APP-005782

ENVIRONMENTAL IMPACT ASSESSMENT

PROPOSED STORAGE AND HANDLING OF HAZARDOUS MATERIAL AT THE NEW PUPKEWITZ MEGABUILD AND AGRIMARK RETAIL SHOPPING DEVELOPMENT IN MARIENTAL, HARDAP REGION

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EXECUTIVE SUMMARY

An Environmental Impact Assessment (EIA) has been commissioned by Jachri Properties (Pty) Ltd, for the proposed storage and handling of hazardous material at the Pupkewitz Megabuild and Agrimark Retail Shopping Development, in Mariental. The EIA is being undertaken in accordance with the requirements of the National Environmental Assessment Policy (1995) and the Environmental Management Act (2007) and its regulations of 2012, and other relevant legislations and regulations pertaining to Environmental Assessments and protection of the environment in the Republic of Namibia.

Impacts identified from baseline studies, site visits and stakeholder consultation process have been assessed making use of a comprehensive assessment methodology as provided by the Department of Environmental Affairs (DEA) of Namibia. This included looking at impact significance through, its nature, extent, duration, probability and intensity. Potential impacts identified during the assessment process are surface and groundwater contamination; air quality (dust pollution); ecological impacts; risk of fires and explosions; health and safety impact; heritage impacts; generation of waste; traffic impacts; noise pollution; socio-economic issues; and cumulative impacts.

These impacts are assessed in each of the two stages of project development namely, construction and operational phases.

Socio-economic impacts amongst others include creation of part-time and permanent employment opportunities, economic spin-offs for the local businesses and suppliers, in-migration of job seekers to the town of Mariental and surroundings. Cumulative impacts expected as a result of the proposed retail shopping development include, an increase in vehicular movement along the main road B1 (in particular, the access road to the site), increase in noise and dust pollution, increase in-migration of job seekers etc.

Necessary mitigation measures for the potential impacts have been provided. The impacts to the environment are rated as acceptable, and can be managed. It is the findings of this EIA report that environmental impacts can be sufficiently mitigated. All environmental risks can be minimised and managed through implementing preventative measures and sound management systems, and on condition of the fulfilment of the Environmental Management Plan. This document should be used as an on-site tool during all phases of the proposed retail shopping development. Monitoring of both surface and groundwater pollution should be conducted regularly at the site.

With regards to public and key stakeholder involvement, the public have been engaged throughout the public participation process.

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

List of Abbreviations

EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMA	Environmental Management Act
EMS	Environmental Management System
ESA	Environmental Scoping Assessment
I&Aps	Interested and Affected Parties
PPP	Public Participation Process
ECC	Environmental Clearance Certificate
AIDS	Acquired immune deficiency syndrome
HIV	Human immunodeficiency virus

PROJECT DETAILS

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REPORT STATUS:	**FINAL**
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GLOSSARY OF TERMS

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

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

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

Sewage - Sewage is water-carried waste, in solution or suspension, which is intended to be removed from a community.

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

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

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

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

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

Environmental 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.

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

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

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

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

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 World Conservation Union (IUCN), the United Nations Environment Programme and the World Wide Fund for Nature (1991).

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

1. BACKGROUND AND INTRODUCTION

Jachri Properties (Pty) Ltd. has commissioned an Environmental Impact Assessment **(EIA)** for the proposed storage and handling of hazardous material at the new Pupkewitz Megabuild and Agrimark Retail Shopping Development in Mariental, Hardap Region. The project site coordinates are 24.62698°S; 17.95423°E.

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

1.1 Project Rationale

As a result of the significant growth and increasing development at the town and its surroundings, the need for a modern retail shopping development becomes more apparent. The proposed development is vital for the smooth functioning of both construction projects and farm operations in the area. The development will provide a much-needed modern retail shopping experience to the town, by providing an extensive range of essential building supplies and agricultural supplies. The development will directly support local construction and agriculture industries, promoting sustainable practices and providing access to essential tools and supplies. Additionally, it will boost the local economy and provide expertise and advice for the local industries.

Potential Benefits:

- Employment: The creation of more than 150 new jobs is expected at the development. It is estimated that the new jobs will improve the livelihoods of the new workers and their families. Given that the unemployment rate in the region is of 32.1% (2023 Population and Housing Census - Hardap Region Labour Force Report). This in itself is regarded as a significant benefit to the socio-economic situation in the region.
- Skills development: As the construction and operation of the development requires specialised work and skills it can be expected that experts will be training locals in certain skills during the life of the development.
- Contribution to economic development: The development will better serve the public interest as it will bring in economic development (e.g. local businesses may supply some materials and goods for construction purposes; new businesses might be created, employment will be created etc.).
- Technology transfer to Namibia: The new development includes state-of-the-art technology. The construction, operation, maintenance and support of these new technologies will expose local artisans and industries to these technologies. This can have a positive effect on the area.

- General enhancement of the quality of life in Mariental, surrounding communities and the region at large.
- Expansion of trade and industrial activities in the area.

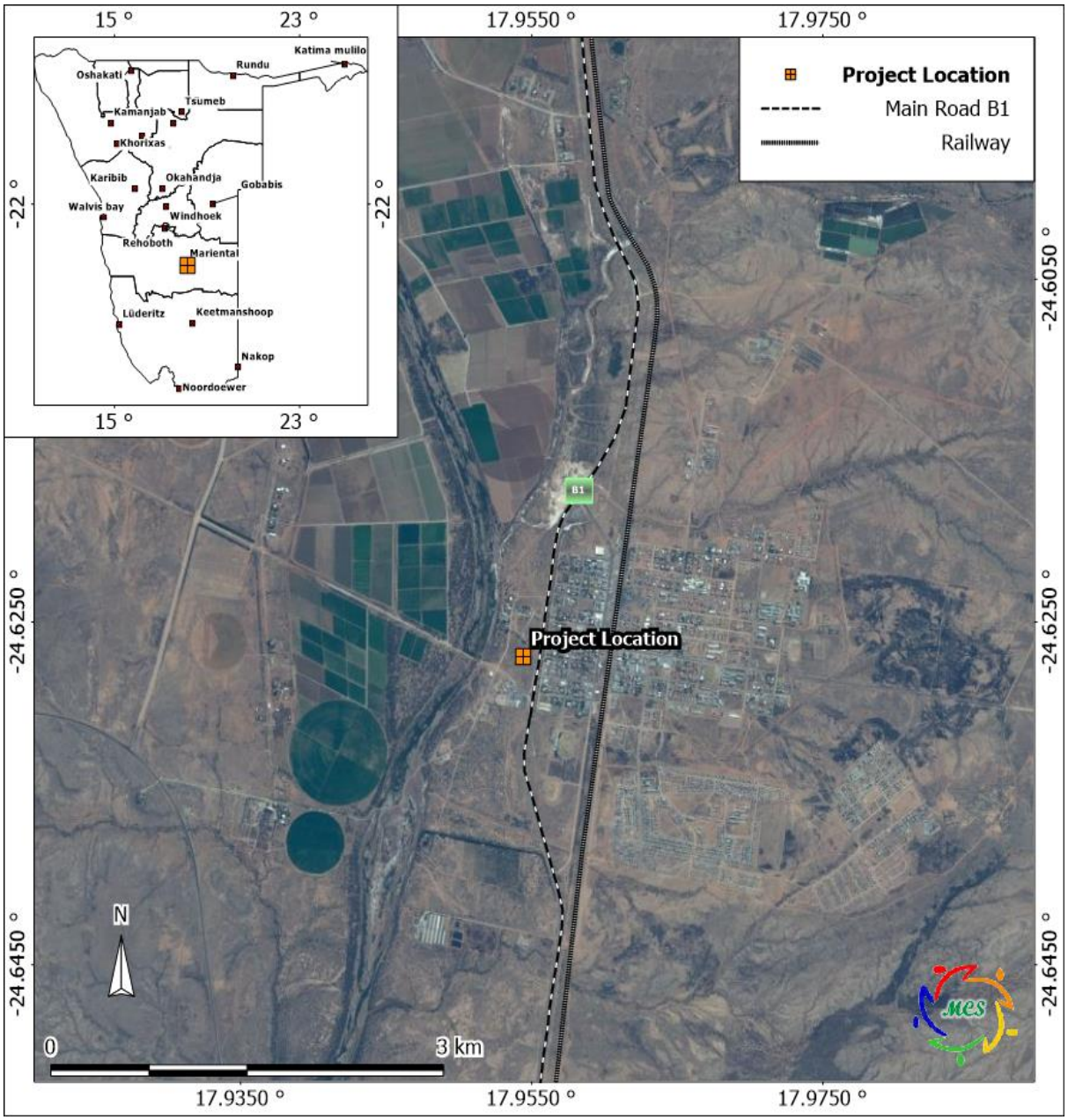

Figure 1. Project location (24.62698°S; 17.95423°E)

1.2 Project Phases

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

Construction Phase:

- Land clearance
- Trench excavations for building foundations, electrical, water and sewerage reticulation systems

- ❖ Construction of associated buildings, parking bays and other infrastructure
- ❖ Installation of associated electrical, water and sewerage reticulation
- ❖ Construction of stormwater systems
- ❖ Progressive rehabilitation of construction site
- ❖ Construction of spill containment systems

Operational Phase:

- ❖ Retailing of various goods to the public
- ❖ Maintenance of buildings, related bulk services and access roads.
- ❖ Progressive rehabilitation.

Decommissioning Phase:

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

2. ENVIRONMENTAL STUDY REQUIREMENTS

According to the Environmental Management Act no. 7 of 2007, the proponent requires an environmental clearance from the Ministry of Environment and Tourism (Department of Environmental Affairs) to undertake the activities of the proposed retail shopping development. In particular to the project development is:

i. The use open land space to other land use

ii. The handling and storage of agrichemicals and building materials that are considered hazardous to the environment

iii. The installation of bulk services for the development

iv. The undertaking of these activities within close proximity to the Fish River

The issuance of an environmental clearance certificate means that the Ministry of Environment and Tourism is satisfied that the activity in question will not have an unduly negative impact on the environment. It may set conditions for the activity to prevent or to minimise harmful impacts on the environment.

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

Table 1. Activities identified in the EIA Regulations relevant to proposed project

Activity Description:	Description of Activity	Activities
Activity 5.1 (d) Land Use and Development Activities	The rezoning of land from – use for nature conservation or zoned open space to any other land use.	The project will be located on open land that is granted special consent use by the Mariental municipality, as per Clause 5(6) of the Mariental Town Planning Scheme.

Activity 8.9 Water Resource Developments	The construction and other activities within a catchment area.	The project entails activities that will be undertaken within the Fish River catchment.
Activity 9.1 Hazardous Substance Treatment, Handling And Storage	The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974.	The project entails the storage and handling of hazardous substances, such as paint, thinners, fertilizers, pesticides, adhesives, cement, liquid petroleum gas, paraffin, etc.
Activity 10.1 (a) (Infrastructure)	The construction of – Oil, water, gas and petrochemical and other bulk supply pipelines.	The project includes the installation of bulk municipal services

3. DESCRIPTION OF ALTERNATIVES

3.1 No-Go Alternative

The no-development alternative is the option of not establishing the retail shopping development. Should the proposed development not take place, development in the area and the region at large is hindered, resulting in the loss of potential economic activities and employment. The development aims to bring a much needed modern shopping experience to the town, by providing an extensive range of essential building supplies, agricultural supplies, and home and lifestyle products.

The project site is currently undeveloped land, which has been previously disturbed with evidence of pedestrian movement (i.e. walkways and tracks) and illegal dumping. If the status quo remains the same at the site, there might be more littering, which could pose a risk to public health and safety.

The No-development option is thus not considered to be a feasible alternative at this stage.

3.2 Site Alternative

The site is located within an urban setting, which is already disturbed and earmarked for development in Mariental. The possible impacts at the project location, both environmental and socio-economic, are of such a nature that they can be mitigated through good practice and compliance to the EMP.

The proximity of the Fish River (approximately 200m) to the site increases the risk of surface water contamination and pollution from various hazardeous materials, which are commonly stored and handled at such a development; however the risk will be lowered by the design and management of the development. Proper containment mechanisms installed will be able to contain any spillages and leakages that may occur during the operation of the development.

4. SCOPE

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

The environmental impact assessment report aims to address the following:

a) Identification of potential positive and negative environmental impacts.

b) Provide sufficient information to determine if the proposed project will result in significant adverse impacts.

c) Identification of "hotspots" which should be avoided where possible due to the significance of impacts.

d) Evaluation of the nature and extent of potential environmental impacts

e) Identify a range of management actions which could mitigate the potential adverse impacts to required levels.

f) Provide sufficient information to the Ministry of Environment to make an informed decision regarding the proposed project.

g) Conduct a public and stakeholder consultation process.

h) Present and incorporate comments from the consultation process.

5. METHODOLOGY

The following methods were used to investigate the potential impacts on the social and natural environment due to the construction and operation of the retail shopping development:

a) Information about the site and its surroundings was obtained from existing secondary information and site visits.

b) Neighbours, interested and affected Parties (I&APs) were consulted and their views, comments and opinions are presented in this report.

6. STATUTORY REQUIREMENTS

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

I. The Namibian Constitution

The Namibian Constitution has a section on principles of state policy. These principles cannot be enforced by the courts in the same way as other sections of the Constitution. But they are intended to guide the Government in making laws which can be enforced.

The Constitution clearly indicates that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at management of ecosystems, essential ecological processes and biological diversity of Namibia for the benefit of all Namibians, both present and future.

The following legislations are relevant to this development:

II. Environmental Management Act No.7 of 2007

This Act provides a list of projects requiring an Environmental assessment. It aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters.

The Act defines the term "*environment*" as an interconnected system of natural and human-made elements such as land, water and air; all living organisms and matter arising from nature, cultural, historical, artistic, economic and social heritage and values.

The Environmental Management Act has three main purposes:

a) to make sure that people consider the impact of activities on the environment carefully and in good time.

b) to make sure that all interested or affected people have a chance to participate in environmental assessments.

c) make sure that the findings of environmental assessments are considered before any decisions are made about activities which might affect the environment.

Line Ministry: Ministry of Environment, Forestry and Tourism

III. Water Resources Management Act (No.11 of 2013)

The Water Act 54 of 1956 is superseded by this new Water Resources Management Act 2013. The latter has been brought into force on 29 August 2023 by GN 268 2023 (GG 8187) Regulations relating to appeals to Water Tribunal in GN 270 (GG 8188). An overlapping period of 18 months is established to enable the phasing in of the new Act whilst the former is phased out.

This Act provides for the management and conservation of all water resources of Namibia including the whole or any part of a watercourse or an aquifer, the sea and meteoric water. The objects of this Act are to ensure that the water resources of Namibia are managed, developed, used, conserved and protected in a manner consistent with, or conducive to, the fundamental principles set out in section 3.

Line Ministry: Ministry Of Agriculture, Fisheries, Water and Land Reform

IV. Environmental Assessment Policy of Namibia (1995)

Environmental Assessments (EA's) seek to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT (in the context of IEM and EA's) is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.

All listed policies, programmes and projects, whether initiated by the government or the private sector, should be subjected to the established EA procedure.

Apart from the requirements of the Environmental Assessment Policy, the following sustainability principles needs to be taken into consideration, particularly to achieve proper waste management and pollution control:

- ***Cradle to Grave Responsibility***

  This principle provides that those who manufacture potentially harmful products should be liable for their safe production, use and disposal and that those who initiate potentially polluting activities should be liable for their commissioning, operation and decommissioning.

- ***Precautionary Principle***

  There are numerous versions of the precautionary principle. At its simplest it provides that if there is any doubt about the effects of a potentially polluting activity, a cautious approach should be adopted.

- ***The Polluter Pays Principle***

  A person who generates waste or causes pollution should, in theory, pay the full costs of its treatment or of the harm, which it causes to the environment.

- ***Public Participation and Access to Information***

  In the context of environmental management, citizens should have access to information and the right to participate in decisions making.

Line Ministry: Ministry of Environment, Forestry and Tourism

V. Draft Pollution Control and Waste Management Bill (Guideline only)

The proposed construction of the retail shopping development, only applies to Parts 2, 7 and 8 of the Bill.

Part 2 stipulates that no person shall discharge or cause to be discharged any pollutant to the air from a process except under and in accordance with the provisions of an air pollution licence issued under section 23. It further provides for procedures to be followed in licence application, fees to be paid and required terms of conditions for air pollution licences.

Part 7 states that any person who sells, stores, transports or uses any hazardous substances or products containing hazardous substances shall notify the competent authority, in accordance with sub-section (2), of the presence and quantity of those substances.

Part 8 calls for emergency preparedness by the person handling hazardous substances, through emergency response plans.

VI. The Draft Wetland Policy (1993)

Requires that any wetlands and its associated hydrological functions form a part, to be managed in such a way that their biodiversity, vital ecological functions and life support systems are protected for the benefit of present and future generations.

Line Ministry: Ministry of Environment, Forestry and Tourism

VII. National Heritage Act (No.76 of 1969)

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

Line Custodian: National Heritage Council of Namibia

VIII. Sewerage and Drainage Regulations (amendments) Local authorities act, section 23 (1992).

The regulations make provision for proper construction of pipelines in drainage lines. The regulations also stipulate the prevention of pollution and environmental damage caused by improper construction of sewerage and water pipelines in drainage lines.

Line Ministry: Ministry of Regional and Local Government, Housing and Rural Development

IX. Soil Conservation Act (No.76 of 1969).

The Act advocates for the Prevention and combating of soil erosion, conservation, improvement and manner of use of soil and vegetation, and protection of water resources.

X. Hazardous Substances Ordinance No. 14 of 1974

The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Welfare. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.

Line Ministry: Ministry of Health and Social Services

XI. Public Health Act 36 of 1919 and Subsequent Amendments

The Act, with emphasis to Section 119 prohibits the presence of nuisance on any land occupied. The term nuisance for the purpose of this ESMP is specifically relevant specified, where relevant in Section 122 as follows:

- ✓ any dwelling or premises which is or are of such construction as to be injurious or dangerous to health or which is or are liable to favour the spread of any infectious disease;
- ✓ any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable or preventable disease or injury or danger to health; or
- ✓ any other condition whatever which is offensive, injurious or dangerous to health.
- ✓ Potential impacts associated with the construction of the development are expected to include dust, air quality impacts, noise nuisance and smoke emissions.

Line Ministry: Ministry of Health and Social Services

7. PROPOSED PROJECT DESIGN

The layout of the mall considered various alternatives to maximise ease of entrance and exit. Due to the site being sandwiched by the service station (south) and River Chalets (north), alternative entrances were limited to the existing B1 access and service road west of the site. The proposed layout maximises the development space and parking as well as facilitating traffic flow. The positive impacts that came from this decision include maximum retail and parking space and easy traffic flow.

The development will consist of a building material and agriculture material supplies, which would involve a comprehensive operation, including a retail space for customers to browse and purchase these materials, warehousing for storage and efficient distribution. Hazardous material offered by the development will require specialized handling, storage, and disposal procedures to protect workers and the environment. This will comply with strict local and international regulations due to the potential risks.

See Figure 2 below for a site layout map.

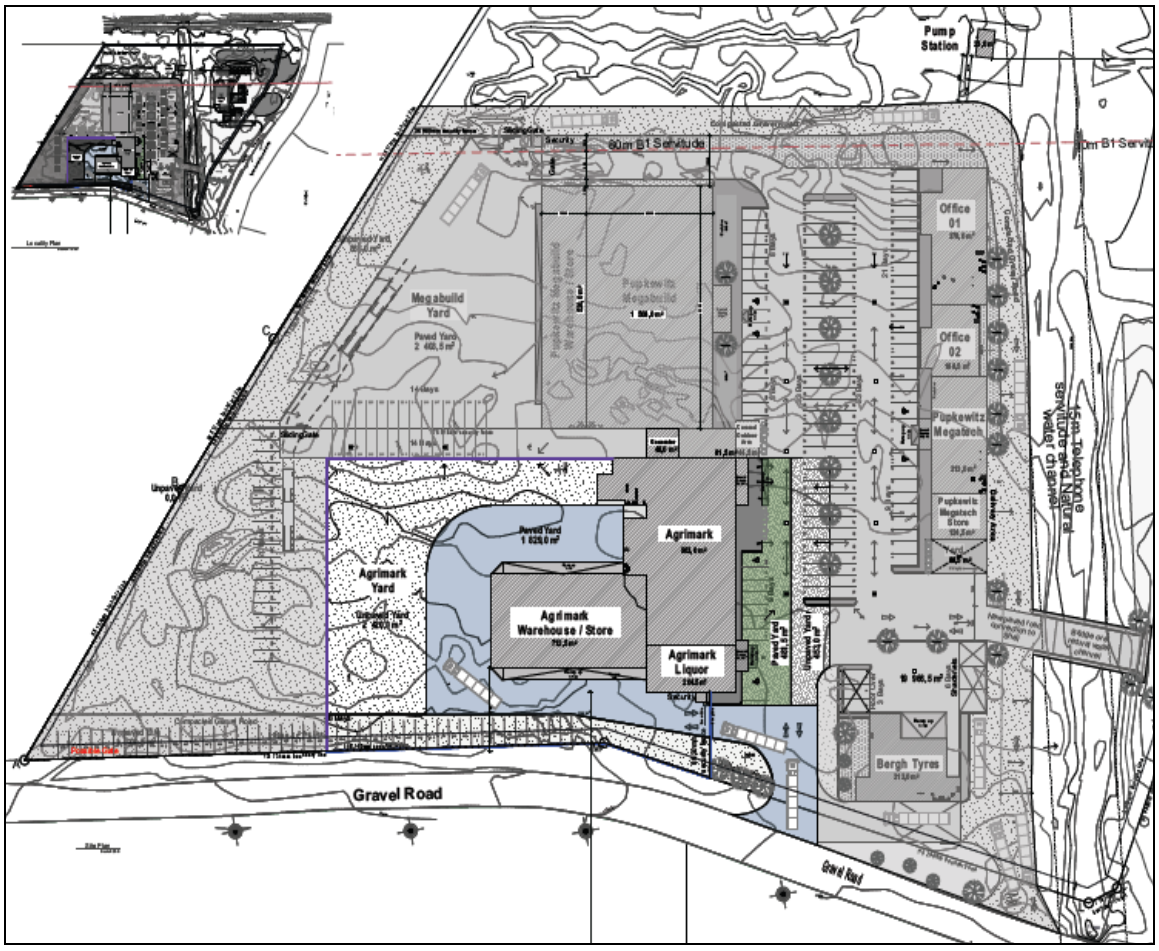

Figure 2. Design layout of the development

This facility will be constructed and operated according to relevant SANS standards (or better), with special emphasis on SANS 10234, SANS 10089, SANS 54470-1, SANS 10206, SANS 310. These standards for the design of storage containment for hazardous substances focus on safety, compatibility, and environmental protection. Key aspects include the structural design of storage facilities, spill containment, ventilation, and the segregation of incompatible substances. These standards are crucial for minimizing risks associated with hazardous materials storage, such as fire, leaks, and environmental contamination.

8. GENERAL ENVIRONMENT OF THE STUDY AREA

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

8.1 Location and Land Use

The proposed project site (24.62698°S; 17.95423°E) is situated on Portion 88 (A Portion of Portion C) of the Farm Koichas No. 89, in Mariental. The project site occupies an approximate land size of 28,000m^2. See Figure 1 for location map. The town of Mariental, which is 1,090m above sea level, is the capital of the Hardap Region.

Directly north of the site is the River Chalets. East of the site is the main road B1, followed by residential and business properties. Directly south of the site is the Fish River Shell Service Station. West of the site is open land (undeveloped land) followed by the Fish River.

Figure 3. Site layout map

Photo 1. View of the site

8.2 Topography and Surface Water

The landscape is classified as being a flat lying plateau area underlain by Nama and Karoo sediments. Locally developed karst in Nama limestones and on surficial calcretes might be present. Dolomite sills locally weather to large rounded boulders. The site is located within the catchment of the Fish River, an ephemeral river, draining in a southern direction. The Fish River is situated approximately 200m west of the site. The river provides a vital water source, particularly during the dry season, supporting both wildlife and local communities downstream.

Surface drainage from the site will flow westward towards the river. Storm water management systems are in place around the site that form part of the existing town storm water control system. Site specific drainage systems should however be developed at the site to control the flow of surface water at the site to avoid flooding (e.g. erection of culverts). Storm water management systems are part of the engineering designs.

8.2.1 Fish River Flood Risk Assessment

According to the Fish River Flood and Hydrological Report (DHI, 2015), the maximum water depth and water velocity for each return period was used to calculate the flood hazard caused by flood events with the probability of occurrence of 1 in 5, 10, 20, 50 and 100 years. Flood hazard is highest when the water depth/velocity combination is also highest, as expected this corresponds to the river channels for all return periods.

Flood vulnerability was determined by combining physical, economic and social indicators and attributing weights which determines their relevance. In order to quantify these indicators, census data was used, Google Earth imagery was analysed, and GIS calculations were carried out.

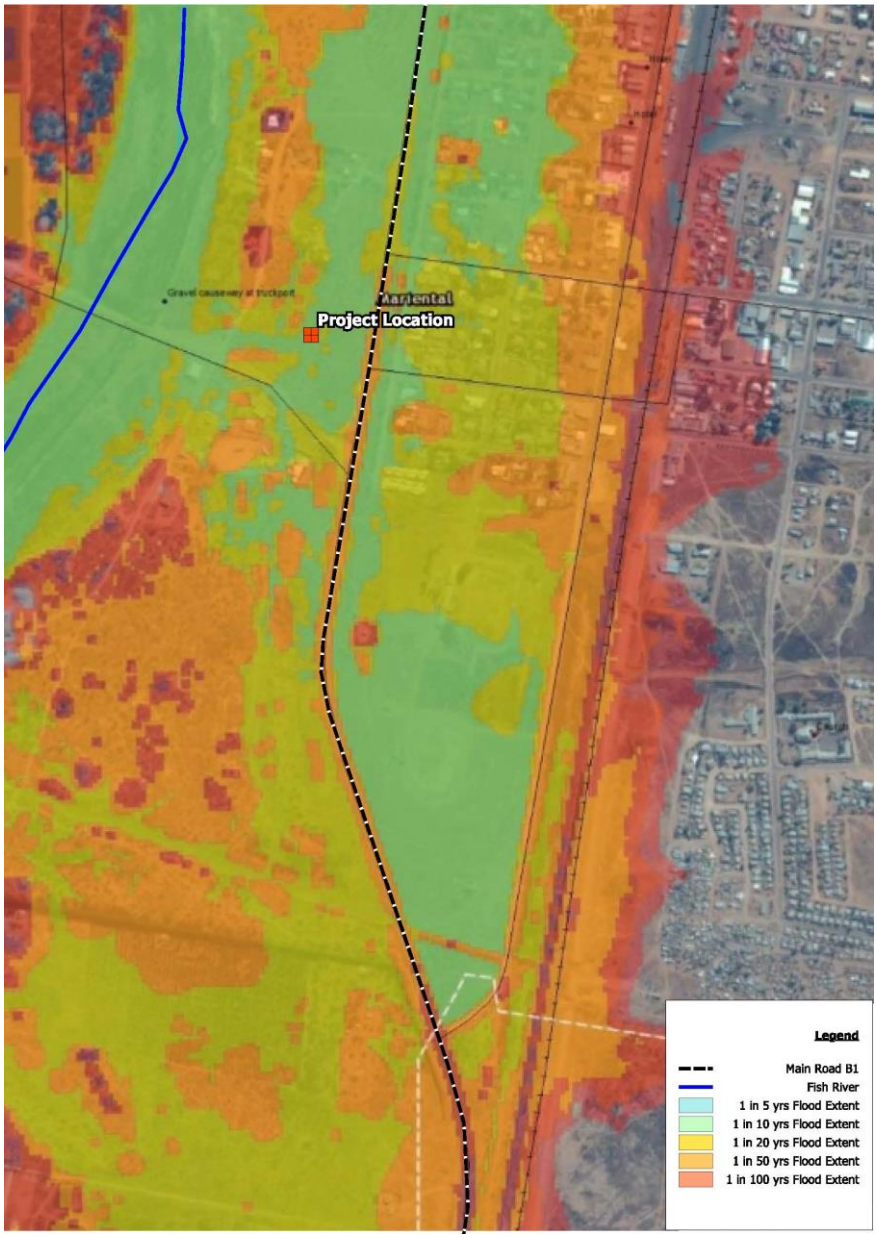

Figure 4. Max flood extent calculated for the 1 in 5, 10, 20, 50 and 100 year return period events (DHI, 2015)

Determined by the weighted overlay of the overall flood hazard estimate, the weighted sum of the flood hazard for each event, and the vulnerability estimate achieved. From the equal weighted intersection of these two parameters, a corresponding risk category was calculated.

The results indicate a clear distinction between the Hardap irrigation scheme and the urban areas. The results from this assessment indicate where priority action should take place in the study area in terms of implementing flood protection plans.

A priority area for intervention is the risk zone of Mariental town between the B1 road and the railway line; agricultural fields close to the Aub Bridge, the pivot fields and adjacent fields by Maltahohe Bridge. The proposed retail shopping development

is located within a medium to high flood risk area, as per flood risk assessment results conducted in 2015. See Figure 5 below.

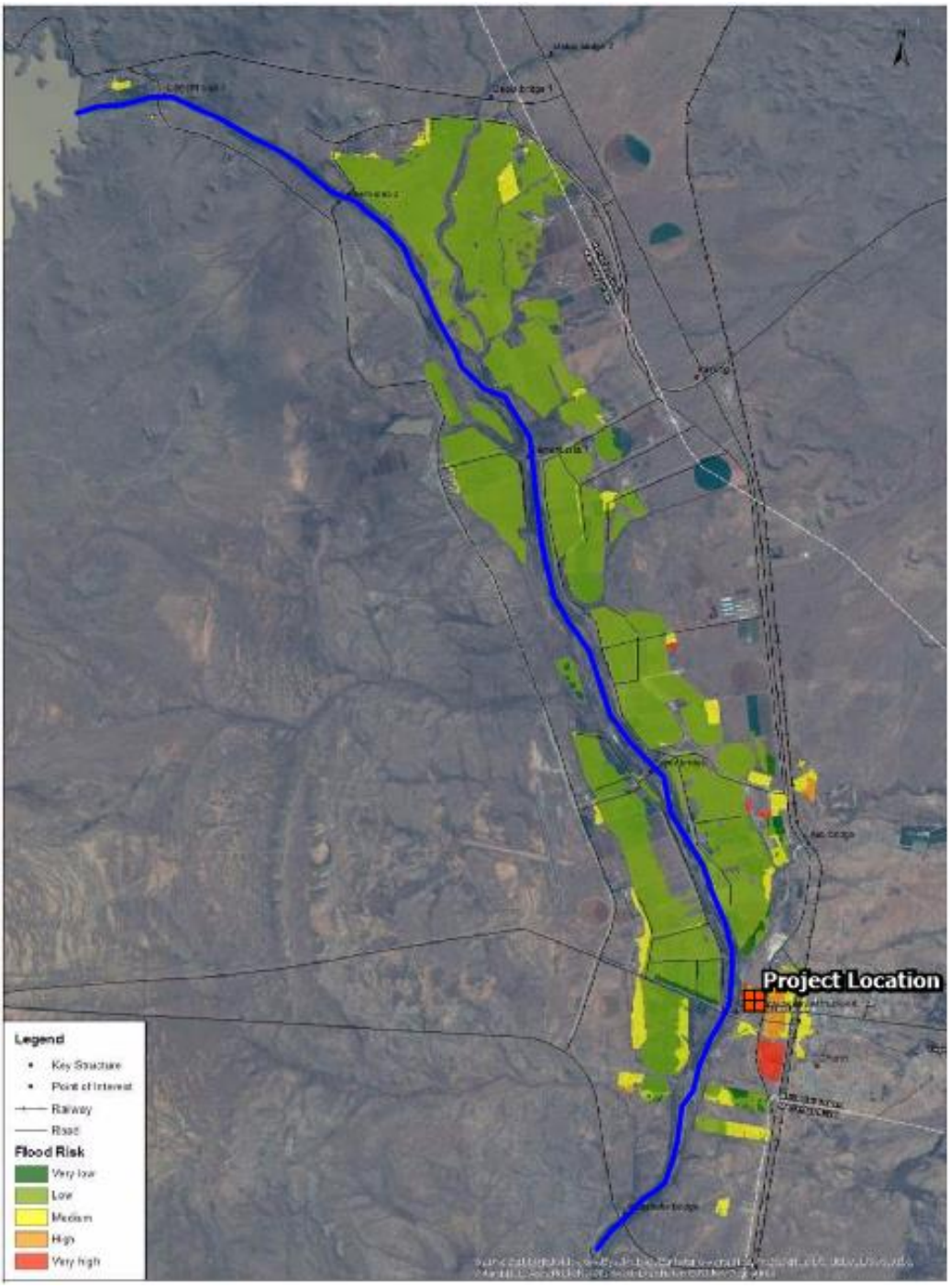

Figure 5. Final flood risk assessment results for the area (DHI, 2015)

8.3 Climate *(Mandelsohn et al, 2003)*

Classification of climate: Semi-arid area

Average rainfall: Rainfall in the area is averaged to be between 200 mm-250 mm per year.

Variation in rainfall:	Variation in rainfall is averaged to be 50-60 % per year.
Average evaporation:	Evaporation in the area is averaged to be between 2100-2240 mm per year.
Precipitation:	The highest summer rains are experienced from January-March.
Water Deficit:	Water deficit in the area is averaged to be between 2100-2300mm per year.
Temperatures:	The summer months lasts for 3.5 months, from November to February, with an average daily high temperature above 34°C. The hottest month of the year is December, with an average high of 37°C and low of 22°C. The winter months lasts for 2.5 months, from May to August, with an average daily high temperature below 26°C. The coldest month of the year in Mariental is July, with an average low of 5.6°C and high of 24°C.
Wind direction:	Wind direction in the area is predominantly southerly and northeasterly winds.

Mariental and its surroundings can be classified as a water deficit area with annual evaporations exceeding the mean annual rainfall by far. Summer rainfall dominates precipitation in the form of thundershowers and seasonal run off events might occur in the form of flash floods. The aridity of the region causes the water resource to be a scarce commodity and has to be conserved and protected from pollution at all cost.

8.4 Geology *of the Study Area*

The geology of Fish River Basin consists of flat lying Nama sediments, Namaqua Metamorphic Complex rocks, Quaternary calcretic and conglomerate deposits. The oldest units belong to the Namaqua Metamorphic Complex (NMC); they were deposited about 1800 millions years.

Some 770 million years ago, the metamorphic units (amphibolites, schists and granulite) were swarmed by dark mafic dolerite dykes that are quite prominent in the northeastern areas of Gibeon. Due to tectonic uplift and erosion over the years the Namaqua rocks were exposed further into lift grabens resulting into formation of a shallow sea. Within this sea the shales, siltstones, limestones and sandstones of the Nama Group where deposited. The original sediments are believed to have originated from the northern Damara Orogen, after their deposition no major metamorphic and deformation occurred. Thus to this day the Nama rocks preserve

the spectacular horizontal structures and forming the sharp plateau geomorphology with Namaqua rocks. Moreover, some 350 Ma modern erosion formed large valleys and depressions.

During the Dwyka glaciations stage the valleys and grabens where widened deeper by southwards flowing rivers, forming the Karoo Sequence. The canyon present today was formed during post-Karoo times, during this time severe erosion removed most of the Karoo units, preserving the NMC and some Nama units. Quaternary calcretes are deposited more easterly of Mariental giving a more flat lying morphology.

Westwards of Mariental geomorphology is less plateaus like but depicts an undulating mountainous terrain. Within the valleys of the Mariental Fish River, the geomorphology (30km radius) is rather flat and rising higher in the western, eastern and northern directions.

8.5 Hydrogeology *of the Study Area*

From a hydrogeological perspective, it is quite difficult to find primary groundwater aquifers, unless of very recent river sediments. In and around Mariental town the main aquifer is the recent surficial sedimentary overburden that have accumulated over time, this could be ± 10m deep before bed rock. It is known that the water table in the town vicinity has risen up by 1.8m due to over grow of organic material.

The dominant aquifers are the secondary aquifers of the Nama and Karoo sediments that have been structurally faulted and jointed to form storage volumes for water. Springs are also common which are as a result of groundwater rising in major fault zones forming an artesian aquifer (water table/potentiometric surface above ground surface). In areas where erosion has incised till undeformed units of the Namaqua Complex and Namaqua rocks it may be quite difficult to find any water within these rocks. This is a very common event in the south-western and western areas of Mariental. High evaporation events have affected the groundwater quality mostly in the south and eastern areas of the Mariental district.

The water supply to Mariental is supplied by Namwater and is sourced from the Hardap Dam, situated approximately 18km northwest of Mariental. Subsurface water in the area is utilized with only one borehole known to exist within a 2km radius of the site. The borehole is situated approximately 1.9km southwest of the site, and is used for agricultural purposes.

The area does not fall within a groundwater control area; however groundwater remains the property of the government of Namibia. This means that government controls the exploration and usage of it.

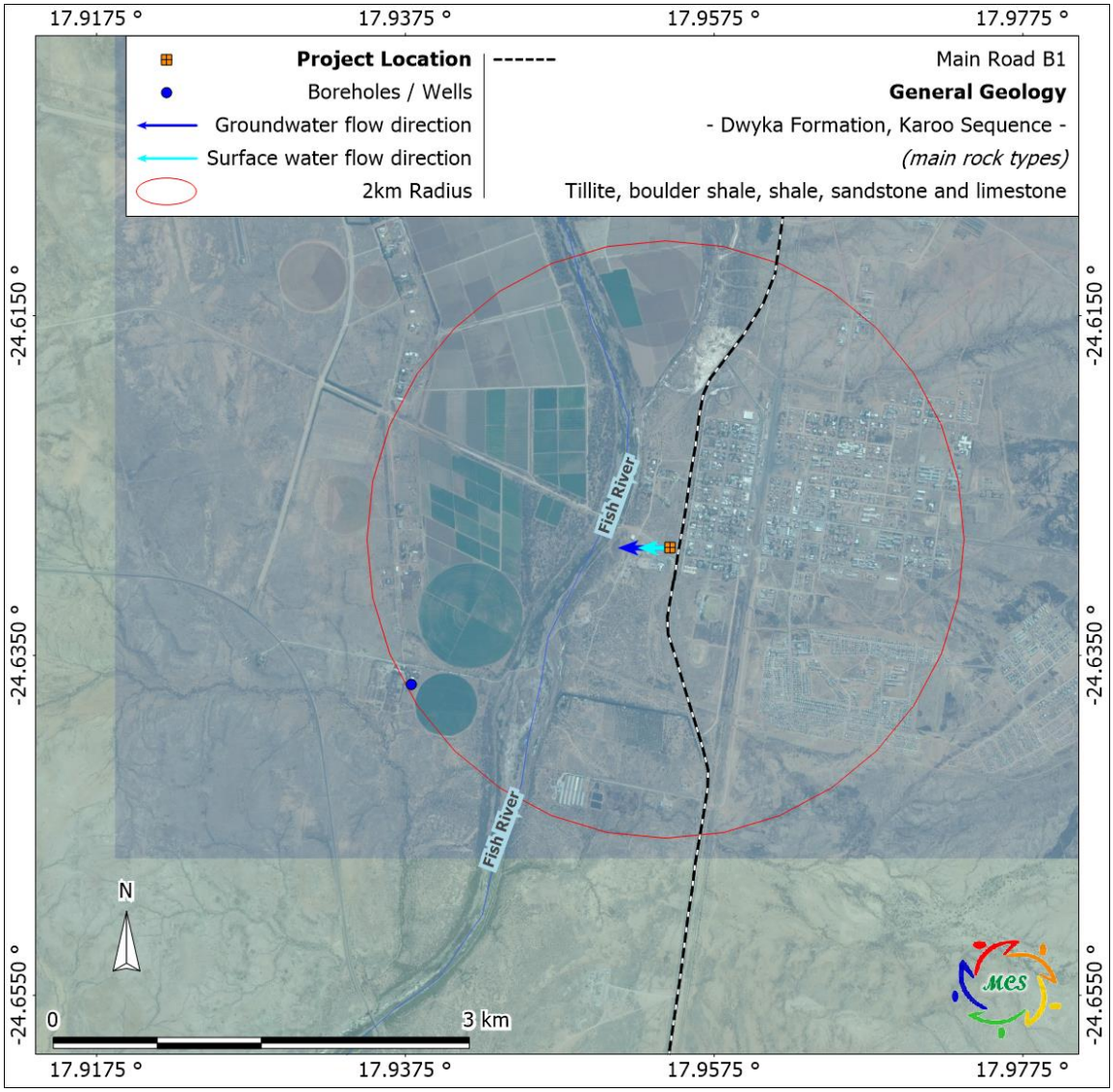

Figure 6. Hydrogeological map

8.6 General Ecology

The site falls within the Nama Karoo biome, which is characterised by Dwarf Shrub Savanna vegetation type. The dominant vegetation structure is low shrubs that usually grow on Eutric Leptosols soils present in this area.

The Nama Karoo is known to support a varied assemblage of plant communities, ranging from deciduous shrub vegetation to perennial grasslands and succulent shrubs. The great wealth of plant species in the area is brought about by the geological substrates, soils and land forms. Seven vegetation types occur within the Nama Karoo biome of which most is arid (See figure 8, for vegetation map).

The area has been previously disturbed with pedestrian movement (i.e. pedestrian walkways and tracks). Undisturbed vegetation is however also observed within the study area. The dominant vegetation on site consists mainly of scattered thorn bush and trees, medium height shrubs, some weedy species and very little grass. No conservation worthy vegetation exists at the project location.

Photos 2 below illustrate the dominant vegetation at the site.

Deducing from the Atlas of Namibia, the proposed site is within the area that is known to have between 50 to 99 plant species (Mandelsohn et al, 2003). With regards to fauna, it is estimated that at least 51 to 60 reptiles, 61 to 75 mammal and 141 to 170 bird species (breeding residents) are known to or are expected to occur in the project area of which only a very few proportions are endemics. Faunal species diversity is presented in the table below:

Table 2. General Fauna Diversity (Atlas of Namibia)

	Diversity	**Endemism**
Mammal	61 - 75 Species	5 - 6 Species
Scorpion	12 - 13 Species	0 Species
Bird	141-170 Species	0 Species
Reptile	51 - 60 Species	9 - 12 Species
Frog	8 - 11 Species	N/A
Lizard	28 - 31 Species	N/A
Termite	1 - 6 Genera	N/A

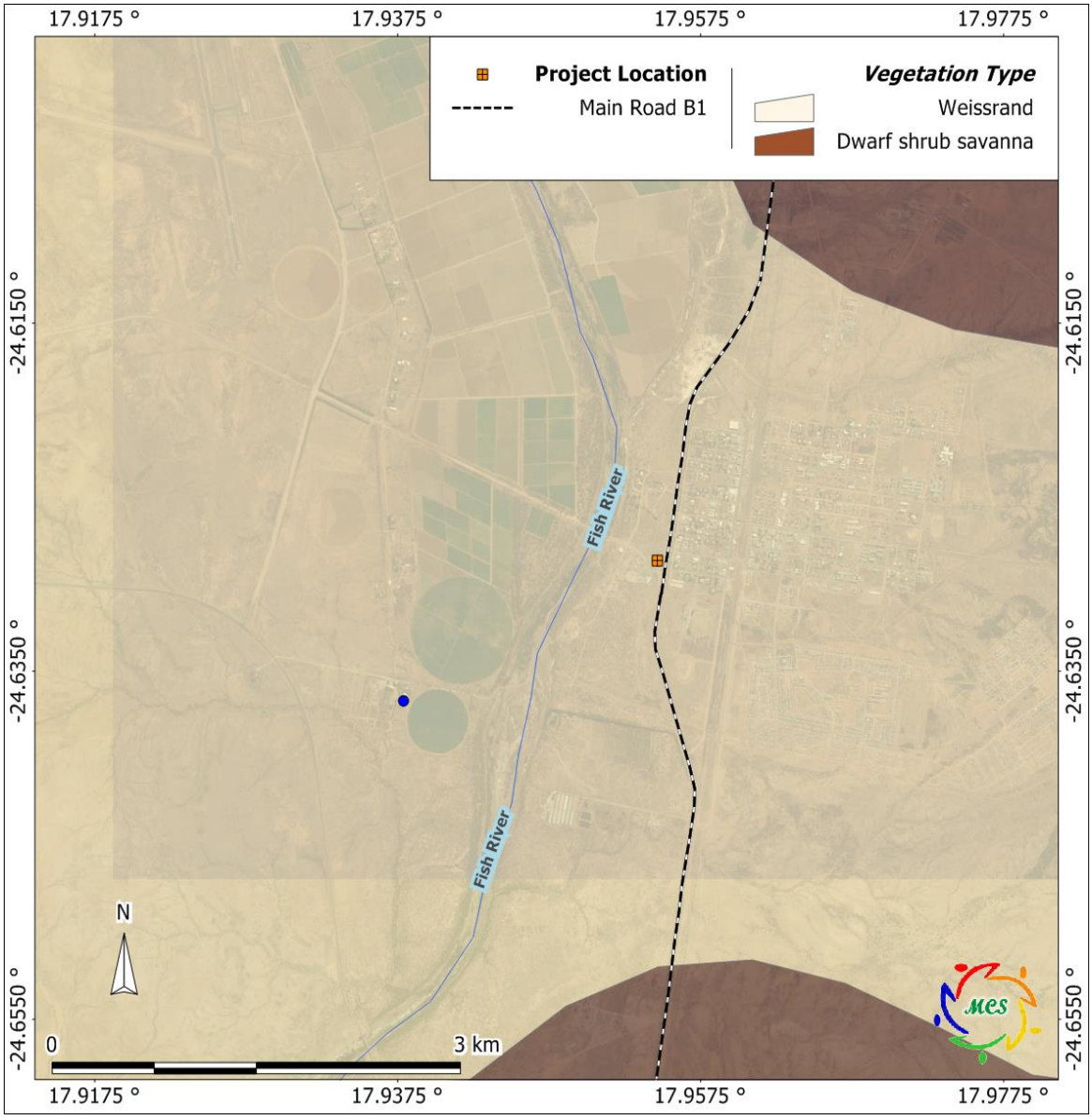

Figure 7. Vegetation map

8.7 Socio-Economic Aspects

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

8.7.1 Regional information

The proposed shopping development will be situated in Mariental, in the Hardap Region of Namibia. The total current population in Mariental is estimated to be 18,494, whilst the regional population is estimated to be 106,680 (54,323 males and 52,357 females) (NSA, 2023). In 2011, the literacy rate among the population of the Hardap Region aged 15 years and older was 91%. This figure is higher than the national literacy rate of 89%.

While there have been some fluctuations in the national literacy rate, the Hardap Region consistently shows a strong literacy rate among adults. For example, the 2023 Namibia Population and Housing Census reported an overall national literacy rate of 87.3%.

The population density in the region is 1 persons per square kilometre (1.0 per km^2), compared to the national average of 4 persons per km^2 (NSA, 2023).

8.7.2 Mariental

The town of Mariental is situated on the banks of the Fish River, 275 km southeast of Windhoek the national capital on the B1 national highway. It links by road and rail to the Republic of South Africa via Keetmanshoop and at the same links with Walvisbay, the national harbor on the C19 secondary road via the Namib Naukluft Park.

8.7.2.1 Economic activities

Mariental is the administrative centre and capital town of the Hardap Region. The town is the hub for most economic activities in the region.

8.7.2.2 Employment (Job Opportunities)

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

The principle of maximising local employment creation can be applied by identifying suitable construction contractors in each region.

The town is well-equipped with competent small and medium enterprise (SME) construction companies to develop the project. The project would also give rise to indirect economic benefits through the procurement of materials, goods and local services.

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

In addition, procurement of construction materials, goods and services would have beneficial downstream economic impacts by stimulating demand up the supply chain. The more goods and services procured from

local SMEs or enterprises at the town, the greater the project's contribution to the growth of the local economy.

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

8.7.2.3 Livelihoods

Livestock farming and formal employment are the main livelihood activities in the Region. Game farming, hunting and ecotourism yield alternative income for some farmers. Nearly half of the population is employed in the private and public sectors, therefore making wages and salaries the main source of income for 64% of households in the region. Pensions constitute the second main source of income for 13% of households, farming make up 7%, cash remittance 7% and non-farming business 4% of the population (NSA, 2011). The livelihoods of the local community are likely to be positively impacted therefore predicted to be better than before the proposed development at the town.

8.7.2.4 Tourism

Many tourists that visit the Mariental and the Hardap Region, come to enjoy the safari and hunting experiences offered in the southern part of Namibia. In addition, private game farms and conservancies offer protection for wildlife, which then becomes an attraction to tourists and trophy hunters.

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

8.7.2.5 In - Migration

Due to enhanced employment opportunities that could be created by the envisaged project, some in-migration of job seekers to Mariental can be expected. Depending on the amount of in-migration, local areas may start experiencing overcrowdings, over use of infrastructure, local conflicts, increase of goods prices due to increased demand etc.

8.7.2.6 HIV & Prostitution

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

The spending powers of locals working on the development are likely to increase, and this might be a perfect opportunity for sex workers to

explore. Migrant labourers from other regions and expatriates are normally vulnerable and may use the services rendered by the sex workers.

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

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

- ✓ Reduced workforce in the Hardap Region.
- ✓ Diversion of income expenditure to medical care.
- ✓ Increase in orphans and households headed by children.
- ✓ Increase in pregnancy related mortality.

In 2022, Namibia had 0.543 physicians per 1,000 people, according to the World Bank. This means that for every 1,000 people in Namibia, there were 0.543 physicians. Alternatively, it could be stated as one doctor for every 1,840 people.

8.7.2.7 Infrastructure & Increased Traffic

The Hardap Region currently has a well developed infrastructure. Even though the town still has gravel roads that need upgrading, such as upgrading the Wolfaardt Road to bitumen standard. The main trunk road which provides a direct link from Windhoek to South Africa passes through Mariental. Plus the town has an all-weather landing strip for small to medium sized planes.

According to NSA (2011), atleast 92% of households have access to safe water. Over 22% have no access to toilet facilities. Less than a half of all households have access to wood or charcoal for cooking, and nearly 85% of all households have access to electricity.

The number of traffic in the area is expected to increase slightly and it might contribute to heavy traffic during peak hours and a higher number of car accidents. Infrastructure like roads (e.g. main road B1) will be affected due to increased traffic and heavy-duty cargo trucks accessing the site.

8.7.2.8 Regional Education Status

According to NSA (2011), there are a total number of 55 schools of which 52 are state owned and 3 privately owned in the Hardap Region. In addition, of the 21,886 learners in the Hardap 20,497 are enrolled in public schools while the remaining 1,389 attend private schools. Only 57 of all

845 teachers in the Hardap Region are without training. The percentage literacy for persons older than 15 years is 83% which is high in comparison with the 81% of Namibia. The Hardap Region has high levels when it comes to academic ratings in the country, most schools offer quality education to the young ones as from primary to high school.

8.7.2.9 Poverty status

According to a survey in 2005, Hardap Region's Human Poverty Index of 25.0 percent is higher than the national average of 24.7 percent. In general with reference to all indicators (e.g. unemployment, life expectancy rates, access to land, access to safe water and toilet facilities, poverty etc) the Hardap Region has much room for improvement in comparison with the rest of the country. In the Hardap, having insufficient land to farm on, being unemployed, and relying solely on a fixed monthly wages for those employed are regarded as the root causes of poverty in the region.

9. STAKEHOLDER PARTICIPATION

The principles of EMA govern many aspects of EIA's, including consultation with interested and affected parties (I&APs). Consultation with the public forms an integral component of an EIA investigation and enables I&APs e.g. neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the potential environmental impacts associated with the proposed development and to identify additional issues which they feel should be addressed in the EIA.

The primary aims of public participation were:

- To initiate participation of Interested and affected parties (I&APs).
- To inform I&APs and key stakeholders about the proposed development
- To identify issues and concerns of key stakeholders and I&Aps with regards to the proposed development.
- To provide information to enable informed decision making
- To develop a communication structure with stakeholder and I&APs
- To promote transparency of the project
- To ensure the public and stakeholders comments are considered for the development.
- To provide answers to I&APs queries
- To encourage shared responsibility and sense of ownership.

A public participation notice was placed at the project site itself (Photo 3). In addition, notices (A3 size) were placed in strategic locations in and around Mariental. These locations included the Mariental Municipality, Mariental Spar, Natis, Nampost, Police Station, Engen Wimpy and the Fish River Shell service stations.


Photo 3. Public participation notice

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

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

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

- ✓ The Windhoek Observer, 28 March 2025 to 03 April 2025
- ✓ Confidente, 28 March 2025 and 04 April 2025

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

The Mariental Municipality (local authority) was also consulted, and the Chief Executive Officer, Mr. Paul Nghiwilepo indicated no obvious environmental concerns regarding the proposed project; however he advised that care should be taken to avoid pollution throughout all stages of the development.

A public consultation meeting was held on 11 April 2025, at the Persianer Community Hall in Mariental. Despite the public invitation for the meeting in various platforms, no attendance was recorded during the meeting.

Table 3. Consulted Stakeholders/I&APS

NAME	ORGANISATION	PROJECT RELEVANCE
Mr. Damian Nchindo	Ministry of Environment and Tourism, Directorate of Environmental Affairs.	EA procedure
Ms. P. Oberholster	Jachri Properties (Pty) Ltd / General Manager	Installation Information

Mr. D. Bosch	Claud Bosch Agapitus Architects / Project Architects	Design Information
Mr. H. Winckler	Hwepo Projects – Civil & Structural Engineers	Project Management & Engineering Designs
Mr. Paul Nghiwilepo	Mariental Municipality / Chief Executive Officer	Local Authority
Ms. M. Nowases	Mariental Municipality / Property Administrator	Local Authority

Consultation with the department of Environmental Affairs (MET) included the environmental assessment procedure and application procedure.

10. ENVIRONMENTAL IMPACT EVALUATION

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

Table 4. Impact Evaluation Criterion *(DEAT 2006)*

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

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

10.1 Construction Phase of the retail shopping development

10.1.1 Erosion and Sedimentation

Clearing of vegetation during earthworks is expected to take place and can make the project site susceptible to soil erosion especially during rainy seasons. The constant movement of heavy construction vehicles during construction also tend to compact the soil surface, which can reduce infiltration capability, and increase surface water runoff.

Proposed Mitigation Measures

- Avoid unnecessary removal of topsoil cover during construction.
- Ensure stockpiles are located within the boundary of the site and are protected from erosion.
- Stabilise cleared areas as soon as possible to prevent and control surface erosion.
- Limit clearing of vegetation to those areas within the footprint of construction.
- Minimise open areas and reduce the frequency of disturbance.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Erosion and Sedimentation	-VE	1	1	4	2	M	L

10.1.2 Dust Pollution and Air Quality

Dust will be generated during the construction phase and might be worse during the winter months when strong winds occur. The nearest residential properties are situated approximately 100m east of the site, while the River Chalets is situated directly north of the site. Dust problems are expected to be site specific and may pose a slight nuisance to these nearby dwellings and to the nearby B1 road users. Dust is regarded as a nuisance as it reduces visibility, affects the human health and retards plant growth.

Release of various particulates and exhaust fumes from construction vehicles and machinery during construction activities is also expected to take place.

Proposed Mitigation Measures

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

Impact Evaluation:

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

10.1.3 Noise Impact

An increase of ambient noise levels at the construction site is expected due to construction activities. Noise pollution due to heavy-duty equipment and machinery will be generated. It is not expected that the noise generated during construction will impact any third parties very much.

Proposed Mitigation Measures

- Ensure the use of construction vehicles and equipment that emit reduced noise levels.

- Ensure proper maintenance is conducted on vehicles to ensure the reduction of noise emission.
- The construction staff should be equipped with ear protection equipment.
- Audio equipment (if any) should not be played at levels considered intrusive by others.
- Construction activities will be limited to a period between 07h00 and 19h00.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Noise	-VE	1	2	4	3	L	L

10.1.4 Safety & Security

Safety issues could arise from the construction vehicles, earthmoving equipment and tools that will be used on site during the construction phase. This increases the possibility of injuries and the contractor must ensure that all staff members are made aware of the potential risks of injuries on site. Construction sites usually house construction building material and equipment on site which may attract criminal activities.

Proposed Mitigation Measures

- Display telephone numbers of emergency services at the project location.
- Provide suitable emergency and safety signage on site (manufactured of durable, weatherproof material). The signage signs should be placed at strategic locations to ensure awareness.
- Demarcate and barricade any areas which may pose a safety risk (including hazardous substances, deep excavations etc). These notices must be worded in English and the local Nama language.
- Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times.
- Prevent illegal access to the construction site by implementing appropriate security measures. These security measures must not pose a threat to surrounding properties.
- Should a construction camp be necessary, it should be located in such a way that it does not pose a risk to the public.
- Equipment housed on site must be placed in a way that does not encourage criminal activities.
- For safety and security reasons it is recommended that the entire site (construction site and camp) be fenced-off and security personnel be employed to safeguard the premises and to avert criminal activates.

- Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used.
- The contractor is advised to ensure that the team is equipped with first aid kits and that they are available on site, at all times.
- Proper barricading and/or fencing around the work sites should be erected to avoid entrance of animals and/or unauthorized persons.
- Adequate lighting within and around the construction location should be erected, when visibility becomes an issue.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Safety & Security	-VE	1	2	6	3	M	L

10.1.5 Traffic

Construction vehicles will access the project location from the B1 main road. Construction related activities are expected to have a minimal impact on the movement of traffic along these roads, due to the fact that construction vehicles will frequent the site only periodically.

No diversion of traffic or closure of the B1 road is expected, however a slight nuisance might be experienced by motorists using the road and the access road to the Engen Wimpy and the Fish River Shell service stations. This will most likely be caused by slow moving vehicles frequenting the construction site. This is however expected to be short-lived.

Proposed Mitigation Measures

- Install and maintain official traffic signalling (where necessary) along the access road / intersection in conjunction with local or national traffic regulations.
- Speed limit warning signs must be erected to minimise accidents.
- Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents.
- Where feasible, Construction vehicles should not travel to and from the site during peak times (07h00 to 09h00 and 16h00 to 18h00), to minimise impacts on traffic.
- Construction vehicles should not be allowed to obstruct the road, hence no stopping in the road, wholly or partially, but rather pull off the road or park on the roadside.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Traffic	-VE	1	2	4	3	L	L

10.1.6 Groundwater

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

Any overflow of the portable toilet facilities available at the construction site, may put shallow groundwater; and sensitive geological structures present at risk.

Proposed Mitigation Measures

- Prevent spillages of any chemicals and petroleum products (i.e. oils, lubricants, petrol and diesel). Use drip trays, linings or concrete floors when evidence of leaks are observed on vehicles or equipment.
- No major servicing and maintenance of vehicles and/or equipment should be conducted at the site.
- All fuelling, storage and chemical handling should be conducted on surfaces provided for this purpose. Drip trays, linings or concrete floors must be used when removing oil from machinery.
- Spillage control procedures must be in place according to relevant SANS standards or better. Waste water collection systems should be connected to these systems.
- Should portable toilet facilities be necessary, adequate containment systems should be erected at the site for use during the construction phase.
- Waste should properly be contained to avoid any leakages and/or spillages, and should regularly be disposed off at a suitable sewage disposal site. Run-off from these toilets due to overflows should be avoided at all cost.
- Proper environmental awareness and remedial response training of operators must be conducted on a regular basis.

Impact Evaluation:

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

10.1.7 Surface Water

Local drainage is well developed and runoff takes place towards the nearby Fish River. Contamination of the nearby river may occur through petroleum, chemical and hazardous substances. Contaminants in the form of oil leakages, diesel, lubricants and grease from the construction equipment and machinery may occur during the construction phase.

Proposed Mitigation Measures

- Use drip trays, linings or concrete floors when evidence of leaks are observed on construction vehicles or equipment.
- Remove leaking vehicles from project site immediately.
- No major servicing and maintenance of vehicles and/or equipment should be conducted on site.
- Any spillage of hazardous substances including fuel, oil, paint or cleaning solvent must be cleaned up immediately and disposed off at a designated hazardous waste site.
- Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons into the nearby river.
- Prevent illegal washing out of contaminated equipment and/or containers in nearby water courses.
- Properly secure all portable toilets (if any) to the ground to prevent them toppling due to wind or any other cause.
- Maintain toilets in a hygienic state and remove waste to a licensed disposal facility. Ensure that no spillages occur when the toilets are cleaned or emptied.
- Prohibit urination on site, other than at designated facilities.
- Contain contaminated water from batching operations and allow sediments to settle before being disposed of as waste water.
- Stabilise cleared areas as soon as possible to prevent and control surface erosion.
- Proper environmental awareness and remedial response training of operators must be conducted on a regular basis.
- An emergency plan should be in place on how to deal with spillages and leakages during this phase.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Surface water	-VE	2	3	6	2	M	L

10.1.8 Generation of Waste

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

Proposed Mitigation Measures

- Ensure that sufficient weather- and vermin- proof bins / containers are present on site for the disposal of solid waste. Waste and litter generated during this phase must be placed in these disposal bins.
- Empty bins regularly as required.
- The Contractor shall institute a waste control and removal system for the site.
- All waste shall be disposed off site, at an approved landfill site.
- No disposal of, burying or burning of waste on site should be conducted.
- The hazardous waste storage is to be clearly marked to indicate the presence of hazardous substances, and the protocols associated with handling of such hazardous wastes shall be known by all relevant personnel.
- Solid and liquid hazardous waste shall be stored in separate containers. Hazardous waste should be disposed of at an approved hazardous waste disposal site.
- Regular inspection and housekeeping procedure monitoring should be maintained at all times.
- Awareness of the hazardous nature of various types of waste should be enforced.

Impact Evaluation:

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

10.1.9 Heritage Impacts

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

Proposed Mitigation Measures

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

Impact Evaluation:

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

10.1.10 Ecological Impacts

No conservation worthy vegetation is present at the site.

Proposed Mitigation Measures

- Limit clearing of vegetation to those areas within the footprint of construction, minimise open areas and reduce the frequency of disturbance.
- Disturbance of areas outside the designated working zone is not allowed.
- No vegetation should be removed outside the designated project area.

Impact Evaluation:

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

10.1.11 Socio-Economic Aspects

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

Proposed Mitigation Measures

- Construction contractor(s) should be sourced from Mariental, and its surrounding areas.
- Construction workers should be sourced from Mariental, and its surrounding areas.
- Suppliers of construction materials should be sourced from Mariental, and its surrounding areas.
- Locally source services required during the construction process, such as securities, rental of portable toilets, plant hire, etc.
- Designate an area outside the construction site for informal traders (if any), to allow them to trade.

Impact Evaluation:

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

Summary of all potential impacts during the construction phase:

In general, impacts are expected to be low to medium, mostly short lived and site specific. Mitigation options recommended in the Environmental Management Plan (EMP) will guide and ensure that the impacts of the construction work are minimised. It is further advised that traffic signs and barricades be installed around any excavations to ensure safety. Proper storm water management plans must be in place to minimise the risk of flooding and pollution, and must form part of the engineering designs.

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

10.2 Operational Phase of the retail shopping development

10.2.1 Spillages

Spillages of hazardous agrichemicals and building materials are bound to occur during delivery and collection. Hazardous substances such as paint, thinners, fertilizers, pesticides, adhesives, cement and other hazardous chemicals may be spilled during handling and storage at the development.

Safe handling and storage of these hazardous chemicals and materials are crucial for protecting the environment and human health.

Proposed Mitigation Measures

- All hazardous chemicals and materials should be placed and handled in suitable containment structures to avoid the spread of any spills. Install suitable containment structures around the storage areas (i.e bundwalls) and handling areas.
- Slope all floors around handling areas to allow for drainage to a watertight collection areas or sumps.
- Careful handling and storage of hazardous agrichemicals and building materials, along with regular maintenance of equipment, are crucial to minimize the risk of spills.
- Risk of impact from this can be lowered through proper training of staff.
- Develop and implement an emergency response plan to address potential spills, leaks, or other hazardous events. Staff should be familiar with the plan.
- Have appropriate materials for cleaning up spills readily available, such as sand, absorbent materials, or spill kits.
- Always store chemicals in their original, properly labelled containers.
- Ensure that all containers are tightly closed when not in use.
- Regularly inspect stored chemicals for damage, leakage, or deterioration.
- Staff should at all times be aware of the precautions associated with the handling of hazardous products as described in the relevant Material Safety Data Sheets.

Impact Evaluation:

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

10.2.2 Air Quality

Handling and storage of hazardous substances can significantly impact air quality through the release of various pollutants, including volatile organic compounds (VOCs), particulate matter (PM), and toxic substances. These emissions can contribute to smog, acid rain, and other air quality issues, posing risks to both human health and the environment.

Proposed Mitigation Measures

- Storage areas should be cool, dry, well-ventilated, and free from moisture to prevent corrosion or degradation of materials.
- Adequate ventilation is essential to prevent the build-up of harmful fumes or gases and to ensure a safe storage environment.
- Implementing systems like gas capture and filtration can reduce the release of pollutants.
- Continuous monitoring of air quality and using predictive models can help assess and manage pollution levels.
- Encourage reduction of engine idling of vehicles at the project site.
- Keep a complaints register regarding air quality contamination at the site; and act on it if becomes a regular complaint.

Impact Evaluation:

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

10.2.3 Fire and Explosion Risks

Hazardous storage facilities face significant fire and explosion risks due to the nature of the materials they handle. These risks stem from the potential for flammable, explosive, or reactive substances to ignite or explode, causing devastating consequences.

Many hazardous materials, including gases, liquids, and solids, are flammable and can easily ignite or explode when mixed with air in the right proportion. Effective fire and explosion risk assessments are crucial for identifying hazards, evaluating risks, and implementing control measures to protect personnel, property, and the environment.

Proposed Mitigation Measures

- Implementing measures to prevent leaks or spills of hazardous materials.
- Ensuring that any releases are contained and safely removed.
- Eliminating or controlling potential ignition sources.
- Implementing systems like automatic fire suppression systems, gas detection, and early warning systems.

- Ensuring that all equipment and systems are properly maintained and functioning correctly.
- Ensure sufficient water is available all the time for fire fighting purposes.
- Emergency response procedures should be in place so as to alert the employees on how to react to fire and explosions incidents.
- An incident reporting procedure should also be implemented to make the employees aware of how, when and to whom to report fire and explosion incidents.
- All electrical wiring of the development must be installed and approved by a qualified electrician who will issue a Certificate of Compliance.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Fire & Explosions	-VE	1	2	6	4	M	L

10.2.4 Generation of Waste

Waste such as contaminated soil, litter, empty containers and packaging of hazardous substances will be generated during the operational phase. Hazardous waste that are not properly stored can leak or spill, contaminating the soil and seeping into groundwater.

Proposed Mitigation Measures

- Contamination of soil should be prevented through the use of containment areas as provided.
- Any contaminated soil generated must be contained, disposed off and/or bioremediated accordingly.
- Waste bins must be readily available at the site, appropriately collected and disposed off at an approved appropriate waste disposal site.
- Hazardous waste and contaminated materials should be collected in appropriate containers and disposed of at designated hazardous waste facilities.
- Dispose of unused hazardous properly according to relevant regulations and manufacturer instructions.
- Reduce the amount of hazardous waste generated through waste minimization and recycling programs.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Waste	-VE	1	2	5	2	L	L

10.2.5 Surface Water

Accidents during storage, handling, or transportation of hazardous agrichemicals and building materials can result in spills or leaks that may contaminate the nearby Fish River. Hazardous substances stored on-site can also be washed into the river by stormwater runoff. Contaminants from materials such as paint, thinners, fertilizers, pesticides, adhesives and cement may pose a risk to the river, potentially harming aquatic life and impacting downstream users.

Proposed Mitigation Measures

- Hazardous agrichemicals and building materials should be stored above flood plain levels to prevent contamination from floods.
- Locate storage facilities above the 50-year floodplain elevation. However, if site restrictions require location within a floodplain, design to protect the facility from inundation and damage from the 20-year flood event.
- All hazardous chemicals and materials should be placed and handled in suitable containment structures to avoid the spread of any spills. Install suitable containment structures around the storage areas (i.e bundwalls) and handling areas.
- Use drip trays, linings or concrete floors when evidence of leaks are observed on delivery and handling vehicles/equipment.
- Develop and implement an emergency response plan to handle spills and leaks promptly and effectively.
- Remove all excess sedimentation, rubble and any other waste material present in the waterway and dispose of in a suitable manner to ensure proper drainage runoff.
- Ensure that stormwater management systems are regularly maintained and tested, and are in good working order.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Surface water	-VE	2	2	6	3	M	L

10.2.6 Groundwater

The groundwater resource may be contaminated by chemicals, fuels, and other hazardous materials stored and handled at the development. This may emanate from possible leaks and spillages due to failure of storage containers, damage, or poor management. Contaminants may seep downward through geological structures within the hardrock formation and contaminate the local groundwater resource.

Proposed Mitigation Measures

- Ensure that all hazardous chemicals are delivered and handled in suitable containment areas to avoid the spread of any spills.
- Suitable containment bunding structures should be installed in storage areas of hazardous chemicals and material.
- Proper monitoring of the product levels must take place to eliminate overfilling.
- Avoid discharge of pollutants (such as cement, paint, thinners, fertilizers, pesticides, adhesives, chemicals and contaminated waste water) directly into the soil.
- All hazardous wastes generated in the project area should be safely contained and disposed of at a designated hazardous waste disposal. Consultation with the Mariental municipality should be sought in this regard.
- Equipment and materials to deal with spill cleanup must be readily available on site and staff must be trained as to how to use the equipment and briefed about reporting procedures.
- Develop and implement a groundwater monitoring system and programme, with the aim of monitoring possible contamination to groundwater.
- Regular containment and pipeline tightness inspections are advised to eliminate the risk of impact on the environment due to leakage.

Impact Evaluation:

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

10.2.7 Health and Safety

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

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

Proposed Mitigation Measures

- Staff must be properly trained and made aware of all the MSDS (Material Safety Data Sheets) sheets of all chemicals and on site.
- Fire fighting equipment and first aid kit should be made available and must be serviced regularly.

- Ensure that all employees handling hazardous agrichemicals and building materials receive proper training on safe handling and storage practices.
- Display contact details of emergency services in the area at strategic locations of the facility.
- Use appropriate PPE, such as gloves, eye protection, and respirators, when handling chemicals.
- Wash hands thoroughly after handling chemicals and before eating or drinking.
- Ensure adequate ventilation at all times for enclosed buildings using natural or mechanical means.

Impact Evaluation:

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

10.2.8 Traffic

Although negligible, a slight increase in traffic will be experienced along the B1 road; and nearby access and service roads. This impact will be long-lived, as motorists will frequent the retail shopping development.

Proposed Mitigation Measures

- Speed limits and road signs as set out by the local and national traffic regulations should be adhered to in order to minimise accidents.
- Appropriate road signs should be erected to reduce these impacts and their spin-offs.

Impact Evaluation:

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

10.2.9 Ecological Impacts

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

Proposed Mitigation Measures

- The operational activities would not exceed the demarcated area of the shopping development as zoned by the local authority.

Impact Evaluation:

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

10.2.10 Socio-Economic Aspects

The creation of new employment opportunities is considered to be a positive impact. At this stage, it is unclear how many people will be employed for the development; however it is envisaged that more than 150 jobs will be created during this phase.

Proposed Mitigation Measures

- Employment creation should be targeted at the immediate communities of the project site, or Windhoek at large.
- Suppliers of operational stock should be sourced from Windhoek, or the region at large.
- Locally source services required during the operational process, such as securities, rental of portable toilets, plant hire, etc.

Impact Evaluation:

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

11. ENVIRONMENTAL MANAGEMENT PLAN

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

The objectives of the EMP are:

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

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

12. CONCLUSIONS

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

The site is generally suitable for the proposed retail shopping development. All environmental risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that this information be made available to the community on a regular basis.

The Environmental Management Plan should be used as an on-site tool during all phases of the proposed retail shopping development. Monitoring of water pollution should be conducted every quarter month of the year.

Future environmental audits should be carried out to ensure compliance of the EMP and environmental regulations of Namibia. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

The environmental clearance is valid for 3 years only, as per the environmental management act No.7 of 2007, thus it is the responsibility of the proponent to commission an application for renewal of the permit by submitting an updated EIA/EMP document before it expires.

11. REFERENCES

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