental scoping assessment for the proposed Sand Mining activity. The following is the summary of the activities associated with the preconstruction, construction, operational and rehabilitation stages of the proposed Fuel Station which have been considered in the impact assessment as potential sources of impacts (impact factors):

- Creation of a right of way servitude to access the fuel station
- Fencing around the backside of the Fuel Station
- Building of temporary infrastructure for the personnel;
- Sourcing of Water (connecting to existing / drilling of new borehole) and Power (installation of Diesel Generator)
- Construction of the Infrastructure
- Closure and Decommissioning / Upgrade of Facility.

The primary objective of the scoping is to identify potential impacts associated with the different development phase of this project. The assessment consisted of a site visit to the project location and public consultation meetings with the Interested and Affected Parties (I&APs). Comments, suggestions and inputs received during the initial consultation process have been addressed in this Scoping report (Appendix B), see the original stakeholder attendance register in Appendix B.

NEED AND DESIRABILITY ASSESSMENT

The economy of Omaheke is driven mainly by construction, retail, tourism, farming, education and transport. These commercial activities are the reason the Otjinene Village is dominated by local and long distance public transport, heavy transporting vehicles transporting their commodities.

Otjinene is a growing settlement with a Village status in respect to the local authority or town establishment categorization procedures of Namibia's Local Authority's Act, with numerous people in rural periphery migrating to settles in this neighborhood and satellite informal settlements. The closest neighborhood and settlement to the proposed service station is in Gobabis (150 km), a small other about 80 km away from Otjinene Village.

The Technical Services Unit of the Otjinene Village stated that the proposed development falls on a well-established route of the City and civil services such as sanitation, water, storm water and electricity are already developed and will be seen as an advantage for the development. Civil services such as sewage and water connections will be approved by the Otjinene Village Council ones the environmental clearance has been obtained.

The movement of traffic flow in this area have increased tremendously as it's a high way to the locations and informal settlements. Furthermore, there is large flow of traffic from Epukiro and Gam which, will further increase the flow of vehicles along the service station route and thus increasing the demand for petroleum products.

The proposed service station will supply local and long distance transport, heavy vehicle drivers and private commuters with a safe and controlled area to stop, park and fill their tanks as well as employment opportunities to the inhabitants surrounding the proposed service station.

Alternatively, potential clients will visit the service station because it is in close proximity to their homes and the availability of services such as all major banks ATM's and a convenience store is a popular demand among consumers.

Investing in a service station in an urban environment and on our highways is a lucrative trade but also an essential service for the surrounding communities as it helps them to get fuel and basic necessities at ease within their locations.

SITE SELECTION PROCESS AND ALTERNATIVE SITES

From the impact assessment of the biophysical and socio-economic aspects discussed in detail in this report it is evident that the proposed development of the Otjinene Service Station is suitable for the site assessed (**Figure 1**)



Figure 1: Proximity of the proposed fuel station location from the B2 road connecting Otjinene to Gobabis and Okondjatu

It should however be noted that this is only if the development is planned and managed in accordance with the mitigation measures supplied described in this report, the and in the Environmental Management Plan (EMP). The development will fit in with the general character of the surrounding area, and further lead to the creation of various job opportunities during the construction and operational phase.

From the detailed impact assessment, it is clear that most of the impacts can be mitigated to an acceptable standards and it is also expected that the development will contribute to the eradication of alien and invasive plant species and soil and vegetation rehabilitation.

The development will also result in better management of the storm water on site. If the proposed development is managed appropriately the Otjinene Service Station could have a significant impact on the socio-economic environment and could even have a positive impacts on the biophysical environment. If measured over the long term it is expected that the development will outweigh the negative bio-physical and socioeconomic aspects.

There are no visible permanent building structures, informal settlements, agricultural activities, public streets, power lines, water and/or gas pipelines, rocky outcrops, natural waterways or wetlands on the terrain.

The erf has already been cleared and bulk infrastructure of sewerage installed and, there are only two big trees on the erf thus cannot be classified as a Greenfield.

There is no vegetation to be protected or artefacts heritage to discover or protected as ground works and levelling has already been undertaken. The environmental aspects and health and safety hazards associated to the site can be mitigated by being constructed and operated according to best environmental best practice, engineering controls and standards such as;

- SANS 10089-1 (1999): The petroleum industry Part 1: Storage and distribution of petroleum products in above-ground bulk installations;
- SABS 0131 (1999): The petroleum industry Part 3: The installation, modification, and decommissioning of underground storage tanks, pumps/dispensers and pipework at service stations and consumer installations;
- SANS 10089-2 (2002): The petroleum industry Part 2: Electrical installations in the distribution and marketing sector;
- SANS 10131 2004, Above-ground storage tanks for petroleum products;
- SANS 10089-3 (2010): The petroleum industry Part 3: The installation, modification, and decommissioning of underground storage tanks, pumps/dispensers and pipework at service stations and consumer installations.
- SANS 1020 (2013): Power-operated dispensing devices for flammable liquid fuels

These standards have been taken into account by the Consulting Engineers who designed the facility and will be constructed (civil, mechanical and electrical) according to the specifications to meet compliance to, prevent onsite failures and onsite and offsite accidents and contamination.

SUMMARY OF THE IMPACT ASSESSMENT RESULTS

Though the initial set up costs are high during the preconstruction and construction phases of the Fuel station and associated infrastructure, it does offer direct and indirect employment opportunities and capacity building in the receiving community of Otjinene and perhaps other Villages such as Epukiro and Okondjatu. However, minor negative impacts in the form of visual intrusion, dust and noise pollution especially during the preconstruction, construction, operation and rehabilitation phases will be experienced. The following is a summary of the likely positive impacts that have been assessed for the different phases of the proposed Fuel Station project:

- i. Reduce the impacts and vulnerability of community to the effects of climate change (Likely impacts are low).
- ii. Raising awareness about the benefits of ecologically sustainable natural resource use (Likely impacts are high).
- iii. Socio-economic development and capacity building through mining and also agricultural skills transfer and training from the garden that will be set up (Likely impacts are high).

The following is a summary of the likely negative impacts that have been assessed for the different phases of the proposed Fuel Station project:

- i. Dust (Likely impacts are high but localized and can employ dust suppressing measures).
- ii. Land use (Likely impacts are negligible; the Fuel Station site is isolated from the distant farms).
- iii. Noise (Likely impacts are low as the site is far from residential areas).
- iv. Visual impact (Likely impacts are low for visual change as the Fuel Station infrastructure will be stationary on a localized portion of the river bank and obscured by natural riverine vegetation).
- v. Ecological and biodiversity loss (Likely impacts are localized and low).
- vi. Health and safety (Overall likely impacts are low with correct PPE).
- vii. Solid and hazardous waste management (Likely impacts are low with a solid waste management plan and minimal hydrocarbon fuel use).
- viii. Socioeconomic (Likely negative impacts are low)

Water pollution risk (Likely impacts are low with a wastewater mitigation regime as prescribed in the environmental management plan and no interference with the ground water table during any Fuel Station activity).

CONCLUSION AND RECOMMENDATIONS

It can be concluded that positive impacts for the Fuel Station activities outweighs the negatives impacts identified during the process of EIA. Most of the negative effects are not very high and they can be mitigated through detailed recommendations provided under their sections in the EMP.

Based on the environmental impact assessment of both the identified positive and negative impacts undertaken for the proposed Unanisa Hei Investment cc Fuel Station project, the positive effects of this project significantly outweigh the negative ones. Most of the negative impacts are localized especially in terms of biodiversity loss, dust and noise pollution, mitigation measures as prescribed in the Environment Management Plan should be adhered to, so as to minimize these effects as much as possible. The Fuel Station sites along the B2 Highway and permission to carry out the proposed Unanisa Hei Investment cc project have been obtained through following the proper channels and the surrounding community members have been incorporated into the project so as to enable them to sustain their livelihoods.

It is hereby recommended that the proposed Unanisa Hei Investment cc Fuel Station project receives the blessings of the Ministry by issued with the Environmental Clearance Certificate for the development of the Fuel Station project. The Environmental Management Plan and the proposed mitigation measures must be adhered to as key responsibility of the proponent. Enviro-Leap Consulting cc will periodically and on appointment by the proponent, carry out environmental audits to assure adherence with the EMP.

1 INTRODUCTION

1.1 INTRODUCTION TO THE PROPOSED PROJECT

1.1.1 PROJECT RATIONALE

Unanisa Hei Investment cc (UHI-CC) is a fully registered, 100% Namibian owned company. Their aim is to provide petroleum retail services including distribution of fuel (Petrol and Diesel) and related products to the Namibian remote communities. The business model is based on the sourcing and supply of high quality and affordable petroleum products. The business values the key pillars of sustainability and thus keens to ensure that all its activities are conducted in a social, environmental and economically ethical manner. These is attain through full compliance with guiding principles and legislations.

In accordance with the provisions of the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazette and the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007), the Fuel Station activities proposed by Unanisa Hei Investment cc may not be undertaken without an Environmental Clearance Certificate (see Table 1 below).

In line with the national environmental assessment process the required environmental scoping assessment encompassing the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the existing Unanisa Hei Investment cc Fuel Station project have been undertaken in order to apply for Environmental Clearance Certificate (ECC), triggered by the proposed project:

Table 1: List of farming activities identified in the EIA Regulations which apply to the Unanisa Hei Investment cc Fuel Station project

EMA 2007 Legislation	Description of activity	Relevance to TPT cc's Fuel Station project
Activity 4 (Forestry activities)	The clearance of forest areas, deforestation, afforestation, timber harvesting or any other related activity that requires authorisation in terms of the Forest Act, 2001 (Act No. 12 of 2001) or any other law.	The proposed project entails clearing some portions of land to make it arable and accessible for agricultural purposes.
The project is listed as an activity requiring an environmental clearance certificate as per the following points from Regulation 29(sub-regulation 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."	The project involves the haulage, storage and handling of a potential hazardous substances (fuel)
	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."	The project involves the haulage, storage and handling of a potential hazardous fuels and other petroleum products
	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."	The project involves the haulage, and storage of Fuel (Diesel and Petrol) of upto 30 cubic meters
	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."	Aspect of the project require the construction and maintenance of a warehouse facility particularly at Otjinene

1.1.2 PROPOSED PROJECT LOCATION

Otjinene is a village in the Omaheke Region of Namibia. It is the district capital of Otjinene Constituency. Otjinene is connected via a 157 kilometres (98 mi) tared road to the regional capital Gobabis, and via a 227 kilometres (141 mi) road which was tared in 2017 from Otjinene to Grootfontein. The village connects the Trans-Kalahari corridor route with the Trans-Zambezi route, through the B2 road. As a result, a large number of vehicles, long distance trucks and tourists travel through the village.

Otjinene is surrounded by a communal area, where there are many villages. There are more or less 20 households in each village. The majority of the people around Otjinene are communal farmers, farming with cattle, goats and sheep. There is one health clinic which operates under the Ministry of Health and Social Services, and a number of retail stores

The proposed fuel supply facility aims at alleviating the fuel shortage experienced by motorists in the area. This facility will secure fuel availability in Otjinene. The proposed retail fuel facility will also provide the much-needed modern fueling point with all its associated services, especially to tourists and residents of the surrounding villages and long distance motorists. It adopts the standard ground buried petrol storage tanks and the above-ground diesel storage tanks as illustrated in **Figure 2**.

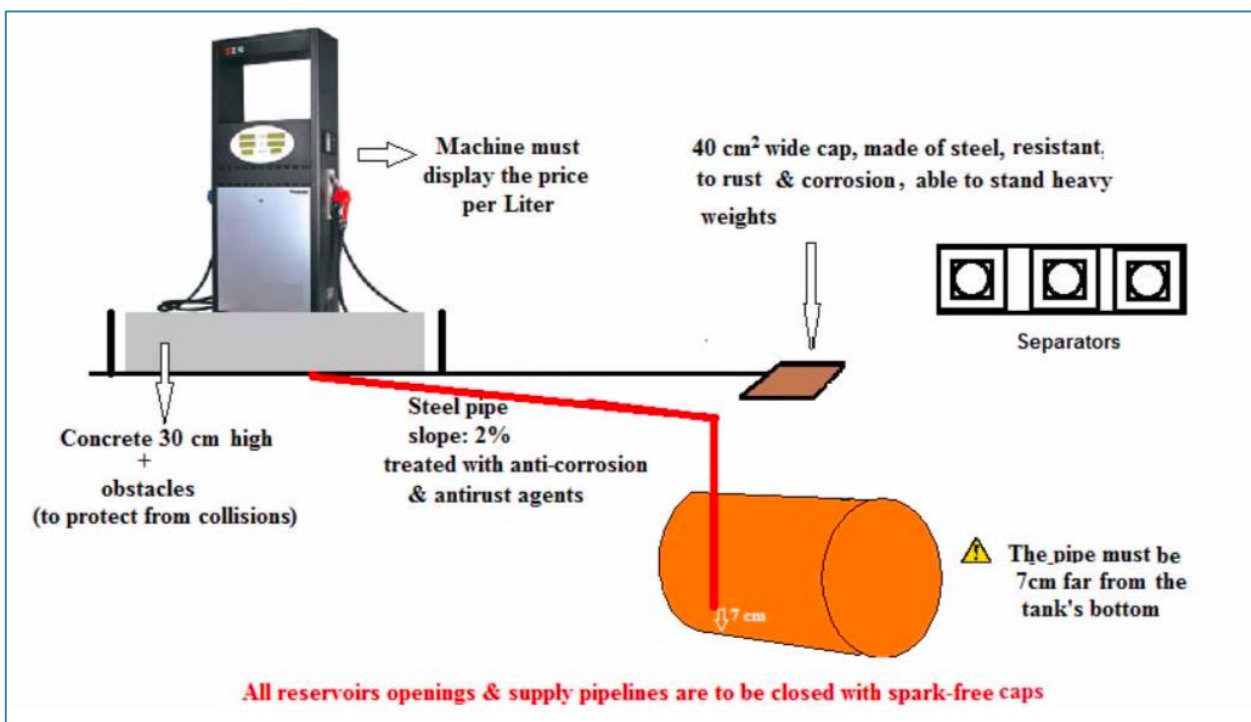


Figure 2: Show the illustration of the preferred fuel facility setup as per both national legislations and global best-practice

1.2 PROPOSE PROJECT ACTIVITIES

The following is the summary of the activities associated with the preconstruction, construction, operational and rehabilitation stages of the proposed Fuel Station which have been considered in the impact assessment as potential sources of impacts (impact factors):

- Creation of a right of way servitude to access the fuel station
- Fencing around the backside of the Fuel Station
- Sourcing of Water (connecting to existing / drilling of new borehole) and Power (installation of Diesel Generator)
- Construction of the associated fuel and value added infrastructure (Tuck shop, Car Wash, Truck Park and Ablution Facilities)
- Closure and Decommissioning, and Rehabilitation of the site after closure

The project is made up of 3 phases, namely the construction, operation and possible decommissioning. Activities involved in all phases are as follows:

Construction Phase:

- Excavation for the pipeline trenches and the tank pits.
- Transport and installation of the storage tanks and relevant material.
- Installation of fuel pipelines and the constructions of dispensing pump islands and installation of the pumps.
- Installation of associated electrical supply.
- Construction of associated buildings and other infrastructure.

Operational Phase:

- Filling of the underground storage tanks from road transport tankers.
- Dispensing of fuel into vehicles and other approved containers.

Decommissioning Phase:

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

2 ENVIRONMENTAL LAWS AND POLICIES

This section draws information from the legal sources in Namibia. The Republic of Namibia has five tiers of law and a number of policies relevant to uranium mining and these include:

- The Constitution.
- Statutory law.
- Common law.
- Customary law.
- International law.

As the main source of legislation, the Namibian constitution makes provision for the creation and enforcement of applicable legislation. In this context and in accordance with its constitution, Namibia has passed numerous laws intended to protect the natural environment and to mitigate against adverse environmental impacts.

Namibia's policies provide the framework to the applicable legislation. Whilst policies do not often carry the same legal recognition as official statutes, policies can be and are used in providing support to legal interpretation when deciding cases.

2.1 APPLICABLE LAWS AND POLICIES

In the context of uranium mining and related infrastructure in Namibia, there are several laws and policies currently applicable. Each of these is discussed in detail below.

2.1.1 NAMIBIA'S ENVIRONMENTAL IMPACT ASSESSMENT (EIA) POLICY OF 1995

This policy promotes accountability and informed decision making through the requirement of EIAs for listed programs and projects.

2.1.2 ENVIRONMENTAL MANAGEMENT ACT

To enforce the policy on EIAs, the Environmental Management Act (EMA) (7 of 2007) has been compiled, but is yet to practically come into force because the required regulations are still in draft form. The EMA is expected to improve the management of impact assessments in Namibia through the establishment of an environmental commissioner, who will approve environmental plans and through requiring government agencies to work as a cohesive decision-making agents to ensure long term sustainable resource use.

2.1.3 THE WATER RESOURCES MANAGEMENT ACT

The Water Act (11 of 1956) regulates the abstraction of groundwater for mining purposes. This Act is also an example of the older legislation which does not meet the needs of Namibia's modern development patterns. In recognition of this, the Water Resources Management Act (11 of 2013) has been drafted and enacted. It is still to come into force. This Act is more relevant to addressing Namibia's geohydrological and climatic contexts.

2.1.4 THE FOREST ACT

The Forest Act (12 of 2001) allows for the declaration of protected areas in terms of soils, water resources, plants and other elements of biodiversity. This includes the proclamation of protected species of plants and the conditions under which these plants can be disturbed, conserved, or cultivated.

2.1.5 PETROLEUM PRODUCTS AND ENERGY ACT OF NAMIBIA

The Act (**Act No. 13 of 1990**) makes provision for impact assessment for new proposed fuel retail facilities and petroleum products known to have detrimental effects on the environment.

2.1.6 LABOR ACT, 2007 ACT 11 OF 2007

Construction safety is regulated under the Health and Safety Regulations under the Labour Act. The health and safety framework in Namibia regulates the following aspects:

- Construction safety; Electrical safety; Machinery safety;
- Hazardous substances; Physical hazards and general provisions;
- Medical examinations and emergency arrangements;
- Rights and duties of employees.

2.1.7 COMMUNAL LAND REFORM ACT OF 2003

The Communal Land Act states for the appropriation of rights in respect of communal land to establishment communal Land Boards, for the provision of chief and Tradition Authorities power. Two types of rights are identified in the Act, Customary land and rights by leaseholder. The local authority is mandated to allocate land rights in terms of customary land right vest in the Traditional Authority verified by the Land Board, while in case of rights by lease vest in the Land Boards of the designated areas (LAC, 2003).

2.1.8 ATMOSPHERIC POLLUTION PREVENTION ORDINANCE OF NAMIBIA

The Ordinance (No. 11 of 1976) Part 2 of the Ordinance governs the control of noxious or offensive gases. The Ordinance prohibits anyone from carrying on a scheduled process without a registration certificate in a controlled area. The registration certificate must be issued if it can be demonstrated that the best practical means are being adopted for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process. Walvis Bay has been declared a controlled area for the purposes of the Ordinance.

2.1.9 HAZARDOUS SUBSTANCES ORDINANCE

The Ordinance (No. 14 of 1974) applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Welfare. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.

2.2 THE UNITED NATIONS CONVENTION ON BIOLOGICAL DIVERSITY

This over-arching international convention is relevant to biodiversity conservation and management.

2.2.1. THE INTERNATIONAL FINANCE CORPORATION'S (IFC) POLICY ON SOCIAL AND ENVIRONMENTAL SUSTAINABILITY

The Developer is likely to seek funding from an international funding organisation such as the International Finance Corporation (IFC). The IFC's Environmental requirements for projects they fund are contained in the above document and the various Performance Standards. The following Standards are applicable:

- Performance Standard 1:
- Performance Standard 3: Performance Standard 4:
- Social and Environmental Assessment and Management Systems
- Pollution Prevention and Abatement
- Community Health, Safety and Security.

These Performance Standards have been considered and the applicable requirements incorporated into the EIA and EMP.

3 PUBLIC CONSULTATION

The range of environmental issues to be considered in the EIA has been given specific context and focus through consultation with authorities and IA&Ps. Included below is a summary of the people consulted, the process that was followed, and the issues that have been identified.

3.1 AUTHORITIES AND INTERESTED AND AFFECTED PARTIES (I & APs)

A Background Information Document was prepared by Enviro-Leap Consulting cc and made available to stakeholders as part of the public consultation requirements preceding the development of an Environmental Scoping Report. This was in line with the environmental regulatory requirements and project registration. During the public stakeholder meeting, concerns on the likely impacts of the proposed Unanisa Hei Investment cc Fuel Station activities were raised especially on whether the mining activities posed any health risk to the community and the underground water table.

The following authorities and IAPs are involved in the EIA process:

National and Regional authorities:

- Ministry of Mines and Energy
- Ministry of Environment and Tourism
- The Maharero Traditional Authority

I & APs:

A call for registration of I & APs did not yield any fruitful results (as there were no parties that showed interest)

3.2 STEPS IN THE CONSULTATION PROCESS

Table 3 below sets out the steps in the consultation process that has been conducted to date.

Table 2: Consultation Process with IA&Ps and Authorities

TASK	DESCRIPTION	DATE
Notification - regulatory authorities and IAPs		
I & APs identification	Newspaper notifications calling for registration as Interested and Affected Party for the proposed project, published in the Namibian and New Era Newspapers	03 July 2019
Newspaper advertisements	Newspaper notifications calling for Interested and Affected Party to attend a public meeting on the proposed project activities	10 July 2019
Review of scoping report		
Competent Authority consent	Submission of Application to Competent Authority (Ministry of Mines and Energy) to obtain consent for the environmental clearance application.	11 March 2019
I & APs and authorities (excluding MET) review of scoping report	Online provision for public review and input on the Scoping Report of the proposed project, comments to be made directly to the Office of Environmental Commissioner	tbc

4 DESCRIPTION OF THE CURRENT ENVIRONMENT

4.1 BASELINE DATA ON AFFECTED ENVIRONMENT

GEOGRAPHIC AND DEMOGRAPHIC

The Omaheke Region is situated east of the capital of Windhoek and spans 84,981 km² and a low population of approximately 70,800 people (with a density of 0.83 / km²) (Namibia Statistics Agency 2011). The region is predominately characterized by grassland and sparsely vegetated shrubland, and scattered small areas of closed canopy forest. The land tenure is predominantly privatized, except for the community lands in northeast districts. Land use is mostly rangeland cattle farming, much of it being intensive commercial cattle farming, grain production, and a large proportion of smallholder subsistence agriculture mainly in the communal lands (King et al. 2011, Gilolmo and Lobo 2016). Namibia is naturally the most arid country in sub-Saharan Africa, and prolonged droughts are well-known occurrences, which is projected to increase and become more unpredictable in the future (Ziedler 2010).

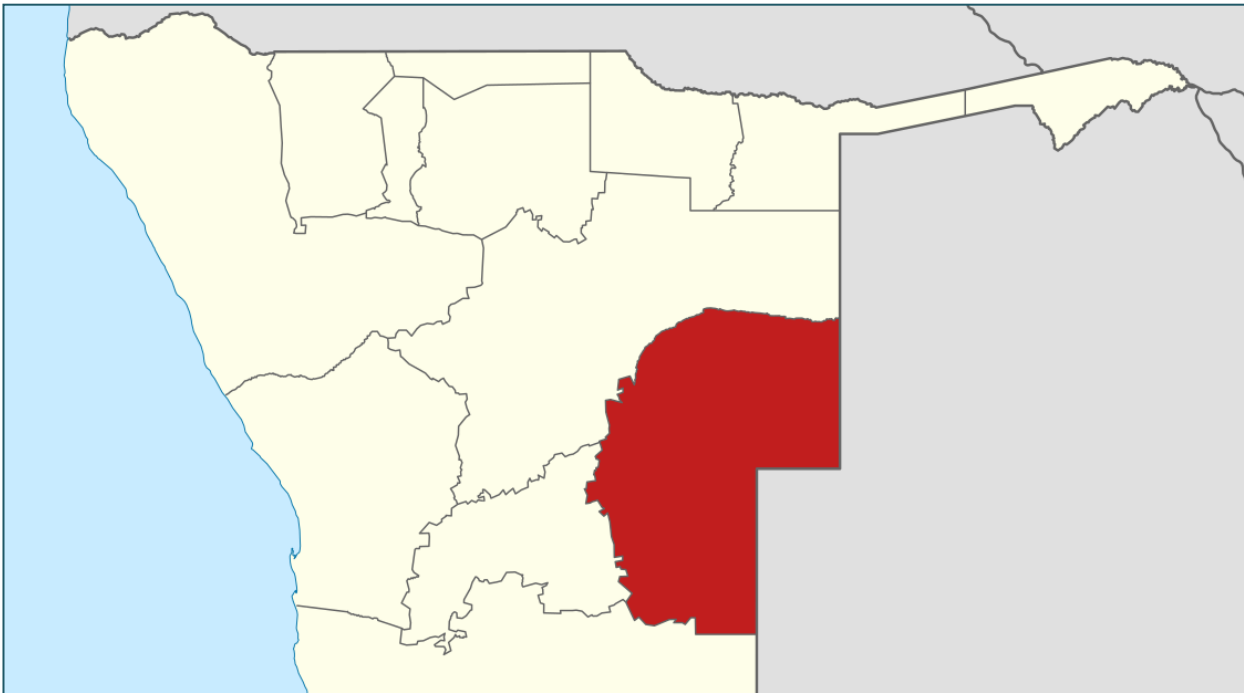


Figure 3: Depicts the locality of the Omaheke Region where Otjinene Village (at which the proposed project site) is situated.

CLIMATIC BASELINE

The summer months (December – February) are hot, with temperatures of up to 40 °C, while daytime temperatures are pleasant during the winter months (June – August). Winter nights are generally cool and sub-zero temperatures are not uncommon. The region's mean annual rainfall amounts to about 400 mm. About 85% of total annual rainfall is recorded between November and March (**Figure 4**). The prominent winds rise from the north-easterly direction reaching average speed of between 5 km/h and 20 km/h (**Figure 5**).

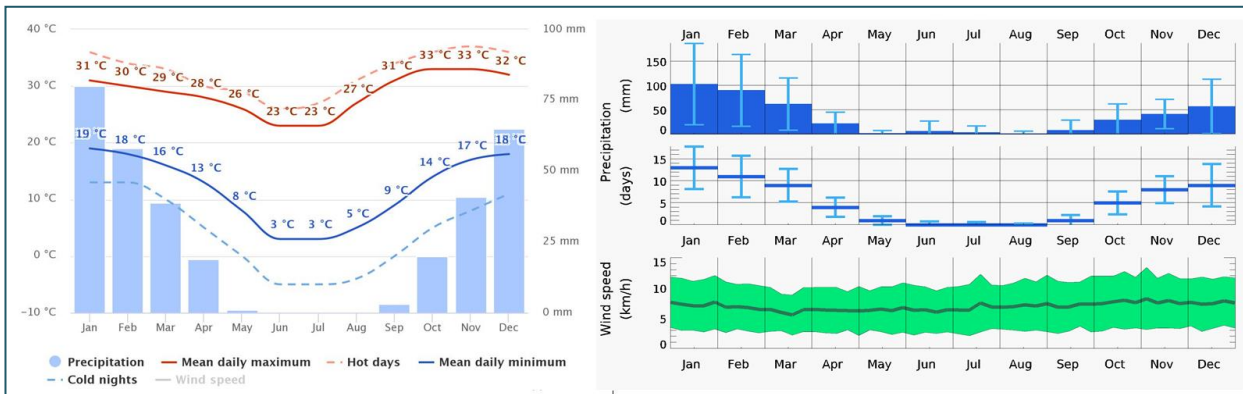


Figure 4: Combined graph of annual average minimum and maximum temperature, precipitation and number rainy days in proximity of the project site (Gobabis).

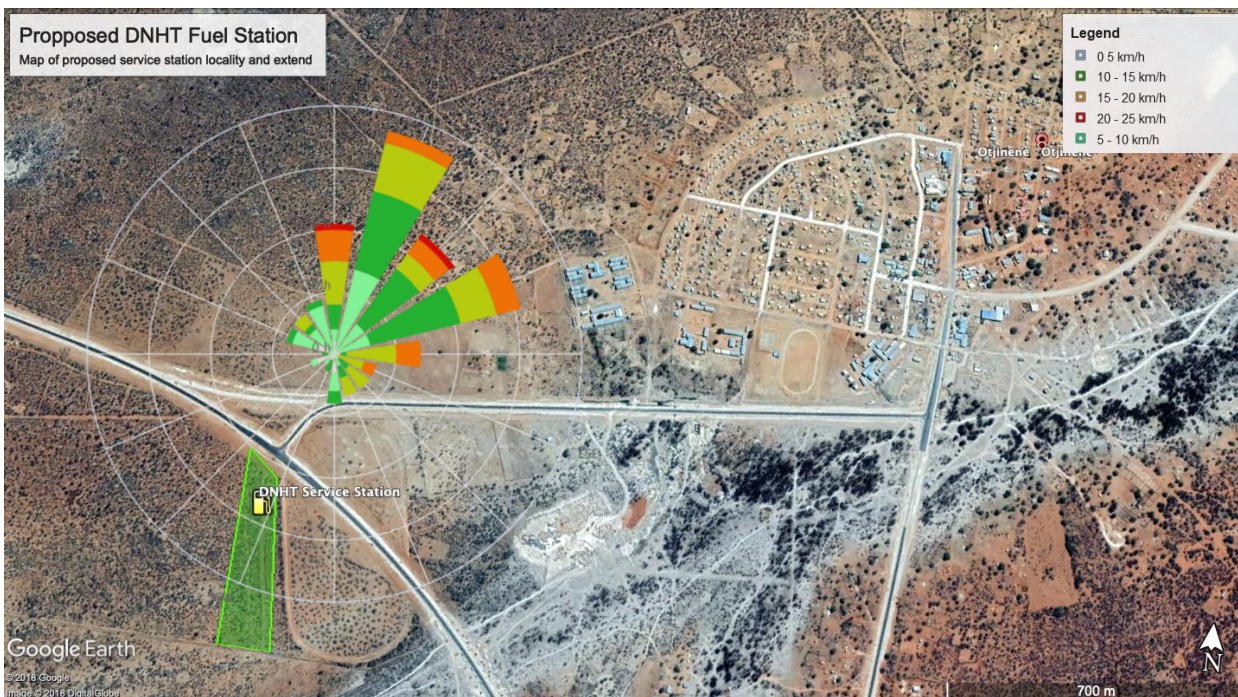


Figure 5: Map of Wind-Rise Direction and Speed (at Gobabis, situated 150 km south-west of Otjinene)

TOPOGRAPHY, GEOLOGY AND SOILS

The Omaheke Region lie on the western edge of a vast basin of sand, and it is this sand that determines much about the vegetation, wildlife, farming and mineral potential of the region. Groundwater is generally available throughout both regions, and the quality of water is also generally good. Higher yielding aquifers are present in several areas: around Grootfontein, Leonardville, Hochfeld and in the Eiseb. The site topography is flat with no water catchment streams, tributary or rivers observe, implying that most of the rain falling on the surface infiltrates directly into the Kalahari sandy soil.

BIOPHYSICAL (VEGETATION AND WILDLIFE)

The vegetation falls largely within the Tree Savannah and Woodland (Northern Kalahari) (Giess 1998), but especially the southern part is strongly ecotonal towards the Camelthorn Savannah (Central Kalahari), whilst the western part fringes on the Thornbush Savannah. This results in rather homogenous landscapes in the central parts with very gradual changes in composition towards the far south-east, and more distinct changes towards the west and south-west, as the vegetation changes into Thornbush savannah. In the far north, near Otjituuo, the study area falls within the southern extent of the Karstveld. The vegetation of the eastern communal conservancies has been fully described (Strohbach, submitted), and the environmental drivers of this vegetation were described in a second paper (Strohbach & Kutuahuripa, submitted). In this third paper of the series, an annotated species list of these conservancies and farming areas is presented.

The plant diversity of the study area is estimated to be between 150 and 299 species (or “lowmedium” diversity), based on incomplete herbarium records due to the general inaccessibility of the area (Craven, 2001; Mendelsohn et al. 2002). Based on this assessment, the area is classed as of lesser importance for plant conservation purpose (Hofmeyr, 2004). Yet, management problems, like illegal wood harvesting for fencing posts, exist in these conservancies and farming areas (Hofmann, 2013), and these could lead to severe desertification (Midgley et al. 2005; Thomas et al. 2005). This study presents a unique opportunity of improving the knowledge of the floristic diversity of the area, which is, in itself, an important management and monitoring tool.

The vegetation can be divided into two broad types, these being the “Sandveld”, dominated by *Terminalia sericea* and *Combretum* species, and the “Hardeveld”, comprised of a mixture of savannah dominated by *Acacia* species, Karstveld elements, wetland vegetation, and vegetation on shallow calcareous soils (Strohbach, submitted) (Figure 2). The “Hardeveld” mainly forms a fringe around the sand plains of the Kalahari (the Sandveld), but it also occurs in patches within this sand plateau. Typical “Hardeveld” elements are vleys, calcrete depressions and the omirimbi (Strohbach, 2008).

Association	Observed	r	n	Estimated
1 <i>Acacio fleckii</i> – <i>Terminalietum prunioidis</i> thickets	92	30	17	120
2 <i>Acacio tortilis</i> – <i>Combretetum imberbis</i> woodlands	117	24	6	137
3 <i>Ptychobolus biflorus</i> – <i>Acacietum luederitzii</i> floodplain bushlands	107	46	6	145
4 <i>Eragrostia echinocloideae</i> – <i>Eriocphaloetum luederitziani</i> low shrublands	114	26	9	137
5 <i>Acacio melliferae</i> - <i>Catophractetum alexandri</i> shrublands	201	34	19	233
6 <i>Acacio melliferae</i> – <i>Hyphaenetum petersianae</i> thickets	143	43	8	181
7 <i>Panicum gilvum</i> – <i>Marsilea</i> vley community	26	26	1	26
8 <i>Eragrostia rigidioris</i> - <i>Urochloaetum brachyurae</i> grasslands	182	43	18	223
9 <i>Tarchonanthe camphorati</i> – <i>Acacietum eriobolae</i> bushlands	176	44	24	218
10.1 <i>Rhigozo brevispinosi</i> – <i>Acacietosum melliferae</i> shrublands	203	45	30	247
10.2 <i>Stipagrostis uniplumis</i> – <i>Acacietosum melliferae</i> shrublands	214	37	30	250
11 <i>Terminalia sericeae</i> – <i>Acacietum eriobolae</i> bushlands	171	42	18	211
“Hardeveld” total	404	40	186	444
12.1 <i>Acacio melliferae</i> – <i>Terminalietosum sericeae</i> shrublands	222	46	90	267
12.2 <i>Grewia flavae</i> – <i>Terminalietosum sericeae</i> shrublands	196	42	45	237
12.3 <i>Combretum collini</i> – <i>Terminalietosum sericeae</i> bushlands	185	39	61	223
12.4 <i>Burkea africanae</i> – <i>Terminalietosum sericeae</i> bushlands	145	32	40	176
13 <i>Terminalia sericeae</i> – <i>Schinziophytetum rautanenii</i> bushlands	95	34	6	123
14 <i>Burkea africanae</i> – <i>Pterocarpetum angolensis</i> bushlands	101	36	16	135
“Sandveld” total	305	39	265	344
Grand total	442	39	451	481

(Source: Strohbach, 2008)

5 ALTERNATIVES CONSIDERED

5.1 CURRENT AND FUTURE LAND USE ALTERNATIVES

On consideration of alternatives for suitable sites, three possible areas were identified and one considered to be less sensitive and thus recommended as the main site. The other two are already taken-up by other lease right holders and thus could not be recommended for the proposed activity. Hence, sand at preferred Sites 1 which is also allocated to the proponent in respect to this proposed activity is considered the only most suitable site.

Further considerations taken into account during the site selection process are; that the area is sparsely inhabited, easily accessible, not in an area prone to flooding (therefore the Fuel Station infrastructure and personnel are at minimal risk). Given that there is a presence of tarred road, access to the site by passing and local vehicle users, it is deemed that the fuel station is well located in servicing the consumer base without intruding into areas demarcated for other land uses.

5.2 THE “NO-GO” OPTION LINKED TO NEED AND DESIRABILITY

The assessment of this option requires a comparison between the alternatives of proceeding with the proposed fuel station development with that of not proceeding. Proceeding with the project will enable the enhancement of the Namibian quest for rural development and decentralization of key services and the project will therefore result in significant positive economic and social impacts.

Not proceeding with the proposed project will prevent Fuel Station project from producing the envisaged sand and quarry products and thus resulting in the current land use unchanged or developed.

6 ENVIRONMENTAL IMPACT ASSESSMENT

6.1 INTRODUCTIONS TO THE ASSESSMENT APPROACH

Potential environmental impacts were identified by EnviroLeap in consultation with IAPs, regulatory authorities, specialist and Unanisa Hei Investment cc. In case of social impacts, the assessment focused on third parties only (third parties include members of the public and other local and regional institutions) and did not assess health and safety impacts on workers because the assumption was made that these aspects are separately regulated by health and safety legislation, policies and standards.

The assessment of the impact of the proposed development on vegetation was conducted by means of a site visit, early December 2016, and a comprehensive botanical assessment was conducted out in the area through field observations and recording.

The impacts are discussed under issue headings in this section. The discussion and impact assessment for each sub-section covers the construction, operational, decommissioning and closure phases where relevant. This is indicated in the table at the beginning of each sub-section. Included in the table is a list of project activities/infrastructure that could cause the potential impact per mine phase. The activities/infrastructure that are summarized in this chapter, link to the description of the proposed project (see Section 6 of the Scoping report).

Mitigation measures to address the identified impacts are discussed in this section and included in more detail in the EMP report that is attached in **Appendix E**. In most cases (unless otherwise stated), these mitigation measures have been taken into account in the assessment of the significance of the mitigated impacts only.

Both the criteria used to assess the impacts and the method of determining the significance of the impacts is outlined in **Table 4**. This method complies with the method provided in the Namibian EIA Policy document and the draft EIA regulations. Part A provides the approach for determining impact consequence (combining severity, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D. Both mitigated and unmitigated scenarios are considered for each impact.

Table 3: Criteria for Assessing Impacts

PART A: DEFINITION AND CRITERIA		
Definition of SIGNIFICANCE	Significance = consequence x probability	
Definition of CONSEQUENCE	Consequence is a function of severity, spatial extent and duration	
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	H	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action. Irreplaceable loss of resources.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints. Limited loss of resources.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favorable publicity.
Criteria for ranking the DURATION of impacts	L	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of Impacts	L	Localized - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

PART B: DETERMINING CONSEQUENCE

SEVERITY = L					
DURATION	Long term	H	Medium	Medium	Medium
	Medium term	M	Low	Low	Medium
	Short term	L	Low	Low	Medium
SEVERITY = M					
DURATION	Long term	H	Medium	High	High
	Medium term	M	Medium	Medium	High
	Short term	L	Low	Medium	Medium
SEVERITY = H					
DURATION	Long term	H	High	High	High
	Medium term	M	Medium	Medium	High
	Short term	L	Medium	Medium	High
			L	M	H
			Localized Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/ national
SPATIAL SCALE					

PART C: DETERMINING SIGNIFICANCE					
PROBABILITY (of exposure to impacts)	Definite/ Continuous	H	Medium	Medium	High
	Possible/ frequent	M	Medium	Medium	High
	Unlikely/ seldom	L	Low	Low	Medium
			L	M	H
CONSEQUENCE					

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	Decision guideline
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

*H = high, M= medium and L= low and + denotes a positive impact.

6.2 GROUNDWATER IMPACT ASSESSMENT

6.2.1 ISSUE: IMPACT ON GROUNDWATER POLLUTION

The effect of Fuel Station activity resulting from too deep excavation would lead to potential contamination of groundwater, however due to the deep sandy soil found in the Omaheke region and at the project site, this risk is very minimal. The installation of underground fuel tanks, particularly for the storage of Diesel fuel must be discouraged by all means, while Petrol Tanks may be permitted.

Table 4: Impact on Groundwater Resources - link to phase & activities

Construction	Operational	Decommissioning	Closure
<u>Site preparation activities:</u> <ul style="list-style-type: none"> Excavations of sand for installation of underground Petrol Tanks Construction of associated infrastructures 	<u>Operation & maintenance of infrastructure:</u> <ul style="list-style-type: none"> Handling and storage of the fuel and other hazardous substances Maintenance of the storage tanks 	<u>Site preparation activities:</u> <ul style="list-style-type: none"> Removal of both the sub-surface and underground fuel storage Rehabilitation site and disposal of waste generated 	<u>Post-closure After-care</u> <ul style="list-style-type: none"> Removal of both the sub-surface and underground fuel storage

6.2.1.1 ASSESSMENT OF IMPACT

If unmitigated, the impact severity in particular where the Fuel Storage Facilities are not carefully installed and equipped with the necessary spill control measures, any fuel spill that shall occur might intersect with the water table and cause contamination with hydro-carbons. The consequent impact will be rated as high risk with long-term effect, it is therefore highly significant that spill control measures are employed.

Tabulated summary of the assessed impact – hazardous excavations and infrastructure

Mitigation	Severity	Duration	Spatial Scale	Consequence	Probability of Occurrence	Significance
Unmitigated	H	H	M	M	L	H
Mitigated	L	L	L	L	L	L

6.2.1.2 CONCEPTUAL DESCRIPTION OF MITIGATION MEASURES

Conceptual discussion of the mitigation measures is provided below and detailed in the EMP (Appendix E).

In the construction, operation and decommissioning phases all hazardous chemicals and materials (new and used), dirty water, and non-mineralised wastes should be handled in a manner that they do not pollute soils. The proponent must adopt best pollution prevention practice through basic infrastructure design and through education and training of workers and the required steps to enable fast reaction to contain and re

6.3 BIODIVERSITY

6.3.1 ISSUE: GENERAL PHYSICAL DISTURBANCE OF BIODIVERSITY

The assessment covers the following broad topics: physical destruction of biodiversity and related functions, impacts on vegetation as an ecological driver, and general disturbances to biodiversity in line with the content of the baseline description, and the content of the EMP (**Appendix E**).

With the land use classified as mixed Urban (Village) land uses consisting of Residential, Institutional, Industrial and Agricultural, the site selected for the proposed UHI-CC fuel facility activity, some degree of ecological disturbance may have already occurred such as clearing of vegetation. Impacts on tree species is observed where the village development extend further to some virgin area on the outskirts of the townlands.

Table 5: Physical destruction and disturbance to biodiversity - link to phase and activities

Construction	Operational	Decommissioning	Closure
<u>Site preparation activities:</u> <ul style="list-style-type: none"> Excavations of sand for installation of underground Petrol Tanks Construction of associated infrastructures 	<u>Operation & maintenance of infrastructure:</u> <ul style="list-style-type: none"> Handling and storage of the fuel and other hazardous substances Maintenance of the storage tanks 	<u>Site preparation activities:</u> <ul style="list-style-type: none"> Removal of both the sub-surface and underground fuel storage Rehabilitation site and disposal of waste generated 	<u>Post-closure After-care</u> <ul style="list-style-type: none"> Removal of both the sub-surface and underground fuel storage

6.3.2 ASSESSMENT OF IMPACT

In the unmanaged scenario, biodiversity will be disturbed in the following ways:

- Illegally collection and removal of vegetation, vertebrate and invertebrate species
- Dust fallout from various dust sources may have adverse effects on the growth of some vegetation and it may cause varying stress on the teeth of vertebrates that have to graze soiled vegetation
- The infrastructure may lead to habitat fragmentation and potential break-down of key ecosystem corridors (migratory routes) and pollution emissions and general litter may directly impact on the survival of individual plants, vertebrates and invertebrates.

Taken together, the disturbances will have a high severity in the unmitigated scenario. In the mitigated scenario, many of these disturbances can be prevented or mitigated to acceptable levels, which reduces the severity to low.

Tabulated summary of the assessed impact – destruction of biodiversity

Mitigation	Severity	Duration	Spatial Scale	Consequence	Probability of Occurrence	Significance
Unmitigated	M-H	H	M	H	H	H
Mitigated	L	H	M	M	L	L

6.3.3 CONCEPTUAL DESCRIPTION OF MITIGATION MEASURES

Conceptual discussion of the mitigation measures is provided below and detailed in the EMP (**Appendix E**).

Avoid unnecessary clearing of vegetation. The laydown areas will be placed within the site boundary, not affecting adjacent land uses. A fauna and flora survey was conducted to identify the presence of any key flora and fauna species of importance onsite and along the proposed transmission line route.

In the construction, operation and decommissioning phases a biodiversity management plan will be implemented. The key components are:

- To generally limit the UHI-CC cc, construction and operation activities and related disturbance to the area specifically identified footprint area and described in this EIA report. As part of this commitment the size of development areas should be kept to an absolute minimum
- To audit the activities of construction and operation teams in the footprint area on a routine basis. Where the construction teams have not complied with the relevant plans contractual penalty clauses will apply
- Implementation of an alien/invasive/weed management programme to control the spread of these plants onto and from disturbed areas
- If irreplaceable biodiversity will be permanently lost and restoration is not possible, a biodiversity offset will be investigated. The modified approach is considered justified on the basis that should all the mitigation measures be successfully implemented then the level of impact should be acceptable (reducing to medium significance in the range of medium to high).

6.4 AIR QUALITY

6.4.1 ISSUE: AIR QUALITY IMPACTS ON SURROUNDING RECEPTORS

With regard to dust impacts, dust suppression techniques should be employed if the specific activity is likely to create dusty atmospheric conditions in excess of the periodic extremes. Avoid activities that create excessive dust on extremely windy days. Personnel are required to wear personal protection equipment (PPE) such as dust masks if excessive dust is created for prolonged working periods. Using water to suppress drought is not an option since the country is experiencing a severe drought.

Table 6: Air quality impacts – link to operation phases and activities

Construction	Operational	Decommissioning	Closure
<u>Site preparation activities:</u> <ul style="list-style-type: none"> • Excavations of sand for installation of underground Petrol Tanks • Construction of associated infrastructures 	<u>Operation & maintenance of infrastructure:</u> <ul style="list-style-type: none"> • Handling and storage of the fuel and other hazardous substances • Maintenance of the storage tanks 	<u>Site preparation activities:</u> <ul style="list-style-type: none"> • Removal of both the sub-surface and underground fuel storage • Rehabilitation site and disposal of waste generated 	<u>Post-closure After-care</u> <ul style="list-style-type: none"> • Removal of both the sub-surface and underground fuel storage

6.5.2 ASSESSMENT OF IMPACT

In the unmitigated scenario, surface water may collect contaminants from numerous diffuse sources. At elevated pollution concentrations these contaminants can result in water concentrations that are above recommended drinking water guidelines and on biodiversity. The dilution effect of the floodwater has not been studied in detail but it will reduce the concentration of any contaminants.

In the mitigated scenario, most surface water run-off should be relatively clean and the severity reduces to low because systems and procedures can be implemented to contain pollution at source and isolate it from potential water resources.

Tabulated summary of the assessed cumulative impact – surface water pollution

Mitigation	Severity	Duration	Spatial Scale	Consequence	Probability of Occurrence	Significance
Unmitigated	L	M	M	L	L	H
Mitigated	L	L	M	L	L	L

6.5.3 CONCEPTUAL DESCRIPTION OF MITIGATION MEASURES

Conceptual discussion of the mitigation measures is provided below and detailed in the EMP (**Appendix E**).

The site selection took into account the pre-dominant windrose direction and thus the reducing the potential risk of the Otjinene residents being exposed to methane and other potentially harmful greenhouse gasses.

7 KEY ASSUMPTIONS, UNCERTAINTIES AND LIMITATIONS

Assumptions, uncertainties and limitations have been discussed throughout the EIA report and in the various specialist studies. The more significant of these included

The EIA focused on third parties only and did not assess health and safety impacts on workers because the assumption was made that these aspects are separately regulated by health and safety legislation, policies and standards, and that Unanisa Hei Investment cc will adhere to these.

8 ENVIRONMENTAL IMPACT STATEMENT & CONCLUSION

The vegetation in the proposed area ear-marked for Unanisa Hei Investment cc is sparsely distributed with a few forest-protected trees distributed within the vicinity. The impact of the project to the vegetation in the area can be rated low since the area is sporadically vegetated.

Table 7: Summary of potential cumulative impacts associated with the proposed project

Section	Potential impact	Significance of the impact (the ratings are negative unless otherwise specified)	
		Unmitigated	Mitigated
Soils and land capability	Loss of soil resources from pollution	H	M-L
	Loss of soil resources from physical disturbance	H	M-L
Biodiversity	Physical destruction of biodiversity from clearing land and placing infrastructure	H	L
	Loss of biodiversity from the loss of subsurface water resources	H	L
	General disturbance of biodiversity	H	L
Water resources	Pollution of surface and groundwater	H	L
Air quality	Air pollution from dust and use of vehicle and diesel generator	H	H
Socio-economic impacts	Injury to third parties, risk of HIV/AIDS and Gender issues	M	L

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APPENDICES

APPENDIX A – PROJECT TEAM CURRICULUM VITAE

<p>PROFESSIONAL RESUME</p> <p>VILHO PANDEINGE MTULENI • ID: 701119 0034 4</p> <p>Profession: Environmental Assessment Practitioner Postal Address: P. O. Box 686 • Windhoek, Namibia, 9000 Mobile: +264 - 81 2326843 • Code B Drivers license • Single • No criminal record Email: vilhomsnake@gmail.com or vilho.mtuleni@sasscal.org</p>							
<p>EDUCATION BACKGROUND</p> <p><i>Full-time tertiary education:</i></p> <ul style="list-style-type: none"> • National Diploma in Project Planning and Management, 2013, Southern Business School • National Diploma in Natural Resources Management, 2000, Polytechnic of Namibia (now Namibia University of Science and Technology) • Matric (Grade 12 Certificate), 1995, Namibia College of Open Learning <p><i>Short-courses</i></p> <ul style="list-style-type: none"> • Ecological Modeling Course, 2009, Presented at the Polytechnic of Namibia by University of Potsdam (Germany) • Safety and off-road driving Course, 2001, Amibis Driving Academy • Basin Management Course (OmbMC), 2008, Southern African Institute for Environmental Assessments (SAIEA) • Advance training on Facilitations Skills, 2006, Indigo – Monkeys Valley, South Africa • SAFRINET Course in Entomology and Arachnology, 1997, Pretoria South Africa • Air Sampling Course, 1996, NOAA – Climate Monitoring and Diagnostics Laboratory (NOAA/CMDL). Boulder, Colorado, United States of America • Hands on Training on Fog Collection and constructing Fog collecting Units, 1996, La Serena Chile 							
<p>RELEVANT WORK EXPERIENCE</p> <table border="1"> <tr> <td> <p>Position Held: Environmental Consultant Institution: Enviro Leap Consulting cc Year: Current, Part-Time</p> </td> <td> <p>Role and Responsibilities:</p> <ul style="list-style-type: none"> • Coordinate Environmental Assessment projects, conduct field studies and facilitate public consultation process • Manage all administrative activities of project management components of the company • Facilitate application for environmental Clearance Certificates </td> </tr> <tr> <td> <p>Position Held: Central Technician Institution: Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL) Year: 2010 to present</p> </td> <td> <p>Role and Responsibilities:</p> <ul style="list-style-type: none"> • Planning and undertaking field trips, Download data from automatic weather station as well as soil moisture data loggers. • Monitoring of environmental components which involve data collection, capturing and processing. • Basic Administration and budgeting, Maintenance of SASSCAL vehicle Fleet and other equipment, Participation in training, workshops and conferences. </td> </tr> <tr> <td> <p>Position Held: Central Technician Institution: BIOTA Southern Project Year: 2004 to 2010</p> </td> <td> <p>Role and Responsibilities:</p> <ul style="list-style-type: none"> • Planning and undertaking field trips, Download data from automatic weather station as well as soil moisture data loggers. • Monitoring of environmental components which involve data collection, capturing and processing. • Basic Administration and budgeting, Maintenance of BIOTA Vehicle Fleet and other equipment, Participation in training, workshops and conferences. • Supervised subordinates (Junior research technician and Para-ecologists) </td> </tr> </table>		<p>Position Held: Environmental Consultant Institution: Enviro Leap Consulting cc Year: Current, Part-Time</p>	<p>Role and Responsibilities:</p> <ul style="list-style-type: none"> • Coordinate Environmental Assessment projects, conduct field studies and facilitate public consultation process • Manage all administrative activities of project management components of the company • Facilitate application for environmental Clearance Certificates 	<p>Position Held: Central Technician Institution: Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL) Year: 2010 to present</p>	<p>Role and Responsibilities:</p> <ul style="list-style-type: none"> • Planning and undertaking field trips, Download data from automatic weather station as well as soil moisture data loggers. • Monitoring of environmental components which involve data collection, capturing and processing. • Basic Administration and budgeting, Maintenance of SASSCAL vehicle Fleet and other equipment, Participation in training, workshops and conferences. 	<p>Position Held: Central Technician Institution: BIOTA Southern Project Year: 2004 to 2010</p>	<p>Role and Responsibilities:</p> <ul style="list-style-type: none"> • Planning and undertaking field trips, Download data from automatic weather station as well as soil moisture data loggers. • Monitoring of environmental components which involve data collection, capturing and processing. • Basic Administration and budgeting, Maintenance of BIOTA Vehicle Fleet and other equipment, Participation in training, workshops and conferences. • Supervised subordinates (Junior research technician and Para-ecologists)
<p>Position Held: Environmental Consultant Institution: Enviro Leap Consulting cc Year: Current, Part-Time</p>	<p>Role and Responsibilities:</p> <ul style="list-style-type: none"> • Coordinate Environmental Assessment projects, conduct field studies and facilitate public consultation process • Manage all administrative activities of project management components of the company • Facilitate application for environmental Clearance Certificates 						
<p>Position Held: Central Technician Institution: Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL) Year: 2010 to present</p>	<p>Role and Responsibilities:</p> <ul style="list-style-type: none"> • Planning and undertaking field trips, Download data from automatic weather station as well as soil moisture data loggers. • Monitoring of environmental components which involve data collection, capturing and processing. • Basic Administration and budgeting, Maintenance of SASSCAL vehicle Fleet and other equipment, Participation in training, workshops and conferences. 						
<p>Position Held: Central Technician Institution: BIOTA Southern Project Year: 2004 to 2010</p>	<p>Role and Responsibilities:</p> <ul style="list-style-type: none"> • Planning and undertaking field trips, Download data from automatic weather station as well as soil moisture data loggers. • Monitoring of environmental components which involve data collection, capturing and processing. • Basic Administration and budgeting, Maintenance of BIOTA Vehicle Fleet and other equipment, Participation in training, workshops and conferences. • Supervised subordinates (Junior research technician and Para-ecologists) 						

APPENDIX E – 9. ENVIRONMENTAL MANAGEMENT PLAN

9.1 OVERALL OBJECTIVES OF THE EMP

The following overall environmental objectives have been set for the Unanisa Hei Investment cc (UHI-CC) Project:

- To comply with national legislation and standards for the protection of the environment.
- To limit potential impacts on biodiversity through the minimization of the footprint (as far as practically possible) and the conservation of residual habitat within the mine area.
- To keep surrounding communities informed of farming activities through the implementation of forums for communication and constructive dialogue.
- To ensure the legal and appropriate management and disposal of general and hazardous waste, through the implementation of a strategy for the minimization, recycling, management, temporary storage and removal of waste.
- To develop, implement and manage monitoring systems to ensure good environmental performance in respect of the following: ground and surface water, air quality, noise and vibration, biodiversity and rehabilitation.

The Management and Mitigation Plans (MMPs), listed in the table below, are applicable to all the relevant activities and facilities of the UHI-CC Sand and Gravel Operations. (The MMPs follow in the subsequent sections).

9.2 STAKEHOLDER MANAGEMENT AND MITIGATION

It is important that channels of communication are maintained over the life of the project for surrounding landowners, the general public members, as well as the local and traditional authorities, table 4 shows the stakeholders communication Management and Mitigation Plan.

Table 8: Actions relating to stakeholder communication

Issue	Management commitment	Phase
Understanding who the stakeholders are	Maintain and update the UHI-CC stakeholder register, including stakeholders' needs and expectations. Ensure that all relevant stakeholder groups are included.	All
	A representative database would include government, employees, service providers, contractors, indigenous populations, local communities, traditional authorities, NGOs, shareholders, customers, the investment sector, community-based organizations, suppliers and the media.	All
	Ensure that marginalized and vulnerable groups are also considered in the stakeholder communication process.	All
	Record partnerships as well as their roles, responsibilities, capacity and contribution to development.	All
Liaising with interested and affected parties at all phases in the mine life	Devise and implement a stakeholder communication and engagement strategy.	All
Responsibility	Unanisa Hei Investment cc	

9.3 TOPOGRAPHY MANAGEMENT AND MITIGATION

9.3.1 ISSUE: SECURITY AND SAFETY IMPACT

Impacts relating to the welfare, health and safety of the local communities may arise as a result of traffic, noise, air quality, pollution issues, etc. During the construction phase UHI-CC Investment cc may at a minimal provide job opportunities to the local community.

Hazardous excavations (particularly for the underground fuel storage tanks and pipelines) and infrastructure including all structures into or of which third parties and animals can collide, fall and be harmed. In the construction and decommissioning phases these hazardous excavations and infrastructure are usually temporary in nature, usually existing for a few weeks to a few months. The operational phase will present more long-term hazardous infrastructure. It is essential that safety and security measures are defined and implemented to adequately protect the mine site from being accessed by unauthorized people.

Table 9: Hazardous excavations & infrastructure - link to phase & activities

Issue	Management commitment	Phase
Hazardous excavations	All staff will be trained to attend to third parties and animals so as to avoid situations where people and animals can enter safety risk areas.	All
Safety and Security Risks	At closure, permanent warning signs will be in place at appropriate intervals, in appropriate languages with danger pictures to warn people of any potential dangerous farm areas / equipment	All
Access to the site by unauthorized persons to the Operation site	Any person entering the agricultural / cultivation and other operation areas (fields and packaging) will only be allowed after formal approval.	All
Emergency	Develop and implement an emergency response plan for third parties falling into or off hazardous excavations and causing injury.	Operational
Responsibility	Unanisa Hei Investment cc	

9.4 BIODIVERSITY MANAGEMENT AND MITIGATION

9.4.1 ISSUE: GENERAL PHYSICAL DISTURBANCE OF BIODIVERSITY

The section is a high level assessment of biodiversity impacts in line with the content of the baseline description (Section 4), and the content of this EMP. The assessment covers the following broad topics: physical destruction of biodiversity and related functions, impacts on surface water resources as an ecological driver, and general disturbances to biodiversity.

The primary impacts would relate to the obstruction key ecosystem functions including the diversion of wildlife corridors and habitat fragmentation, however given that the site selected for the proposed development activity is located within a build environment. The impacts associated to the proposed activity is minimal, as preceding activities has already caused prior disturbance. Therefore, impacts directly associated to this activity shall be limited to clearance of annual vegetation species and hence localized and short-term in nature.

Table 10: Physical disruption of biodiversity - link to phase and activities

Issue	Management commitment	Phase
Physical disruption to biodiversity by Staff	The Principle of zero tolerance to killing and collecting of biodiversity i.e. no poaching (including collection firewood) will be allowed and poaching offenders will be prosecuted.	All
	All species with a conservation and or protection status should be identified, clearly marked and preserved (by at least 50%)	Construction
Physical disruption to biodiversity by infrastructures	Erect a game-proof fence around the pit and mining operations to ensure that animals have no access to operation areas, which may be contaminated by agricultural chemicals.	All
	Upon completing construction, initiate restoration of all infrastructure including roads areas that were only impacted during construction and will not be required for farming operation	Operation, decommissioning and closure
Emergency	Certain instances of injury to animals may be considered emergency situations. These will be managed in accordance with the UHI-CC Investment emergency response procedure.	All
Responsibility	Unanisa Hei Investment cc	

9.5 WATER RESOURCES MANAGEMENT AND MITIGATION

9.5.1 ISSUE: POLLUTION OF GROUNDWATER

The altering and obstructing of surface water drainage (change in water flow and gully erosion of the river beds from channeling of water) is identified as a potential impact associated with the proposed activities, as well as water pollution i.e. through the change of topography.

There are a number of pollution (hydrocarbons) sources in all project phases that has a potential to pollute surface and groundwater, particularly in the unmitigated scenario. In the construction and decommissioning phases these potential pollution sources are temporary in nature, usually existing for a few weeks to a few months. Although these sources may be temporary, the potential pollution may be long term. The operational phase will present more long-term potential sources.

Table 11: Altering surface drainage patterns –link to operation phases and activities

Issue	Management commitment	Phase
Surface and Groundwater contamination (hydrocarbons)	Minimize infrastructure footprint and construction footprint, and ensure that the design of fuel storage facility incorporates spill control measures	Construction, Operation
	Avoid placing any infrastructure or waste material across drainage lines. Where unavoidable ensure uninterrupted drainage by constructing bypass channels.	Construction, Operation
Loss of surface water, and change of drainage patterns	Do not place service infrastructure in ecologically sensitive areas, or in areas identified as corridors of animal movement.	Operation
Natural flow of storm water (clean and dirty)	Design all storm water interventions in such a way that storm water can bypass the major structures.	Operation
	Ensure that these facilitates are designed, constructed and operated that flood protection is provided.	Operation
Responsibility	Unanisa Hei Investment cc	

9.6 AIR AND NOISE MANAGEMENT AND MITIGATION

9.6.1 ISSUE: AIR AND NOISE POLLUTION

During the construction phase, excavation and transport of materials on site is likely to create very little dust and noise that may contribute although little, to air and noise pollution. This may be an unwanted change to the community of the area.

Table 12: Air pollution – link to phase and activities

Issue	Management commitment	Phase
Air pollution impact to Biodiversity and nearby Human community	All design mitigation measures to be implemented (including water sprays on all temporary unpaved access roads), water sprays at highly polluting areas activity sites.	Construction and Decommissioning
	All diesel powered equipment and plant vehicles should be kept at a high level of maintenance. Any change in the noise emission characteristics of equipment should serve as trigger for withdrawing it for maintenance.	Construction and Decommissioning
Impact of noise on the environment/ sensitive receptors	Document and investigate all registered complaints and make efforts to address the area of concern where possible. A mechanism to monitor noise levels, record and respond complaints and mitigate impacts should be developed.	Construction and Decommissioning
Responsibility	Unanisa Hei Investment cc	

9.7 SOCIO-ECONOMIC MANAGEMENT AND MITIGATION

9.7.1 ISSUE: ECONOMIC IMPACTS ON LOCAL NON-FARMING LIVELIHOODS

The activities associated with the UHI-CC sand and gravel mining have socio-economic impacts in all phases – some positive and some negative. These impacts related to amongst others employment/job creation, local and regional economies, land use and surrounding landowners and community safety and security. During the construction phase UHI-CC may at a minimal provide job opportunities to the local community. This EMP aims to provide measures to enhance the positive impacts and limit the negatives impacts.

Table 13: Health and safety – link to phase and activities/infrastructure

Issue	Management commitment	Phase
Impacts on livelihood resettlement	Engage with the affected communities through a process of informed consultation and participation to reach consensus on any activities that affect them.	All
	Provide affected people with necessary transitional support (such as short-term employment, subsistence support, or salary maintenance).	Construction
Impacts on HIV / AIDS	Preparation of a health and safety plan for workers and impacted communities addressing issues including education on measures to prevent the spread of HIV/AIDS through awareness campaigns, provision of safety equipment for workers, child labor prohibited	
Responsibility	Unanisa Hei Investment cc	