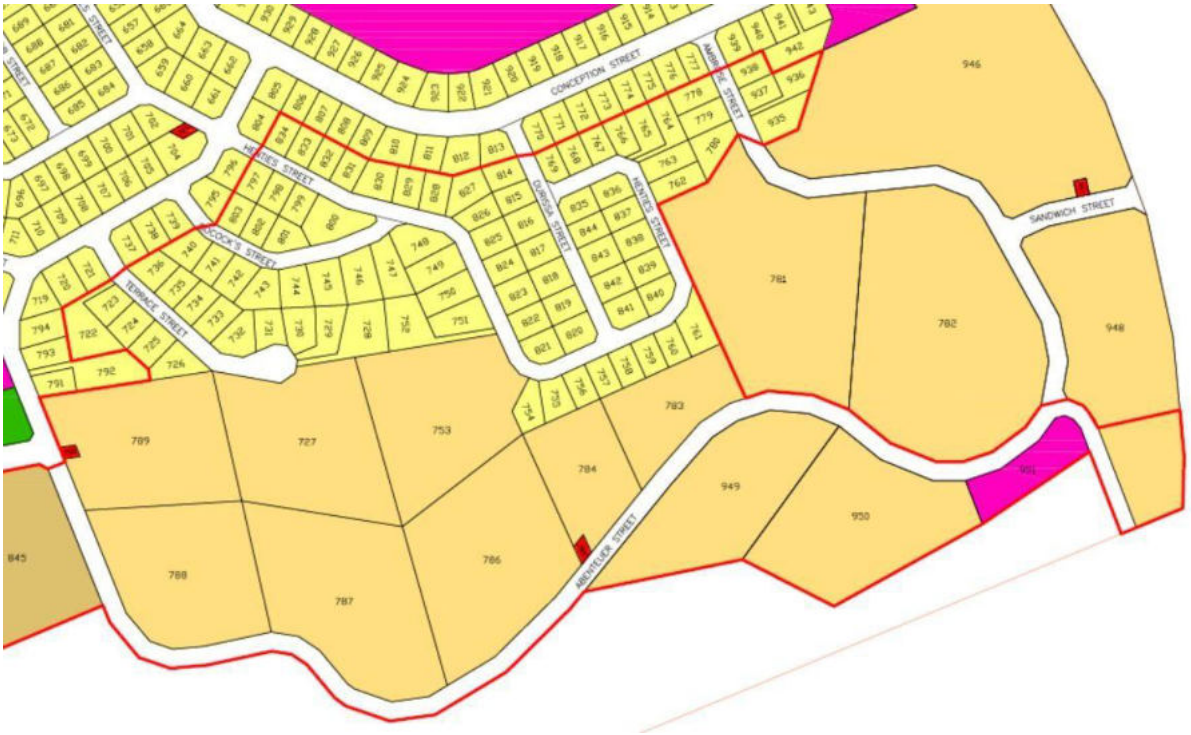
PROPOSED BULK SERVICES OF KLEINE KUPPE EXT 1 PHASE 2 TOWNSHIP,

WINDHOEK,
KHOMAS REGION



ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

JUNE 2019

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PROJECT DETAILS

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REPORT STATUS:	**FINAL**

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) SUMMARY

Project Title:	PROPOSED BULK SERVICES OF KLEINE KUPPE EXT 1 PHASE 2 TOWNSHIP	**Project Number:**	MCS-259
Country:	NAMIBIA	**Region**	Khomas

EXECUTIVE SUMMARY

Champac Investments CC intends to develop Kleine Kuppe Extension 1 Phase 2 Township. This Environmental Management Plan (EMP) serves as a managing tool for all construction and operational activities during the development of the proposed township, in Windhoek. The EMP is developed to outline measures to be implemented in order to minimize adverse environmental degradation associated with this development.

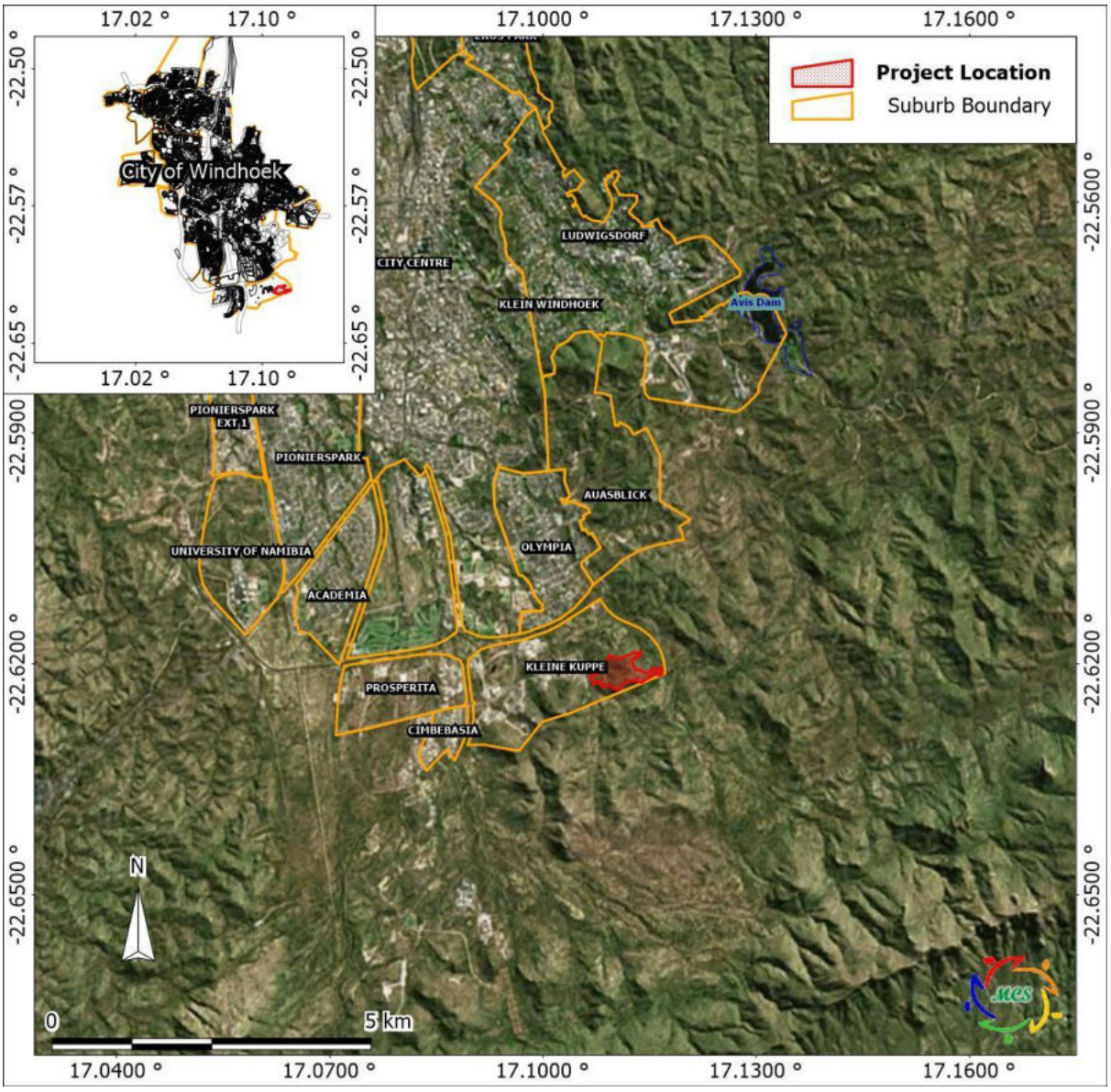

Figure 1: Location Map of Kleine Kuppe Ext 1 Phase2

MAJOR ENVIRONMENTAL AND SOCIAL IMPACTS

The project is expected to provide job opportunities to the local communities, of which at least 80% are expected to be unskilled and semi-skilled people, and can be sourced from the unemployed labour force of the local communities. The local economy of the project location is expected to benefit from the projects, as the money spent in the communities around the project locations would create substantial flows of revenue within these communities, thus acting as a catalyst for growth in the local economy. Goods and services procured from local businesses or enterprises will also increase the project's contribution to the growth of the local economy. Improvement of quality of life due the provision bulk services.

The use of heavy construction machineries and increased traffic at the project site during the construction can result in soil compaction, which could increase run-off capacity of the soil at the site. Waste material will be generated during the construction of the proposed development. Waste in the form of rock cuttings, pipe cuttings, electrical cuttings, oil spills or leakages of petroleum products might occur during the construction phase. Contamination of soil, groundwater and surface water might occur through petroleum, chemical, harmful and hazardous substances. Contaminants in the form of oil leakages, diesel, lubricants and grease from the construction equipment and machinery during the construction phase may occur. Care must be taken to avoid contamination of soil and groundwater.

Dust will be generated during the construction phase. Dust problems are expected to be site specific and will not pose a nuisance to any neighboring land; however it might be worse during the winter months when strong winds occur. Earthmoving equipment will be utilized during the construction phase and noise would be generated. No known heritage artifacts or areas envisaged to be impacted by the development.

Safety and security issues could arise from the earthmoving equipment and tools that will be used on site during the construction activities. This increases the possibility of injuries. The presence of construction activities could also encourage criminal activities. Open flames, smoking or any potential sources of ignition are potential threats to health and safety, especially in areas where highly flammable materials are stored on the premises.

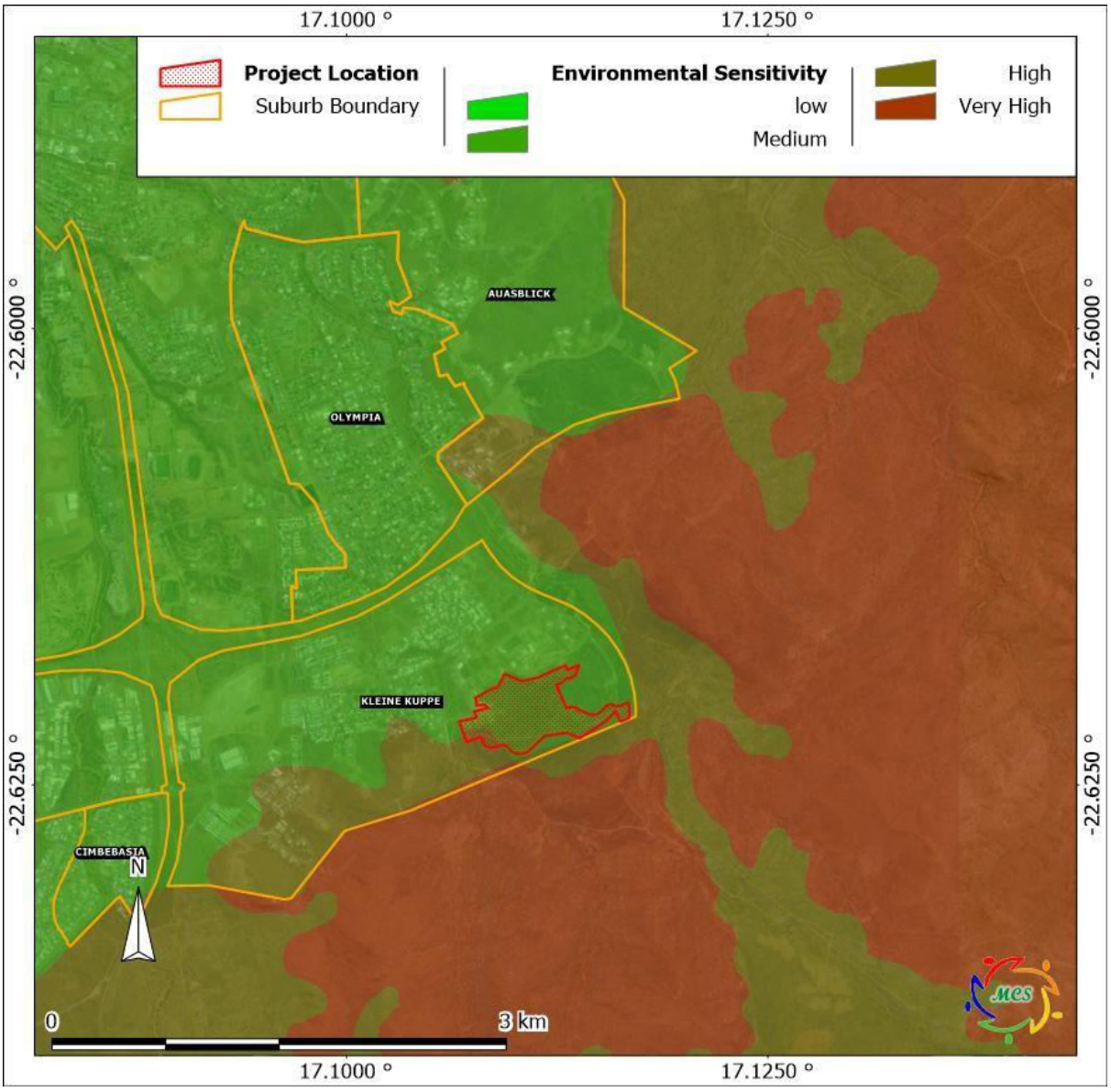

Figure 2. Environmental control zones

The study area falls within low environmental sensitivity zone. This means that the environmental consequences of the proposed development in that area are insignificant.

According to City of Windhoek Environmental Structure Plan of 2004:

The control zones are based upon the following;

- The critical sensitivity of the southern Windhoek aquifer.
- The sensitivity of the catchment of the Goreangab Dam, and surface water resources, including rivers and streams throughout Windhoek.

- The sensitivity of the environment or a specific critical environmental component.
- The relative importance of the 'sense of place' or the specific character of Windhoek determined through resident participation, which includes topography and landscape quality as well as cultural / historical resources.
- The need to protect open space in Windhoek, which includes the river and aquatic systems, as well as the ridgelines, hills and mountains, and natural areas surrounding the city.
- The need to protect, manage and conserve sensitive natural vegetation cover

In general, impacts are expected to be low to medium, mostly short lived and site specific. Mitigation options recommended in the Environmental and Social Management Plan (ESMP) will guide and ensure that the impacts of the construction work are minimized.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Proposed mitigation measures, monitoring and implementation plan of the potential environmental and social impacts identified.

Anticipated Environmental & Social Impact	Proposed Mitigation Measures	Monitoring and Reporting Indicators	Implementation Plan and Institutional Responsibilities	Timing
Pre-construction (Planning/Design) Phase				
Compliance with Legal Environmental and Social Requirements	▪ Conduct an environmental and social management Plan to comply with the Environmental Management Act (2007) and its regulations of 2012. ▪ Identify and address all environmental and social issues. ▪ Resettlement and land acquisition issues (if any) must be addressed and documented.	*Develop site-specific ESMP for each project site. *Screening and appropriate resettlement procedure implemented.	EM, and appointed Consultant	Once
Environmental Awareness Training	▪ Ensure that all persons involved in the project are aware of, and are familiar with the environmental requirements for the project. ▪ Develop and implement environmental emergency preparedness procedures.	*Record of awareness training. *Record of attendance register of training.	EM, and appointed Consultant	Before construction/ Ongoing
Health and Safety Aspects	▪ Ensure that all persons involved in the project are aware of, and are familiar with the environmental requirements for the project. ▪ Establish personnel protection standards and mandatory safety practices and procedures for the field activities related to Corrective Actions at the site. ▪ Establish the lines of communication among contractors and subcontractors involved in work operations for safety and health matters. ▪ Conduct HIV /Aids Awareness Programme on Site for not less than 90% of workers inclusive of all direct and indirect costs. ▪ Provide and maintain condom dispenser. ▪ Provide and maintain HIVÁIDS awareness posters.	*Record of health and safety plan.	EM, and appointed Consultant	Before construction/ Ongoing

	▪ Provide information regarding the voluntary testing of construction workers and counselling, support and care.			
Construction Phase				
Dust Pollution and Air Quality	▪ Ensure measures are in place to minimise dust generated by Upgrading activities, to the satisfaction of the EM and ECO. ▪ 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. ▪ Use appropriate dust suppression measures when dust generation is unavoidable, e.g. dampening with water, particularly during prolonged periods of dry weather. ▪ Control dust on site roads through wet suppression. ▪ Ensure all vehicle, plant and equipment are in good condition. ▪ Encourage reduction of engine idling.	*Regular visual inspections by EM and ECO. *Number of disturbances outside designated area; *Evidence of disturbances to vegetation or property outside designated area.	ECO, Contractor	Construction phase
Noise Impact	▪ 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.	*Regular visual inspections. *Evidence of no excessive noise.	ECO, Contractor	Construction phase
Contamination of Groundwater	▪ 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	*Daily and weekly, records of remediation. *Visible contaminants from trucks and equipment; *Evidence that leaking equipment decommissioned; *Evidence of soil and water contamination.	ECO, Contractor	Construction phase

	systems. - Proper environmental awareness and remedial response training of operators must be conducted on a regular basis.			
Soil and Surface Water Contamination	- Prevent contamination of soil and surface water through oil leakages, hydrocarbon fuel, lubricants and grease from the construction vehicles and equipment during construction phase. - Spillage control procedures must be in place according to relevant SANS standards or better. - Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons into nearby water courses. - Prevent illegal washing out of containers in water courses. - Conditions of any reticulation systems (i.e. fuel, sewage, water etc) both existing and new will have to be checked regularly and repaired (if necessary) to prevent leakages. - Proper environmental awareness and remedial response training of operators must be conducted on a regular basis.	*Daily and weekly, records of remediation. *Visible contaminants from trucks and equipment; *Evidence that leaking equipment decommissioned; *Evidence of soil and water contamination.	ECO, Contractor	Construction phase
Generation of Waste	- 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. - No disposal of /or burying of waste on site should be conducted. - No waste should be burned on site. - Empty bins regularly as required. - Separate hazardous wastes from general waste, clearly marked, and stored in appropriate containers. - Solid and liquid hazardous waste shall be stored in separate containers. - 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 staff	*Evidence of littering, *Evidence of adequate waste disposal containers; *Amount of recyclable material; *Number of incidents of unauthorised entry.	ECO, Contractor	Construction phase

	members. - Where no formal hazardous waste disposal facility exists, any contaminated soil produced should be contained, transported and disposed of at the nearest approved Hazardous waste site; or a controlled bioremediation facility should be developed. - Awareness of the hazardous nature of various types of waste should be enforced.			
Traffic	- Install and maintain official traffic signalling (where necessary) on local roads / intersections surrounding the project location in conjunction with local or national traffic regulations.	*Adequate traffic signage. *Evidence of traffic congestion.	ECO, Contractor	Construction phase
Fires and Explosions	- Ensure availability of sufficient water for fire fighting purposes. - Ensure that all fire-fighting devices are in good working order and they are serviced. - All personnel must be trained about responsible fire protection measures and good housekeeping such as the removal of flammable materials on site. - Regular inspections should be carried out to inspect and test fire fighting equipment by the contractor.	*Record of fitness and service of fire fighting equipment. *Record of awareness training of fire fighting equipment. *Adequate and appropriate signage in place. *Fire-fighting equipment in place.	ECO, Contractor	Construction phase
Safety and Security	- Display telephone numbers of emergency services, in the at project location. - Provide suitable emergency and safety signage on site (manufactured of durable, weatherproof material). - Demarcate any areas which may pose a safety risk (including hazardous substances, deep excavations etc). These notices must be worded in the - Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times. - Prevent illegal access to the construction sites by implementing appropriate security measures. These security measures must not pose a threat to surrounding communities.	- Evidence of signage in place. *Evidence of personnel using construction machinery or equipment possessing appropriate PPE.	ECO, Contractor	Construction phase
Erosion and Sedimentation	- Avoid unnecessary removal of topsoil cover during construction. - Ensure stockpiles are located within the boundary of	*Evidence of proper stockpiling and management. *Evidence of surface erosion.	ECO, Contractor	Construction phase

	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.	*Evidence of surface erosion. *Number of disturbances outside designated.		
Ecological	- Limit clearing of vegetation to those areas within the footprint of construction, minimise open areas and reduce the frequency of disturbance. - Big trees and protected trees present at the project site should be conserved and incorporated into the development. All big trees with a girth of >150mm must be conserved, for the end-users of the properties. - Disturbance of areas outside the designated working zone is not allowed.	*Evidence of conservation. *Number of disturbances outside designated.	ECO, Contractor	Construction phase
Operation and Maintenance Phase				
Dust Pollution and Air Quality	- Acquire all reasonable measures to minimise dust generated by operational activities. - Avoid handling and transporting of materials which may generate dust under high wind conditions or when a visible dust plume is present. - Appropriate dust suppression measures should be deployed when dust generation is unavoidable, e.g. dampening with water (wet suppression.), particularly during prolonged periods of dry weather. - Ensure all vehicle, plant and equipment are in good condition. - Promote the reduction of engine idling at the project site.	*Records of number of dust complaints. *Visible dust plumes. *Visible wind erosion. *Regular visual inspections of air quality at site. *Evidence of vehicles idling too long.	City of Windhoek	Operational phase
Noise Impact	- Ensure the use of operational vehicles, equipment and machines that emit reduced noise levels, compatible with the most recent environmental standards. - Ensure proper maintenance are conducted on vehicles to ensure the reduction of noise emission. - Where necessary, workers should be equipped with	*Record of noise complaints. *Evidence of no excessive noise. *Records of grievance procedure.	City of Windhoek	Operational phase

	ear protection equipment. - Daily maintenance activities should be limited to 07H00 - 19H00 (where feasible). - Utilise stringent vehicle and equipment noise specifications. - Perform appropriate and timeously maintenance of equipment and vehicles.			
Contamination of Groundwater	- Ensure compliance to the maintenance and service plans of project sites' vehicles and equipments. - All leaks should be properly contained and repaired immediately. - Leaking equipment should be removed from the work area to a designated containment area, which should be equipped with a waste water collection system. - 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.	*Records of vehicle maintenance. *Record visible contaminants from vehicles and equipment.	City of Windhoek	Operational phase
Contamination of Groundwater	- Ensure that stormwater management systems are regularly maintained and tested, and are in good working order. - Ensure compliance to the maintenance and service plans of project sites' vehicles and equipments. - All leaks should be properly contained and repaired immediately. - Leaking equipment should be removed from the work area to a designated containment area, which should be equipped with a waste water collection system. - 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.	*Regular visual inspections of storm water channels. *Evidence of no leakages or pollution from stormwater ways.	City of Windhoek	Operational phase
Generation of Waste	- Implement measures to manage litter from the project site. (e.g. cover waste in windy conditions). - Regularly clear windblown litter that gathers along project site or beyond. - Dispose of any hazardous waste generated at an	*Evidence of waste management. *Evidence of no litter in and around the site.	City of Windhoek	Operational phase

	approved hazardous waste site. - Awareness of the hazardous nature of various types of waste should be enforced.			
Traffic	- Speed limits and road signs as set out by national traffic regulations should be adhered to in order to minimise accidents.	*Evidence of no congestion or traffic accidents.	City of Windhoek	Operational phase
Safety and Security	- Display contact details of emergency services in the area at strategic locations of the project site. - Demarcate and place signage on any areas which may pose a safety risk (including trenches, excavations etc). - The contractors are advised to ensure that proper personal protective gear and first aid kits are available, at all times. - Workers should be properly trained in first aid and safety awareness.	*Evidence of signage in place. *Evidence of use of appropriate PPE for specific tasks.	City of Windhoek	Operational phase

CONCLUSION

In general, the proposed development would pose limited environmental and social risks. All environmental risks can be minimized 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. Since the development is in a high groundwater sensitivity zone, potential pollution activities must be avoided at all cost.

The Environmental and Social Management Plan should be used as an on-site tool during all phases of the proposed development. Environmental audits should be carried out to ensure compliance of the ESMP and environmental regulations of Namibia. Parties responsible for non-conformances of the ESMP will be held responsible for any rehabilitation that may need to be undertaken.

Table of Contents:

LIST OF ANNEXURES:

LIST OF FIGURES:

LIST OF TABLES:

ACRONYMS:

DEA	Department of Environmental Affairs
EA	Environmental Affairs
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
MCS	Matrix Consulting Services
MET	Ministry of Environment and Tourism
MET: DEA	Ministry of Environment and Tourism: Department of Environment Affairs

GLOSSARY OF TERMS

Environment - This means the surroundings within which humans exist and that are made up of;

a) the land, water and atmosphere of the earth;

b) micro-organisms, plant and animal life;

c) any part or combination of a) and b) and the interrelationships among and between them; and

d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well being.

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.

Potentially Hazardous Substance - is a substance which, in the reasonable opinion of the ECO, EM, and Engineers can have a deleterious effect on the environment.

Environmental and Social 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.

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.

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.

Solid waste - means all solid waste, including construction debris, chemical waste, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, domestic waste, dead vegetation, asphalt products, etc.

Contaminated water - means water contaminated by the Contractor's activities containing cements, concrete, lime, paint products, thinners, turpentine, chemicals, fuels, oils washing detergents, etc.

Environmental Manager (EM) - For the purposes of this document, the 'EM' refers to the individual appointed by the employer to be the "employer's representative" and to act as an on-site implementing agent and has the responsibility to ensure that the Client's responsibilities are executed in compliance with the relevant legislations.

Contractor - For the purposes of this document, the term 'Contractor' refers to the main contractor(s) appointed to undertake the construction of the project, or portion of the construction of the project. The Contractor(s) are required to adhere to the EMP and are responsible for ensuring that all Sub-Contractors, suppliers and staff appointed by them also adhere to the conditions of the EMP.

Proponent (or Developer) – The client (an individual or group), whom is responsible for the planning, funding and development of the project.

Environmental Consultant – The individual or company responsible for the development of the EMP. The Environmental Consultant can also fulfill a role in the monitoring and auditing of the implementation of the EMP. For the purposes of this document, the term 'Environmental Consultant' refers to *Matrix Consulting Services*.

Environmental Control Officer (ECO) – For the purposes of this document, the 'ECO' refers to the individual appointed by the Developer to oversee the implementation of the EMP on site by the various Contractors. The ECO is to be qualified in the environmental sciences, understand the detailed environmental issues associated with the development, and is to be well versed in the contents of the EMP and its associated reports. The ECO will be the liaison person between the Environmental Site Officers (ESOs, refer below) of the contracting teams, and the Developer (refer above).

Reasonable - means, unless the context indicates otherwise, reasonable in the opinion of the ECO after he has consulted with a person, not an employee of the Client, suitably experienced in "environmental management plans".

Project site (or location) - means any area within the boundaries of the Site where construction is taking place.

Contractor - refers to construction personnel responsible for *upgrading activities* and/or *maintenance activities* at the project site.

Project Personnel - refers to the employees, staff and visitors of the project responsible for the operations of the project site.

Contractor's camp or construction camp - Means the area designated for all the Contractor's temporary offices, storage areas, plant parking areas, staff welfare facilities etc.

1 INTRODUCTION

Champac Investments CC intends to develop Kleine Kuppe Ext 1 Phase2 Township. This Environmental Management Plan (EMP) serves as a managing tool for all construction and operational activities during the development of the proposed township, in Kleine Kuppe. The EMP is developed to outline measures to be implemented in order to minimize adverse environmental degradation associated with this development.

The aim of is to ensure that the proposed township development is conducted in an environmentally acceptable and safe manner. This Environmental Management Plan (EMP) serves as a managing tool for all construction and operational activities during the development of the Kleine Kuppe Ext 1 Phase 2 Township, in Windhoek. The map below indicates the proposed layout of the Phase2.

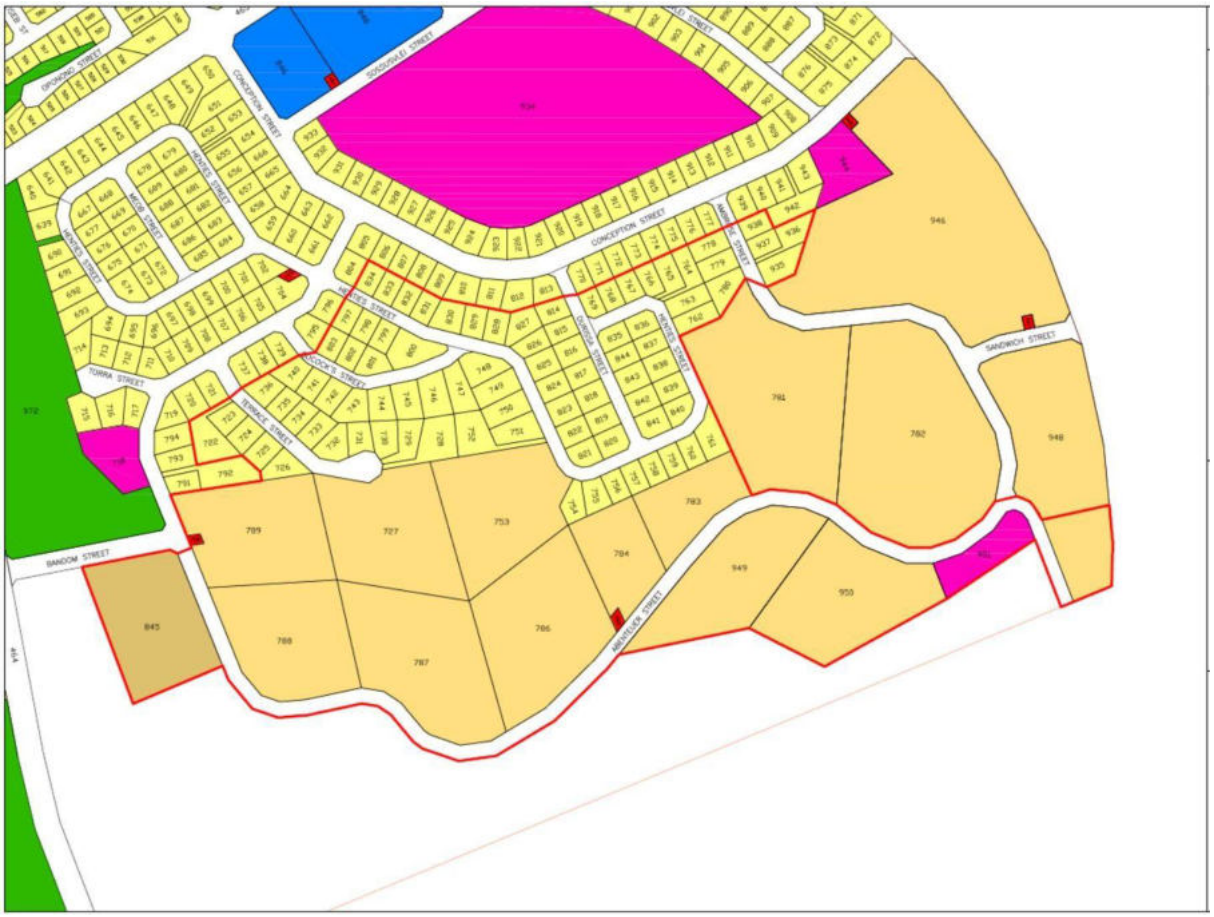

Figure 3: Kleine Kuppe Ext 1 Phase2 Township Layout

The EMP is developed to outline measures to be implemented in order to minimise adverse environmental degradation associated with this development.

The EMP serves as a guiding tool for the contractors and workforce on their roles and responsibilities concerning environmental management on site, and also provides an environmental monitoring framework for all project phases of the development. This environmental management plan aims to take a pro-active route by addressing

potential problems before they occur. The EMP acts as a stand-alone document, which can be used during the various phases of the development.

In this report, the Contractor refers to UUM Investments and its sub-contractors.

1.1 PURPOSE OF THIS EMP

The purpose of an ESMP is to ensure that all activities conducted during the project phases are environmentally acceptable and safe manner. The ESMP is developed to outline measures to be implemented in order to minimize adverse environmental degradation associated with this development.

The ESMP serves as a guiding tool for the contractors and workforce on their roles and responsibilities concerning environmental and social management on site, and also provides an environmental and social monitoring framework for all project phases of the development. This environmental and social management plan aims to take a pro-active route by addressing potential problems before they occur. The ESMP acts as a stand-alone document, which must be used during the various phases of the development.

The objectives of the ESMP 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.

1.2 PROJECT LOCATION

The intended development of the Kleine Kuppe extension 1 phase2 is surrounded by Kleine Kuppe extension 1 (North) and open undetermined townlands

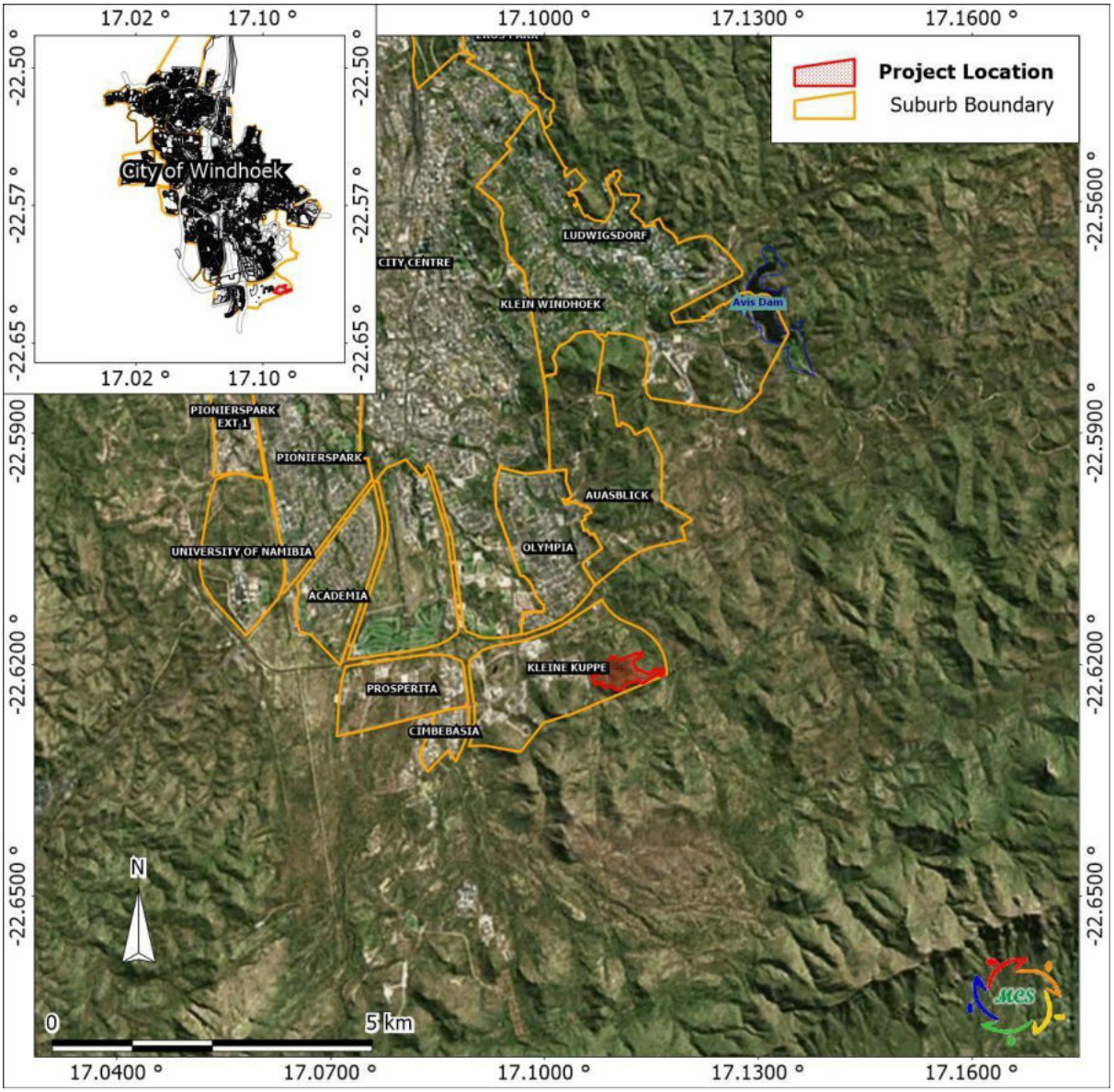

Figure 4: Locality Map for Kleine Kuppe Ext 1 Phase2 Township.

2 LEGISLATIVE FRAMEWORK

2.1 NATIONAL LEGISLATIVE 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 legislations are relevant to this project:

2.2 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.

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

2.3.1 EIA Regulations GN 28, 29, and 30 of EMA promulgated on 6 February 2012

The gazette EIA Regulations promulgated in terms of the EMA, identify certain activities, which could have a substantially detrimental effect on the environment. These listed activities require an ECC from the competent environmental authority, i.e. MET: DEA, prior to commencing.

Table 1: List of activities identified in the EIA Regulations that apply to the proposed project:

Activity Description and No(s):	Description of Activity	Activity Triggers
Activity 8.9 Water resource developments	Construction and other activities within a catchment area.	There is a possibility of some construction taking place within catchment areas.
Activity 10.1 (a) (Infrastructure)	The construction of – Oil, water, gas and petrochemical and other bulk supply pipelines.	The proposed project includes the installation of bulk services.
Activity 10.1 (b) (Infrastructure)	The construction of – Public roads.	The proposed project includes the construction of internal/access roads (streets).

Line Ministry: Ministry of Environment and Tourism (Contact: Dr. Freddy Sikabongo, Tel: 061-284 2715, e-mail: freddy@met.na)

2.3.2 Atmosphere Pollution Prevention Ordinance (1976)

This Ordinance generally provides for the prevention of the pollution of the atmosphere. Part IV of this ordinance deals with dust control. The Ordinance is clear in requiring that any person carrying out an industrial process which is liable to cause a nuisance to persons residing in the vicinity or to cause dust pollution to the atmosphere, shall take the prescribed steps or, where no steps have been prescribed, to adopt the best practicable means for preventing such dust from becoming dispersed and causing a nuisance.

Line Ministry: Ministry of Environment and Tourism (Contact: Dr. Freddy Sikabongo, Tel: 061-284 2715, e-mail: freddy@met.na)

2.3.3 Water Resources Management Act of Namibia (2004)

This act repealed the existing South African Water Act No.54 of 1956 which was used by Namibia. This Act ensures that Namibia's water resources are managed, developed, protected, conserved and used in ways which are consistent with fundamental principles depicted in section 3 of this Act. Part IX regulates the control and protection of groundwater resources. Part XI, titled Water Pollution Control, regulates discharge of effluent by permit. Thus developers are required to efficiently plan for sewage disposal.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry (Contact: Ms Elizabeth Amagola, Tel: 061-208 7719)

2.3.4 Water Act No.54 of 1956

This Act provides for Constitutional demands including pollution prevention, ecological and resource conservation and sustainable utilisation. In terms of this Act, all water resources are the property of the State and the EIA process is used as a fundamental management tool.

A water resource includes a watercourse, surface water, estuary or aquifer, and, where relevant, its bed and banks. A watercourse means a river or spring; a natural channel in which water flows regularly or intermittently; a wetland lake or dam, into which or from which water flows; and any collection of water that the Minister may declare to be a watercourse. Permits are required in terms of the Act for the undertaking of the following activities relevant to the proposed project:

- Discharge of waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit in terms of Section 21 (f); and
- Disposal of waste in a manner that may detrimentally impact on a water resource in terms of Section 21 (g).

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry (Contact: Ms Elizabeth Amagola, Tel: 061-208 7719)

2.3.5 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 and Tourism (Contact: Dr. Freddy Sikabongo, Tel: 061-284 2715, e-mail: freddy@met.na)

2.3.6 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.

Line Ministry: Ministry of Environment and Tourism (Contact: Dr. Freddy Sikabongo, Tel: 061-284 2715, e-mail: freddy@met.na)

2.3.7 Forestry Act (No.12 of 2001)

This Act makes provision for the protection various plant species. Harvesting permits are required from the Directorate of Forestry to clear certain protected vegetation species from the site.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry (Contact: Andries Uugwanga, Tel: 062-501925)

2.3.8 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 (Contact: Mr. Erastus Negonga, Tel: 061-297 2911)

2.3.9 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. *(Contact: Dr. Freddy Sikabongo, Tel: 061-284 2715, e-mail: freddy@met.na)*

2.3.10 Draft Pollution Control and Waste Management Bill

The proposed project of Kleinne Kuppe Ext 1 Phase bulk servicing only applies to Parts 2 and 7 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.

2.3.11 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)

2.3.12 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 EIA 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 development of the proposed development of the small animal teaching hospital are expected to include dust, air quality impacts, noise, nuisance and smoke emissions. *(Line Ministry: Ministry of Health and Social Services)*

2.3.13 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.

(Contact: Rev. Salomon April, Tel: 061-244375, National Heritage Council of Namibia)

2.3.14 International Conventions and Regulations

The Article 144 of the Namibian Constitution states that "the general rules of public international law and international agreements binding upon Namibia form part of the law of Namibia." This means that all the international agreements that Namibia signed become part of the law of our country. These laws and/or agreements are:

- Convention on Biological Diversity, 1992;
- United Nations Framework Convention on Climate Change, 1992;
- Kyoto Protocol on the Framework Convention on Climate Change, 1998;
- Stockholm Convention of Persistent Organic Pollutants, 2001.
- International Convention on Civil Liability for oil pollution Damage.1969;
- Convention on Wetlands of international Importance, especially as Waterfowl Habitat, 1971 (Ramsar Convention);
- Convention Concerning the protection of the World Cultural and national Heritage 1972;
- International Convention for the Prevention of Pollution from Ships, 1973;
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973;
- World Heritage Convention, 1975;
- Vienna Convention for the Protection of the Ozone Layer, 1985
- Basel Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989;
- Convention to Combat Desertification in those countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, 1994;
- SADC Protocol on Shared Watercourse System in the Southern Africa Region, 1995;
- Convention on the Law of Non-Navigational Uses of International Watercourses, 1997;
- Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998;
- SAD Protocol on Wildlife Conservation and Law Enforcement, 1999;

- Cartegena Protocol on Biosafety, 2000; and
- International Treaty on Plant Genetic Resources for food and Agriculture, 2001.

2.3.15 Municipal By-Laws (City of Windhoek)

- **Groundwater Protection Regulations**

The protection of the groundwater resource in a development scenario should be provided for, in a formally documented and legislated EIA process. The EIA process or procedure provides for the institutionalization of decision making regarding the potential impact development activities will have on the receiving natural, social and cultural environment. Further, the process makes provision for the identification and listing of types of activities that would be required to follow the process before any authorisation will be given.

- **Environmental Structure Plan and Policy**

The Environmental Structural Plan & Policy provides sufficient information for those making decisions regarding a particular development so that proper environmental evaluation can be conducted, which is appropriate to the scale of the proposed project and the risks to the environment which it may pose.

It establishes where there are potential and real problem environmental areas, such as land degradation, pollution, indiscriminate resource use etc. The Environmental Structural Plan is the baseline upon which the policy is established.

- **Windhoek Town Planning Scheme (2005)**

The Town Planning Scheme enables the comprehensive management of all property and related public sector functions across the city. The guidelines on the Conservation of Natural Resources should be addressed in this project.

- **Policy for the Distribution and Future Usage of Public Open Spaces in Windhoek (2000)**

The policy provides guidelines for the establishment of open spaces and green corridors along drainage lines and sensitive environmental areas. The policy advocates for the provision of land for the explicit development of open spaces.

3 RECEIVING ENVIRONMENT

This section lists the most important environmental characteristics of the project areas and provides a statement on the potential environmental impacts.

3.1 Kleine Kuppe Extension 1 Phase2

i. Climate Data

Classification of climate:	Sub-tropical area
Average rainfall:	Rainfall in the area is averaged to be between 300-350 mm per year.
Variation in rainfall:	Variation in rainfall is averaged to be 30-40 % 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 in February.
Water Deficit:	Water deficit in the area is averaged to be between 1700- 1900mm per year.
Temperatures:	Temperatures in the area are averaged to be between 18- 20 °C per year.
Wind direction:	Wind directions in the area are predominantly easterly winds.

ii. Topography and Drainage

The landscape of the Kleine Kuppe Extension 1 Phase 2 site is classified as being in the Khomas Hochland Plateau region, which is characterized by rolling hills in the west with many summit heights equivalent reflecting older land surfaces.

The site lies in the Arebbusch River catchment which eventually join the Aretaragas River, a tributary of the Otjiseva River, which flows into the Swakop River upstream of Gross Barmen.

The site lies in a sensitive area because a few production boreholes that are in the vicinity. Drainage in the area is well developed and runoff is expected to take place into the nearby streams, and eventually into the Arebbusch River. Care should be taken to avoid contamination of these surface water bodies in the area, especially during rainy seasons, as water in these bodies is used for aquifer recharge; and is often used for wildlife watering and sustains the biodiversity in the area.

iii. Geology and Hydrogeology

This section lists the most important hydrogeological characteristics of the study area and provides a statement on the potential environmental impacts on each. The characterization study provides an understanding of groundwater condition(s) within the local geological setting.

Metasedimentary rocks of the Swakop Group, which is part of the Damara Sequence, constitute the general Windhoek Aquifer. A number of north- to north-westerly striking faults and joints found in Windhoek form the major underground water conduits and hence determine the conditions of the aquifer. Secondary porosity giving rise to high aquifer transmissivity is best developed in faults with post-hydrothermal alteration brecciation in quartzitic environments. Moreover host rock fracturing along fault planes results in better development of secondary porosity in quartzite compared to schistose terrain such that the aquifer reaches its maximum potential in this type of setting. The sedimentary formations of the study area strike in an east-north-easterly direction and dip 25-30° to the north-northwest.

The more competent quartzite in the southern part of Windhoek is subject to brittle deformation and thus exhibits relatively high secondary porosity and permeability due to jointing. The joints of the quartzite show evidence of fluid flow by carbonate and quartz infill and iron staining.

The micaceous schist on the other hand, which underlies the central and northern parts of Windhoek (inclusive of project area) is prone to plastic deformation rather than brittle, fracturing, exhibits significantly lower secondary porosity and permeability. Groundwater flow would be mostly through secondary porosity along fractures, faults and other geological structures present within the underlying formations in the area. The natural groundwater flow direction regionally is towards the north-west in the direction of the Aretaragas River.

According to the City of Windhoek, Namwater and Department of Water Affairs Databse (DWA), Approximately 6 boreholes/wells are present within a 2 km radius.

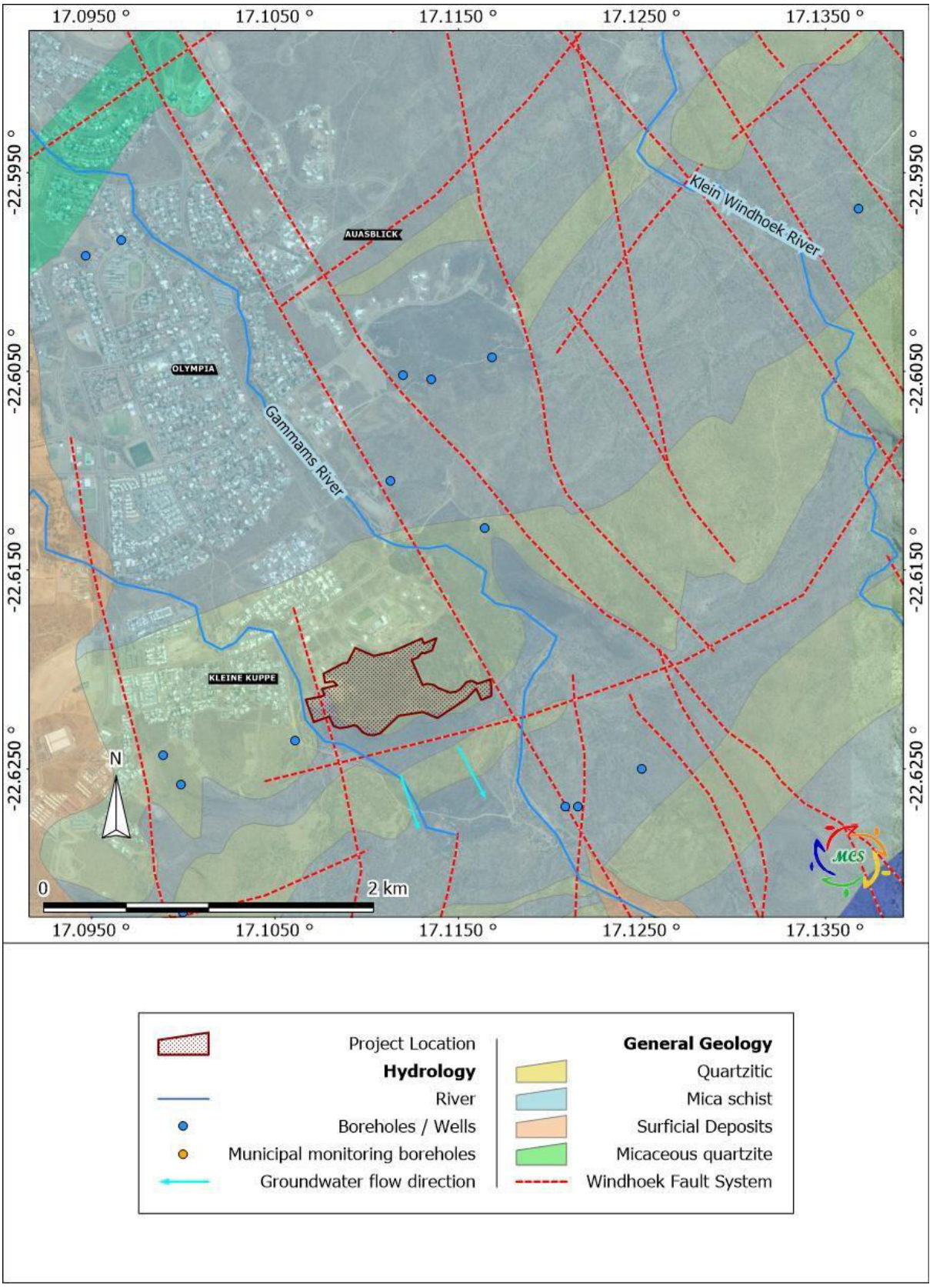

Figure 5. Hydrogeological Map of Study Area

The numerous folding, thrusting and faulting episodes of which the complex geology of the Windhoek area was subjected to from compressive forces from the north, resulted in westerly boundary fault lines. These bounding faults consist of a complex fault zone of numerous sub-parallel faults that join and split from one another. This astonishing pattern is clearly evident in the faults in the study area. A number of north- to north-westerly striking faults and joints found in the study area form the major underground water conduits and hence determine the conditions of the aquifer. The area was mapped during the Vulnerability Study of the Windhoek Aquifer (City of Windhoek, 2000) as having a moderate to high aquifer vulnerability. The site is situated within a fault zone of the abovementioned sub-parallel faults in the area. The following map illustrates the groundwater vulnerability for the study area.

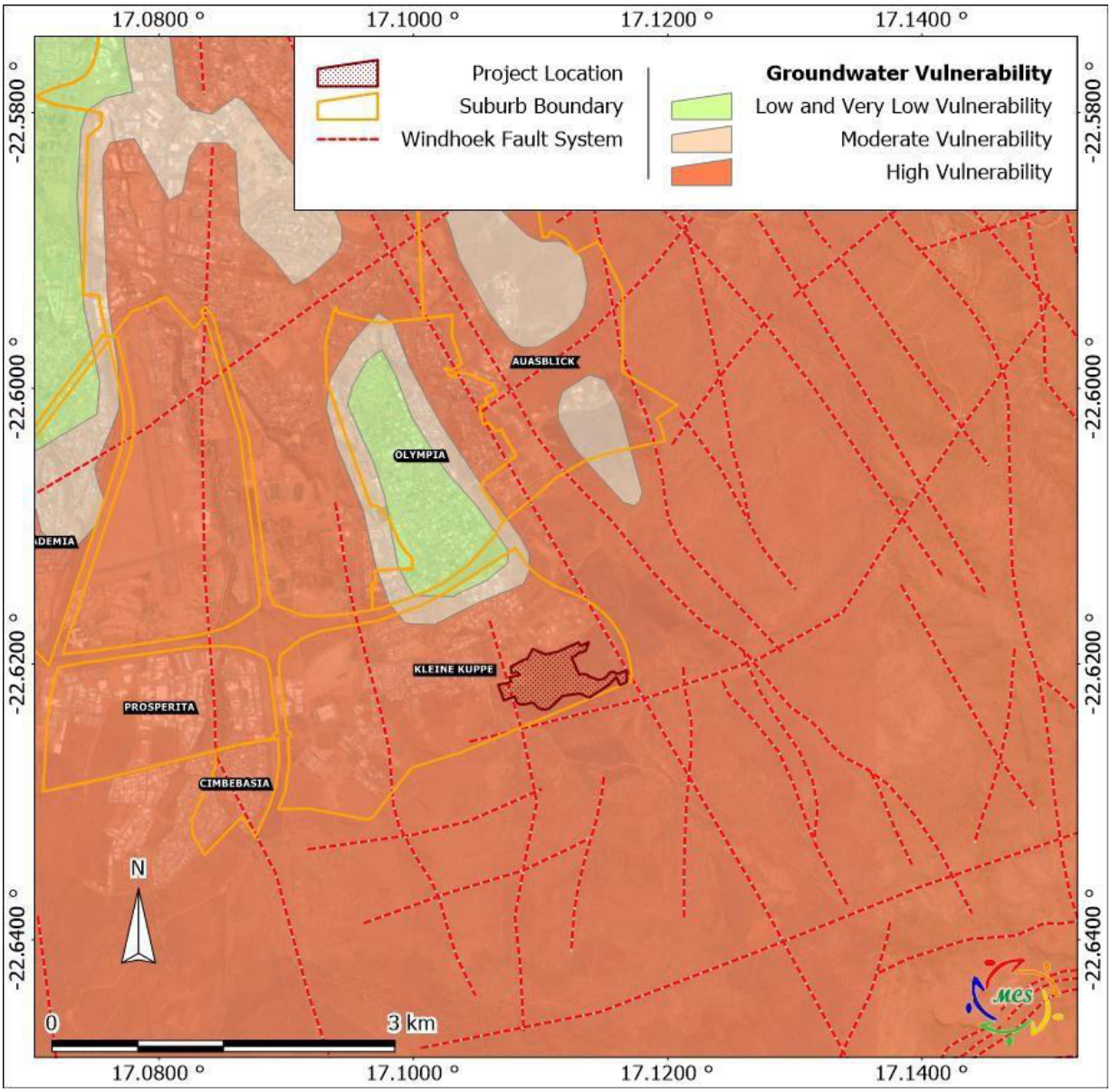

Figure 6: Groundwater vulnerability of the study area

iv. General Ecology

The site falls within the Tree and Shrub savanna biome, which is characterised by high shrubland and thorn bush type vegetation. The vegetation structure type is classified as Dense Shrubland. Most of the vegetation on the was cleared for the purpose of developing the township. A few undisturbed vegetations are however observed. This vegetation consists mainly of short to medium grass, shrubs, acacia species (mainly *Acacia mellifera*) and a few scattered *Catophractes alexandrii* species. A few grass species, with a few invasive *Datura ferox and Nicotiana glauca* species are also encountered at the site. The following map illustrate the vegetation sensitivity of the study area.

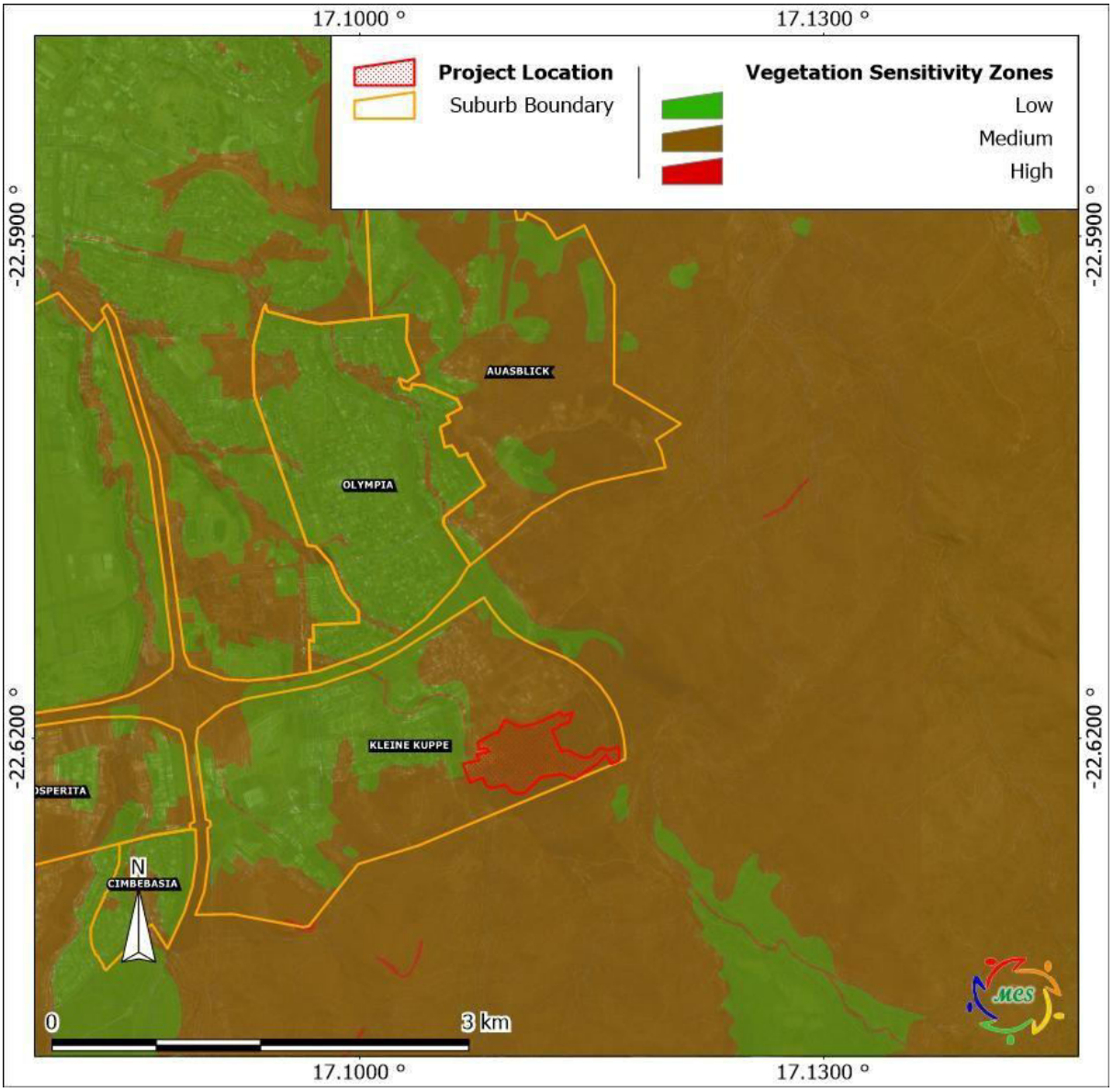

Figure 7: Vegetation sensitivity of the study area

Deducing from the Atlas of Namibia, the proposed site is within the area that is known to have >500 plant species (Mandelsohn et al, 2003).

With regards to fauna, it is estimated that at least 71 to 80 reptile, 8 to11 amphibian, 61 to 75 mammal and 201 to 230 bird species (breeding residents) are known to or are expected to occur in the project area of which only a very few proportion are endemics.

The study area falls within low environmental sensitivity zone. This means that the environmental consequences of the proposed development in that area are insignificant, however careful environmental management to prevent pollution in general must be maintained.

According to City of Windhoek Environmental Structure Plan of 2004:

The control zones are based upon the following;

- The critical sensitivity of the southern Windhoek aquifer.
- The sensitivity of the catchment of the Goreangab Dam, and surface water resources, including rivers and streams throughout Windhoek.
- The sensitivity of the environment or a specific critical environmental component.
- The relative importance of the 'sense of place' or the specific character of Windhoek determined through resident participation, which includes topography and landscape quality as well as cultural / historical resources.
- The need to protect open space in Windhoek, which includes the river and aquatic systems, as well as the ridgelines, hills and mountains, and natural areas surrounding the city.
- The need to protect, manage and conserve sensitive natural vegetation cover

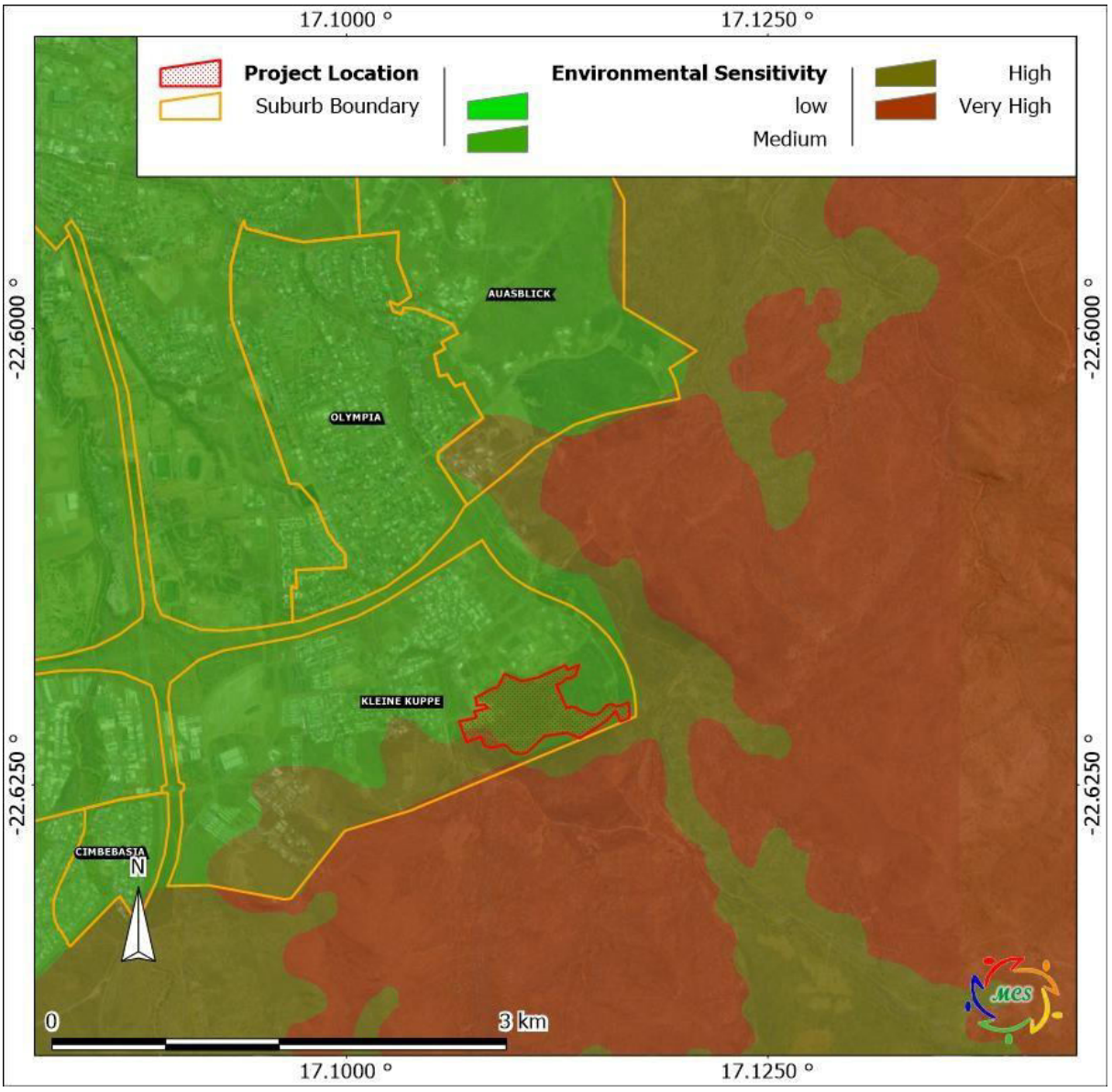

Figure 8: Environmental Sensitivity of the study area

4 SOCIO-ECONOMIC ASPECTS

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

- **Regional Information**

The proposed bulk services project is situated in the Khomas Region of Namibia. The total current population is estimated to be 342141 (169672 males and 172469 females) (NSA, 2011). Ninety-Seven percent of the population of the Khomas Region over 15 years of age are literate. The estimated unemployment rate in Khomas region is 30%, whilst it is 35 to 40% in Windhoek. The population density in Khomas region is relatively high at 6.8 persons per km^2, compared to the national average of 2 persons per km^2.

The life expectancy in Khomas region is 56 years in females and 54 years in males. The Human Poverty Index in Khomas region is 17.09, meaning almost a quarter of all people living in Khomas are poverty stricken (2007).

- **Windhoek**

  - **Economic Activities**

The City of Windhoek is the capital city of Namibia and is often referred to as the cleanest city in Africa. The city is the hub for all economic activities in the Khomas Region and is linked to Namibia's air, rail and road network, making it well situated to service Zambia, Zimbabwe, Botswana, Southern Angola and South Africa.

The proposed township development is a win-win opportunity for all parties involved, whether they are the developer and/or potential consumers, or the surrounding community. The project will address and maintain the supply of serviced land in Windhoek. The project has a potential revenue generation from the sale of serviced erven.

  - **Employment (Job Opportunities)**

Unemployment still hampers most of the developing world and Windhoek is not an exception. The proposed project is likely to increase the job opportunities in Windhoek. 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 Windhoek (unemployment rate is 30% in Windhoek).

The proposed project may require construction services which involve engineers, construction firms, equipment vendors, and utilities. All of this cost is spent locally for piping, construction, and operational personnel, contractors, providing additional economic benefits to the community through increased employment. Some of the services in the operational phase will be outsourced e.g. maintenance of security services, waste removal etc. The outsourcing of these services will strengthen existing businesses operating in the area and provide employment to people.

Livelihoods

Economic activities in Windhoek and the surrounding areas are limited and livelihoods are heavily dependent on the business sector and salaries of civil servants. The livelihoods of the locals are likely to be positively impacted therefore predicted to be better than before the development of the project in the area.

Tourism

Windhoek is the major tourism gateway to the rest of Namibia. The city itself also attracts a lot of tourists from all over the world, due to its range of attractions in and around the city; and the rich cultural diversity found in the capital.

This tourist city renowned for being one of the cleanest in the world, therefore the project helps assure adequate supply serviced erven for our ever growing road networks.

Excessive waste, dust, noise, vibrations and appalling air quality can have negative impacts on the tourism industry in the area, as it can become a nuisance to tourists.

In - Migration

Due to enhanced employment opportunities that could be created by the envisaged project, some in-migration of job seekers to Windhoek 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.

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 for the age group 15 to 49 is estimated at 21.3% for Namibia (UNDP, 2005).

The spending powers of locals working on this project 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.

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

- ✓ Reduced workforce in the Khomas Region.
- ✓ Diversion of income expenditure to medical care.
- ✓ Increase in orphans and household headed by children.
- ✓ Increase in pregnancy related mortality.
- ✓ The current rate of 3129 people per doctor could increase.

Infrastructure & Increased Traffic

The traffic in the area would be expected to increase slightly and it might contribute to heavy traffic during peak hours and a higher number of car accidents along the Kleinne Kuppe Extension 1 streets. Infrastructure like roads will be affected due to increased traffic and heavy-duty cargo trucks.

5 ENVIRONMENTAL MANAGEMENT PLAN

5.1 RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT

CHAMPAC INVESTMENTS CC (proponent) will be responsible for environmental control on site during the construction and operational phase. It is very important a pre-work briefing meeting be held at all times to reach an agreement on specific roles of various parties and penalties for non-compliance.

The Contractor and / or its agents will be responsible for environmental management on site during the upgrade and operational activities. For the purpose of this report,

- ❖ Contractor (and its sub-contractors) refers to construction personnel responsible for all *construction activities* at the project site.

A pre-construction meeting is recommended in order to reach agreement on specific roles of the various parties and actions for non-compliances with the ESMP. In addition surrounding residents, tenants or land owners must be notified in advance of any potentially disturbing activities.

An environmental consultant will need to act as the ECO and conduct inspections of the construction activities and EMP implementation throughout the duration of

construction. After each inspection, the ECO will produce a monitoring report that will be submitted to the environmental manager (and Ministry of Environment and Tourism (Department of Environmental Affairs) if required). Relevant sections of the minutes of site meetings will be attached to the monitoring report.

Roles, responsibility and authority shall be defined, documented and communicated in order to facilitate effective environmental management through implementation of the ESMP. Management shall provide resources essential to the implementation and control of the ESMP including: human resources, technology, and financial resources.

5.2 RESPONSIBILITY MATRIX

The responsibility matrix table below will be confirmed upon contract award.

Table 2. Responsibility Matrix

Function	Name / Mobile Number	Responsibility
Environmental Manager (EM)	**Champac Investments** Tel: +264 61 238460	▪ Overall management of project and ESMP implementation. ▪ Oversees site works, liaison with Contractor, ESO and ECO.
Environmental Control Officer (ECO)	TBA	▪ Implementation of ESMP and liaison between CHAMPAC INVESTMENTS CC, Contractor and relevant stakeholders
Environmental Site Officer (ESO)	TBA	▪ Interaction with ECO, neighbours and workers. Must understand the ESMP.
Contractor	TBA	▪ Implementation and compliance with recommendations and conditions of the ESMP, Appoints dedicated person (ESO) to work with ECO

The general roles and responsibilities of various parties during the school infrastructure upgrading activities of the project are outlined below.

5.3 TRAINING AND INDUCTION

The proponent is expected to be responsible for ensuring that environmental awareness education of all employees and contractors is done satisfactorily. The CHAMPAC INVESTMENTS CC should also ensure that employees and contractors are made aware of the environmental requirements of the project.

Training and Induction Requirements		
Training Requirement		**Frequency**
Site Induction - the purpose of the induction is to ensure that, as a minimum, all on-site staff and personnel understand the ESMP in terms of:		**Construction and Operational Phase**: prior to commencement of work by staff and / or contractors.
	Key issues relating to the project.	
	Relevant conditions of the Environmental Authorisation.	
	Location and protection of environmentally sensitive areas (if any).	
	Waste management and minimisation.	
	Minimising potential impacts to all identified potential impacts.	
	Surface and groundwater contamination.	
	Spill control measures.	
	Environmental Emergency Plan.	
	Incident reporting procedures.	
	Roles and responsibility relating to environmental management.	
Pre-Start Meeting – Pre-start meetings should be undertaken prior to commencement of all new activities in order to discuss the planned work and operational aspects of the tasks. Health, safety and environmental issues and controls should be discussed and understood.		**Construction and Operational Phase**: As required.

The EMP should form part of the Terms of Reference for all contractors, sub-contractors and suppliers. All contractors, sub-contractors and suppliers will have to sign an agreement to assure that they understood the EMP and that they will comply. All senior staff should familiarise themselves with the full contents of the EMP and its implications. Senior staffs (Foreman/Supervisor) are expected to train and assist the rest of the employees on the contents of the EMP.

5.4 METHOD STATEMENTS

The ESMP provides the overall project strategy for management of environmental issues; however, a Construction Method Statement (CMS) will address environmental management issues at a site level. The CMS provides an environmental manual for use by management and construction staff involved in the site upgrades works. It addresses the environmental issues that are specific to an activity or site. CMS's should be produced for all major construction activities, and should typically provide detailed descriptions of items including, but not necessarily limited to:

- ✓ Nature, timing and location of activities;
- ✓ Procedural requirements and steps;
- ✓ Management responsibilities;
- ✓ Material and equipment requirements;
- ✓ Transportation of equipment to and from site;
- ✓ Develop methods for moving equipment/material while on site;
- ✓ How and where material will be stored;
- ✓ Emergency response approaches, particularly related to spill containment and clean-up;
- ✓ Response to compliance/non-conformance with the requirements of the ESMP; and
- ✓ Any other information deemed necessary by the EM/ECO.

The contractor shall not commence the activity until the Method Statement has been approved and shall, except in the case of emergency activities, allow some time for approval of the Method Statement by the ESO and EM. Such approval shall not unreasonably be withheld.

The ESO and EM may require changes to a Method Statement if the proposal does not comply with the specification or if, in the reasonable opinion of the ESO and EM, the proposal may result in, or carries a greater than reasonable risk of, damage to the environment in excess of that permitted specifications.

Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. The contractor shall carry out works in accordance with the approved Method Statement. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract.

Based on the specifications in this ESMP, the following Method Statements are required as a minimum (but not limited to these):

- ✓ Site clearing;

- ✓ Site layout and establishment;
- ✓ Hazardous substances;
- ✓ Cement and concrete batching (for each operation)
- ✓ Traffic accommodation;
- ✓ Solid waste control system;
- ✓ Wastewater control system;
- ✓ Erosion remediation and stabilization (for both operations);
- ✓ Fire control and emergency procedures.

5.5 ENVIRONMENTAL INCIDENT REPORTING

All environmental incidents occurring at the proposed site will be recorded. The incident report will have to include time, date, location, and nature of the incident, extent of the incident, actions taken, and personnel involved.

All complaints received from the neighbouring community should be directed to the Technical Manager of CHAMPAC INVESTMENTS CC and channelled to the appointed Environmental Control Officer (ECO). In addition, the proponent's Management should also be able to respond to the complainant within a week (even if pending further investigation).

It is important that the issues raised are considered and that the complainant feels that their concerns have been addressed to and wherever possible actions taken to address these. All complaints should be entered in the environmental register and all responses and actions taken to address these should be recorded.

5.6 ENVIRONMENTAL MONITORING

Periodic environmental monitoring must be taken on a regular basis. Monitoring should be done in order to ensure compliance with all aspects of the EMP. Findings should be liaised with to all responsible officers as chain command.

5.7 EMP ADMINISTRATION

Copies of this EMP shall be kept at the site office and should be distributed to all senior staff members, including those of the contractors.

5.8 NON COMPLIANCE OF THE EMP

Problems may occur in carrying out mitigation measures or monitoring procedures that could result in non-compliance of the EMP. The responsible personnel should encourage staff to comply with the EMP, and address acts of non-compliance and penalties.

CHAMPAC INVESTMENTS CC is responsible for reporting non-conformance with the EMP, to the ECO officer. The proponent's management in consultation with the ECO must thereafter, undertake the following activities:

- Investigate and identify the cause of non-conformance.
- Report matters of non-conformance to CHAMPAC INVESTMENTS CC (depending on the severity of the incident).
- Implement suitable corrective action as well as prevent recurrence of the incident.
- Assign responsibility for corrective and preventative action.
- Any corrective action taken to eliminate the causes of non-conformance shall be appropriate to the magnitude of the problems and commensurate with the environmental impact encountered.

5.9 ENVIRONMENTAL REGISTER

An environmental register should be kept on site in which incidents related to actual impacts are recorded. This will include information related to incidents such as spillages, dust generation and complaints from adjacent neighbours. It should also contain information relating to actions taken. Any party on site may complete the register, however, it is envisaged that the Technical Manager, the contractor and the ECO officer will be the main contributors, and who will also be the main parties involved in suggesting mitigation measures.

5.10 RESPONSIBLE PARTIES

The implementation of this EMP should be the responsibility of CHAMPAC INVESTMENTS CC during the construction phase of the intended development. Below are the responsibilities of the people required during the construction phase to implement a range of environmental management related issues.

5.10.1 Environmental Control Officer

A qualified Environmental Control Officer should be appointed by CHAMPAC INVESTMENTS CC(proponent) or the Contractor to monitor and review the on-site environmental management and implementation of this EMP.

i) Duties of the ECO officer:

The Environmental Control Officer is responsible for the following responsibilities:

- The identification of potential environmental impacts, prior to the onset of decommissioning. A site visit may also be required prior to site development. This would be carried out in consultation with the Technical Manager.
- Monitoring of all the Contractor's activities for compliance with the various environmental requirements contained in this EMP;
- Providing of an environmental register at the site to be filled in by any person reporting an environmental incident, issue or concern and inspected by the ECO officer on a regular basis to check for issues raised and actions taken;
- Ensuring that the EMP conditions are adhered to at all times and taking action;

- Ensuring that environmental impacts are kept to a minimum;
- Notifying the Environmental Authorities immediately of any events or incidents that may cause significant environmental damage or breach the requirements of the EMP;
- Environmental Awareness Training courses to be conducted to the Contractor's entire team of workers;
- Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed;
- Reviewing and approving method statements in consultation with the Technical Manager;
- Reporting to CHAMPAC INVESTMENTS CC and the Technical Manager on a regular basis and advising of any major environmental impacts. Attending the site meetings (when necessary);
- Inspecting the site and surrounding areas regularly, and monitoring an ongoing environmental awareness program in conjunction with the Technical Manager;
- Requesting the removal of people and/or equipment not complying with the specifications of EMP;
- Keeping both a written and photographic record of progress on site from an environmental perspective, and an ad hoc record of all environmental incidents;
- Undertaking continual review of the EMP and submitting a report to the relevant stakeholders; and
- The ECO officer will submit all written instructions and verbal requests to the proponent via the Technical Manager and Project Engineer.

5.10.2 Roles of the Environmental Site Officer (ESO)

The ESO is expected to administer and control all environmental matters relating to the upgrade or operational activities of the project site. The ESO will conduct the following:

- ✓ Ensure implementation of the ESMP.
- ✓ Ensure that the latest ESMP documents are filed and readily accessible as required.
- ✓ Ensure communication of ESMP requirements to relevant project, contractor and sub-contractor personnel as required for EMP implementation.
- ✓ Monitor compliance of ESMP implementation and compliance of all contractors and sub-contractors.

- ✓ Facilitate environmental induction of all project staff and either deliver or coordinate delivery of all such training that would be required for the effective implementation of the ESMP. This includes identifying additional project training requirements and implementing the training programme.
- ✓ Maintain training records for all project personnel including contractors.
- ✓ Maintain environmental incidents and stakeholder complaints register.
- ✓ Undertake environmental system reviews, site inspections, audits and other verification activities to assure that the ESMP implementation is at an optimal level.
- ✓ Report significant incidents internally and externally as required by law and the conditions of authorisation.
- ✓ Investigate incidents and recommend corrective and preventative actions.
- ✓ Provide support and advice to the contractor and all sub-contractors in the implementation of environmental management procedures and corrective actions.
- ✓ Ensure that monitoring programs, which assess the performance of the ESMP, are implemented.
- ✓ Ensure maintenance of site document control requirements.
- ✓ Assess the efficacy of the ESMP and identify possible areas of improvement or amendment required within the ESMP.

5.10.3 The Contractor

The ESO, will be responsible for monitoring compliance with the ESMP, and liaising with the EM. The contractor shall ensure that all construction staff, sub-contractors, suppliers, etc. are familiar with, understand and adhere to the ESMP. Failure by any employee of the Contractor, Sub-contractor, and Suppliers etc. to show adequate consideration to the environmental aspects of this contract shall be considered sufficient cause for the ESO to instruct the EM to have the employee removed from the site. The EM will also order the removal of equipment from the site that is causing continual environmental damage (e.g. leaking oil and diesel). Such measures will not replace any legal proceedings the Client may institute against the Contractor.

The EM shall order the contractor to suspend part or all of the works if the contractor and/or any sub-contractor, suppliers, etc., fail to comply with both the EMP and the construction procedures supplied by the Contractor. The suspension will be enforced until such time as the offending procedure or equipment is corrected and/or if required remedial measures are put in place.

By virtue of the environmental obligations delegated to the Contractor through the Contract Document, all staff (including subcontractors and staff), suppliers, and service providers appointed for the project would be responsible for:

- Ensuring adherence by providing adequate staff and provisions to meet the requirements of the ESMP;
- Ensuring that Method Statements are submitted to the Environmental Manager for approval before any work is undertaken, and monitor compliance with the ESMP and approved Environmental Method Statements;
- Ensuring that any instructions issued by the ESO and/or EM are adhered to;
- Ensuring the representation of a report at each site meeting, documenting all incidents that have occurred during the period before the site meeting;
- Undertake daily, weekly and monthly inspections of the work area(s);
- Ensuring that a register of all the transgressions issued by the ESO is kept in the site office;
- Ensuring that a register of all public complaints is maintained; and
- Ensure that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the success full implementation of the environmental requirements of the Contract.
- Report and record any environmental incidents caused by the Contractor or due to the Contractor's activities;
- obtain required corrective action within specified time frames and close out of environmental incidents;
- Provide weekly checklists to the EM and ESO.

The Contractor will nominate its own Environmental Site Officer (ESO) who will be responsible for ensuring that the requirements of the ESMP and the associated documents are complied with on the construction site on behalf of the Contractor. The ESO shall:

- Identify areas of non-compliance and recommend measures to rectify them in consultation with the EM and the ESO as required;
- Ensure that environmental problems are remedied timeously and to the satisfaction of the EM and the ESO as required;
- Set up activity based method statements prior to the start of relevant upgrade and operational activities and submit these to the EM and the ESO as required;
- Perform ongoing environmental awareness training of the Contractor's site personnel.

6 CONSTRUCTION PHASE

It is recommended that all principles contained within this Environmental Management Plan (EMP) apply to all construction activities.

CHAMPAC INVESTMENTS CC (proponent) should be responsible for the following:

- Ensuring that all identified environmental impacts are managed in accordance with the EMP;
- Ensuring that all monitoring and compliance auditing occurs in line with the EMP;
- Ensuring that the environment is rehabilitated as far as practicable to its natural state or existing land use practices;

6.1 ENVIRONMENTAL MONITORING AND AUDITING

Environmental monitoring is the continuous evaluation of the status and condition of environmental elements whereas, environmental auditing is the process of comparing the impacts predicted with those which have actually occurred during implementation.

The ultimate purpose of environmental monitoring and auditing is to confirm that all relevant programmes, legislation, laws and policies are adhered to and abided by and that the environmental specifications are being implemented in an effective and correct manner.

Monitoring and auditing is intended to promote environmental best practice, ensure protection of resources and support sustainable development.

6.1.1 Monitoring Methods

In order to ensure that the above objectives are adhered to, the following monitoring methods will be employed:

- Aspect monitoring (Air quality);
- Incident reporting;
- Site inspections;
- Site monitoring and reporting;
- Independent external auditing.

6.2 COMPLIANCE

Compliance involves actions and programmes designed to ensure that all relevant environmental laws, legislations, standards and other requirements such as permits are followed and adhered to.

6.2.1 Non-Compliance

Failure by the Contractor, operator and their staff together with their suppliers to comply with all relevant programmes laws, legislation, policies and mitigation measures laid out in this Environmental Management Plan will result in the following actions and consequences:

- Failure to comply or respond to notifications and recommendations within a specified timeframe will result in written warning being issued;
- Failure to comply or respond to warnings within a specified timeframe will result in fines being issued.
- Continued and wilful failure to comply or respond will result in the suspension of site activities until compliance is reached to the satisfaction of the ECO. In the event of severe negligence or failure to comply, all site activities may be terminated.

6.3 PLANNING AND DESIGN MANAGEMENT PLAN

It should be noted that, CHAMPAC INVESTMENTS CC together with the project manager must ensure that this Environmental Management Plan is also included in the tender documentation that is to be given to the Contractor (to be appointed) and the Contractor must adhere to all requirements as well management actions outlined in this EMP.

The Planning Management Plan addresses all aspects of the planning and design phase, such as detailed architectural, infrastructural and engineering services layout and design. All members of the planning and design team are to be in possession of this Management and must be aware of the environmental aspects, risks and mitigation measures.

6.4 ENVIRONMENTAL AWARENESS

An environmental awareness plan must be implemented for both the construction and operational phases. The EMP will thus provide the basis of the information to be supplied as well as any other relevant documentation including any specialist reports.

All construction and operational staff as well as suppliers and regular out-sourced contractors will be required to attend a general orientation session prior to the commencement of any activities. All impacts that could potentially arise and affect the environment will be discussed and explained in detail as well as required mitigation

measures. The consequences of not following the mitigation measures stipulated in the Environmental Management Plan will be addressed.

It is recommended that all permanent staff receive detailed training relative to their job description. This training will focus on the environmental issues and impacts that are directly linked to their activities. In addition, staff ambers will be required to report all incidents so that the appropriate mitigation measures can be implemented in a timely manner.

6.4.1 Access Routes, Traffic and Work Sites

With regards to traffic, the Contractor should be responsible for the control of all project related traffic. This will include building material suppliers and ensure that all construction vehicles or those associated with the project use designated routes within working times.

No new tracks/roads shall be established and only existing roads may be used and those that are planned. Work sites shall be clearly demarcated and road signs erected were needed. The general public should not have unauthorised/uncontrolled access to the project location during this phase.

Vehicle access will be limited to one or two entrances to facilitate control. Access must be of a high standard to prevent unauthorised access from entering the site.

The entrance will be manned during the operation hours; and access routes will be closed to prevent unauthorised entry. A notice board, in two languages (English and Afrikaans), must be erected at the entrance and must state entrance requirements and operating hours of the site, the operator/responsible person and emergency telephone numbers. Suitable signs must also be erected on the approach roads and on-site, to direct drivers and to control speed.

Road access to the working face of the development must be maintained at all times in a manner suitable to accommodate vehicles normally expected to use the facility. Roads must be regularly graded and wetted to control dust, where necessary.

Furthermore, on-going controls, such as fencing and policing, must be implemented.

6.4.2 Fire and Safety Management

All electrical installations, wiring and systems at the project location, must be approved by a qualified electrician who will issue a Certificate of Compliance.

Proper handling, storage, use and disposal of any hazardous waste (e.g. hydrocarbons, paint, batteries, radioactive waste etc) should be conducted. Hydrocarbons are volatile under certain conditions and their vapours in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.

No uncontrolled fire, whether for cooking or any other purpose, is to be made at the project location during both the construction and operation phases. The Contractor

shall take all reasonable measures and active steps to avoid increasing the risk of fire through activities on site and prevent the accidental occurrence or spread of fire; and shall ensure that there is sufficient fire-fighting equipment on site at all times. This equipment shall include fire extinguishers. The Contractor should be prepared for such events.

6.4.3 Staff Management

The Contractor must ensure that their employees have suitable personal protective equipment and properly trained in fire fighting and first aid. Training records must be kept for future references.

6.4.4 Ablution Facilities

The Contractor shall provide temporary toilets on site for the workers and these toilets should be in a walking distance of the work area. The Engineer / ECO on site shall approve the location of the toilets and shall also not be placed closer than 50m to water resources (e.g. streams). The toilets (1 toilet per 15 users is the norm) to be provided where construction is occurring. Workers need to be encouraged to use these facilities and not the natural environment.

Waste from chemical toilets should be disposed of regularly and in a responsible manner by a registered waste contractor. Discharge of waste from toilets into the environment is prohibited. All toilets shall be secured to the ground to ensure that they do not overturn during high winds or for any other reason. It is the responsibility of the Contractor to ensure that no spillage occurs when the toilets are cleaned or emptied and that these contents are removed from site.

6.4.5 Waste Management

Waste will be generated in the form of rubble, cement bags, pipe and electrical wire cuttings. Contaminated soil due to oil leakages, lubricants and grease from the construction equipment and machinery may also be generated during the construction phase.

The oil leakages, lubricants and grease must be addressed. Contaminated soil must be removed and disposed off at the hazardous landfill. The contractor must provide containers on-site, to store any hazardous waste produced. Regular inspection and housekeeping procedure monitoring should be maintained by the contractor.

Waste in the form of solid waste from households, businesses and institutions will also be generated during the operational phase. General waste will be removed and disposed off at an authorised Landfill site in Windhoek by CHAMPAC INVESTMENTS CC, their contractors or alternatively liaise and arrange with the City of Windhoek Waste Management Department.

However, the Contractor shall provide sufficient waste skips on site during the construction. These waste skips should be in pairs to ensure that one is always present

as the other is being emptied. No waste of any sort shall be burnt or buried on site. The waste skips are expected to be emptied on a daily basis.

6.4.6 Cement and Concrete Batching

Concrete mixing directly on the ground shall not be allowed and shall take place on an impermeable surface. All run-off from batching areas shall be strictly controlled, and cement contaminated water shall be collected, stored and disposed of at a suitable waste disposal facility.

6.4.7 Hydrocarbons Management

If any spillage occurs, contaminated soil shall be collected in a holding tray or drum and which will then disposed at a **hazardous waste disposal site**. Any spillage of more than 200 litres must be reported to the Ministry of Mines and Energy as per the Petroleum Products Act.

The Contractor shall take all reasonable measures to prevent surface or groundwater pollution from the release of oils and fuels.

6.4.8 Information Board

The Contractor will be responsible for erecting information boards on site. The number and locations of these boards shall be agreed upon by the ECO officer.

The contents of the information board shall be provided by the Technical Manager and will essentially be to advise the public of the construction activity and the prohibition on entering certain areas. The information board shall also provide the contact number of the ECO, to ensure that the public can access relevant information and lodge any complaints during the construction phase of the intended development.

6.4.9 Flood Management

The intended development will be designed in such a way that surface water run-off is well developed. Storm water management of the intended development should be a key aspect of flood management within the development. All culverts should be kept clean to allow storm water to flow freely.

6.4.10 Stockpiling, Handling, and Storage of Building Materials

The Contractor shall ensure that stockpiles and storage yards be demarcated in areas that are already disturbed or where they will cause minimal disturbance. The Contractor / ECO shall indicate which activities are to take place in which areas within the site (e.g. mixing of cement, stockpiling of materials etc). These activities must be limited to single sites only. All the necessary handling and safety equipment required for the safe use of petrochemicals and oils shall be provided by the Contractor to, and used or worn by the staff whose duty it is to manage and maintain the Contractor's and his subcontractor's and supplier's plant, machinery and equipment.

6.4.11 Excavation, Backfilling and Trenching

The contractor shall ensure that all excavations are not to be left open for more than 2 days, thus it is recommended that excavations should be opened and closed the same day. Warning signs should be erected around the excavated area to clearly demarcate the area against access. In addition, soil that was/has been removed shall be used to backfill areas where required and excavated material shall be stockpiled along the trench within the working servitude.

6.4.12 Erosion Control

The Contractor shall protect all areas susceptible to erosion and shall take measures, to the approval of the ECO. The Contractor shall not allow erosion to develop on a large scale before effecting repairs and all erosion damage shall be repaired as soon as possible.

6.4.13 Servicing and Re-Fuelling of Construction Equipment

All maintenance and repair work will be carried out at the main construction camp within an area designated for this purpose, equipped with necessary pollution containment measures. The ground under the servicing and refuelling areas must be protected against pollution caused by spills and / or tank overfills (bunded / lined).

The Contractor may only change oil or lubricant at agreed and designated locations, except if there is a breakdown or emergency repair, and then any accidental spillages must be cleaned up / removed immediately. Construction vehicles are to be maintained in an acceptable state of repair.

No vehicles or equipment with leaks or causing spills will be permitted to operate at any of the construction sites. These will be sent immediately back to the maintenance yard for repair. Fuels required during construction must be stored in a central depot at the construction camp. This storage area should be located on a slab and be contained within a bund capable of containing at least the volume of one of the containers.

6.4.14 Noise

Construction phase of the development shall only occur from Mondays to Fridays between the hours of 07:00 am and 18:00 pm. The Contractor / ECO shall ensure that people from adjacent areas must be kept informed of the need and extent of noisy disruptive processes. The use of radios, television sets and other such equipment by workers must be controlled and noise levels kept to a level that does not disturb the neighbouring business properties.

6.4.15 Dust

The Contractor shall take precautions to the satisfaction of the ECO to limit the production of dust and damage caused by dust. Dust suppression measures shall be

agreed upon in consultation with the Project Manager / ECO. The following measures must be implemented to limit/ minimise dust impacts:

- Construction vehicles to only use designated roads;
- During high wind conditions the Contractor must make the decision to cease works until the wind has calmed down; and
- Cover any stockpiles with a suitable material, such as plastic or shade-cloth, to minimise windblown dust.

6.4.16 Heritage / Archaeological Sites

Should any archaeological resource be found on both sites, construction work should be ceased immediately. It is therefore the responsibility of the Contractor to inform the ECO of any archaeological resource found on site or in close proximity of the site. The ECO shall report the incident to the National Heritage Council of Namibia and during this time further construction work may only resume once clearance is given by the archaeologist and/or specialist.

6.4.17 Site Demarcation and Rehabilitation

The Contractor must ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project. The sites should be fully rehabilitated (e.g. clear and clean area, rake, pack branches etc.) including all disturbed areas and protect them from erosion. Only indigenous plants which are able to establish easily and will need less maintenance because they have already adapted to the local conditions should be considered.

6.4.18 Site Management

It should be noted that areas outside this designated working zone shall be considered "no go" areas. The offloading zones must be clearly demarcated when offloading goods to enhance safety around the project location.

6.5 CONSTRUCTION & OPERATIONAL PHASE MANAGEMENT ACTIONS

Below is a table with management actions that are to be implemented in order to avoid and minimise negative impacts on the environment that may occur during the construction phase of the project.

Figure 9: Construction AND Operational Management Actions

Environmental Awareness (Construction Phase)	
Proposed Mitigation Measures	The Environmental, Health and Safety Induction course is to be conducted by the ECO together with the Contractor's SHE Officer.
Proposed Monitoring	Monthly EMP compliance audits.
Responsible Party	CHAMPAC INVESTMENTS CC/ ECO

Safety to the Public (Construction Phase)	
Proposed Mitigation Measures	In cases where the general public might be exposed to danger of any road works or site activities, the Contractor shall provide warning signs in English or most popular language (Oshiwambo and/or Afrikaans) in Windhoek. The Contractor shall implement all appropriate measures to limit and social impacts that may be associated with the establishment of worker's accommodation on local communities.
Proposed Monitoring	Monitoring of Public Safety.
Responsible Party	CHAMPAC INVESTMENTS CC/ Contractor

Heritage or Archaeological sites (Construction phase)	
Proposed Mitigation Measures	Should archaeological artefacts be found during construction or decommissioning, then work in the area must be halted and a heritage specialist must be called to assess the situation and make recommendations. In addition, if any fossils are discovered during the construction phase, then an Archaeologist must be called to assess their importance and rescue them if necessary.
Proposed Monitoring	Regular visual inspection of the construction site.
Responsible Party	CHAMPAC INVESTMENTS CC/ ECO

Nuisance Pollution (Construction Phase)	
Description	Aesthetics and inconvenience caused to persons using the CHAMPAC INVESTMENTS CC gate and access road as well as other surrounding roads. The construction activities would be visible from the gate.
Proposed Mitigation Measures	The Technical Manager or Supervisor should maintain tidiness on site at all times. Take cognition when parking vehicles and placing equipment.
Proposed Monitoring	The Technical Manager or Supervisor should maintain tidiness on site at all times and do periodic inspections.
Responsible Party	CHAMPAC INVESTMENTS CC/ Contractor

Ablution Facilities (Construction Phase)	
Proposed Mitigation Measures	Portable toilets must be provided on site during construction (maximum ratio of 1 toilet per 15 people). It is the responsibility of the Contractor to ensure that workers make use of the provided toilets and not the natural environment. Toilets must be located at least 30m away from any water bodies and waste from these toilets must be disposed off regularly in a responsible manner at designated sites.
Proposed Monitoring	Monitor all ablution facilities regularly
Responsible Party	CHAMPAC INVESTMENTS CC/ ECO

Groundwater (Construction Phase)	
Description	Possible groundwater quality could be impacted through leachate of oil leakages, diesel, lubricants and grease from the heavy-duty equipment and machinery utilised during construction phase. Care must be taken to avoid contamination of soil and groundwater. Drip trays must be used when removing oil from machinery. Run-off from overflowing onsite sewage systems might transport the effluent to areas where geological structures are present. Inflow into these structures would cause a pollution thread. There is a slight potential health impact on groundwater users in the area. Potential impact on the natural environment from the polluted groundwater also exits. In general, impact on groundwater due to the construction of the bulk services is considered to be slightly minimal through proper management practices.
Proposed Mitigation Measures	Prevent spillages of any chemical or fuel. Use drip trays when doing maintenance on machinery. Maintenance should be done on dedicated areas with linings or concrete floor. No maintenance of machinery may be done at the project location. Implementation of sound and proper management practices.
Proposed Monitoring	Regular visual inspection to avoid spills or potentially polluting activities.
Responsible Party	CHAMPAC INVESTMENTS CC/ Contractors

Groundwater (Operational Phase)	
Description	Spillages and/or leakages of various possible contaminants might occur due to failure of reticulation pipelines or storage tanks. Contaminated soil might pose a risk to surface water.

	Potential impact on the natural environment from possible polluted groundwater also exits. The area is subjected to structures, which might act as preferential pathways for any contaminants entering the saturated zone.
Proposed Mitigation Measures	The risk can be lowered further through the use of suitable and adequate SANS approved piping material; and installation should be done by certified installers/technicians. All surface spillages and leakages must be cleaned up immediately. Proper containment structures should be constructed to avoid any possible leakages. The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently.
Proposed Monitoring	Groundwater monitoring sampling for pollution.
Responsible Party	City of Windhoek / Contractors

Surface Water (Construction Phase)	
Description	The project area is situated in the Arebbusch River Catchment. Contamination of surface water might occur through oil leakages, diesel, lubricants and grease from the heavy-duty equipment and machinery during the construction phase. Surface runoff emanating from overflowing and/or leakages from chemical and sewage storage and reticulation pipeline systems might reach water bodies. Potential Health problems caused by viruses, bacteria and parasites found in the effluent would be the main concern from this pathway. Potential health impact on surface water users and on the natural environment associated with the nearby streams and rivers. Surface runoff from the site is expected in a westerly direction.
Proposed Mitigation Measures	Machinery should not be serviced on site to avoid spills given that the project area is located in a catchment area. All spills should be cleaned up as soon as possible. Hydrocarbon/chemical contaminated soil; clothing or equipments should not be washed within 25m of any water body. No natural watercourse is to be used for the cleaning of tools or any other apparatus. This will include for the purpose of bathing, or the washing of clothes etc. Trucks delivering concrete shall not be washed on site or anywhere inside the project area.
Proposed Monitoring	Regular visual inspection. Surface water quality monitoring in cases of evident pollution.
Responsible Party	CHAMPAC INVESTMENTS CC/ Contractors

Surface Water (Operational Phase)	
Description	Spillages and/or leakages of various possible contaminants might occur due to failure of reticulation pipelines or storage tanks. Contaminated soil might pose a risk to surface water. All spills should be cleaned up as soon as possible. An emergency plan should be in place on how to deal with spillages and leakages during this phase. Potential health impact on surface water users and on the natural environment associated with the river channels in the area do exist. This may result in socio-economic impacts on surface water users.
Proposed Mitigation Measures	As part of the development, a storm water drainage network will be required to account for this change in absorption capacity of the site. Planned creation of green spaces with gardens, trees and vegetations that will be present in the new project will help in minimizing soil erosion. The landscape architects will ensure that the designs of gardens not only improve the aesthetic aspect of the terrain but also help in decreasing major surface runoffs. Drip trays and/or plastic sheeting should be used to contain any leaks emanating from the heavy-duty machinery and fleet. All spills should be cleaned up as soon as possible. The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently.
Proposed Monitoring	Regular visual inspection. Surface water monitoring sampling for pollution.
Responsible Party	City of Windhoek / Contractors

Dust [Air Quality] (Construction Phase)	
Description	Dust will be generated during the construction and installation of bulk services and problems thereof are expected to be site specific. Dust is expected to be worse during the winter and spring months when strong winds occur. Release of various particulates from the site during the construction phase and exhaust fumes from vehicles and machinery related to the construction of bulk services are also expected to take place. Dust is regarded as a nuisance as it reduces visibility, affects the human health and retards plant growth.
Proposed Mitigation Measures	It is recommended that regular dust suppression be included in the construction activities, when dust becomes an issue. No unnecessary revving of engines or operation of vehicles is allowed. In general, the construction of the proposed hospital is foreseen to have minimal impacts on the surrounding air quality. The Contractor must ensure that stockpiles of sand or construction areas that are likely to cause dust are made wet after daily construction work (after hours -17h00).

Proposed Monitoring	Regular visual inspection.
Responsible Party	CHAMPAC INVESTMENTS CC/ Contractors

Dust [Air Quality] (Operational Phase)	
Description	During the operational phase of the proposed development, it is expected that dust impacts may occur should the proposed roads leading to the development be tarred.
Proposed Mitigation Measures	It is recommended that dust suppression is implemented by means of wetting the roads at periodic intervals. Heavy duty construction trucks (machines) shall NOT be allowed on these streets other those for waste removal. Constant rehabilitation of the road must be implemented.
Proposed Monitoring	Regular visual inspection. A complaints register regarding emissions/smell should be kept and acted on if it becomes a regular complaint.
Responsible Body	City of Windhoek/Contactors

Noise (Construction Phase)	
Description	An increase of ambient noise levels at the proposed site area is expected due to the construction activities that will be taking place. 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 severely.
Proposed Mitigation Measures	Sensitive construction vehicle drivers and machinery operators must switch off engines of vehicles or machinery not being used. Ensure engines of machinery are fitted with mufflers. Equipment and machinery operators should be equipped with ear protection equipment. The construction engineers should make sure to use machinery equipped with latest sound-reduction technology. Buffer zones between the site and existing built up areas will be provided to reduce noise propagation. Works on public holidays, weekends and during overtime will be minimised to ensure noise is kept low. Operations should be strictly between 08H00 to 17H00. Drivers must be instructed to only use theirs hooters when required. No amplified sound shall be allowed on site. It is the responsibility to ensure that construction vehicles and machinery have silencer units and should be maintained in good working order.
Proposed Monitoring	Strict operational times. Regular inspection.
Responsible Party	CHAMPAC INVESTMENTS CC/ Contractors

Noise (Operational Phase)	
Description	Noise pollution due to this projecting the operational phase is expected to be mainly from road maintenance machinery during maintenance.
Proposed Mitigation Measures	Ensure that the generator engines are fitted with mufflers. Operators working in close proximity to the generators should be equipped with ear protection equipment, when noise becomes an issue. Observation of on-site noise levels by the Manager or Supervisor of Bulk Services Maintenance Department. Loud music from vehicles fuelling up should be restricted.
Responsible Body	City of Windhoek / Contractors

Erosion & Sedimentation (Construction Phase)	
Description	Vegetation clearance and creation of impermeable surfaces could result in erosion in areas across the development site. The proposed development will increase the amount of impermeable surfaces and therefore decrease the amount of groundwater infiltration. As a result, the amount of storm water during rainfall events could increase.
Proposed Mitigation Measures	Implementation of proper storm water management measures should be conducted as to prevent negative impact on the water courses in the area. Monitor water consumption to ensure that there is no undue waste. Ensure that consumption does not exceed permitted quantities and ensure that all construction personnel are trained in water wise principles and that they practice prudent use of water during the construction phase. Any erosion that occurs on site must be repaired as soon as possible to avoid it spreading onto a large scale of the site area. It is recommended that storm water drainage systems or measures are developed on site to prevent runoff and avoid erosion.
Proposed Monitoring	Regular visual site inspection.
Responsible Party	CHAMPAC INVESTMENTS CC/ ECO

Erosion & Sedimentation (Operational Phase)	
Description	Potential release of sewage, storm-water, water, into the environment due to pipeline/system failure. As a result, the spillage could be released into the environment and could potentially be a health hazard to surface and groundwater.
Proposed Mitigation Measures	Proper reticulation pipelines and drainage systems should be installed. Regular bulk services infrastructure and system inspection should be conducted.
Proposed Monitoring	Regular visual site inspection.
Responsible Party	City of Windhoek

Waste Generation (Construction Phase)	
Description	This can be in a form of rubble, cement bags, pipe and electrical wire cuttings. Contaminated soil due to oil leakages, lubricants and grease from the construction equipment and machinery may also be generated during the construction phase.
Proposed Mitigation Measures	The oil leakages, lubricants and grease must be addressed. Contaminated soil must be removed and disposed off at the nearest hazardous landfill. The contractor must provide containers on-site, to store any hazardous waste produced. Waste skips must be provided at the construction sites as well as the construction camps. Ensure that no excavated soil, refuse or building rubble generated on site are not placed, dumped or deposited on adjacent/surrounding properties or land. These waste kips must have lids to avoid rubbish being blown away by the wind. It is the responsibility of the Contractor to ensure that workers put the rubbish in the waste skips / bins provided. The Contractor / ECO shall ensure that the waste skips are emptied and transported in plastic rubbish bags and disposed off at an authorised landfill site in Windhoek. Receptacles must be equipped with a closing mechanism to prevent their contents from blowing out and from scavenging animals. The working areas and storage sites must be cleared of litter on a daily basis. The Contractor will maintain good housekeeping practices as this will ensure all work sites. The Contractor may not dispose off any waste and/or construction debris by burning or burying it. The Contractor shall also ensure that all waste service providers have a valid waste carrier's registration certificate. Ensure that sufficient numbers of mobile toilets are available on site ad that these are located beyond the buffer zones. Ensure that mobile toilets are maintained in a sanitary and operational state. Waste from ablution facilities must be regularly removed and care must be taken to ensure that there is no spillage.
Proposed Monitoring	Regular inspection and housekeeping procedure monitoring. Observation of site appearance by the manager.
Responsible Party	CHAMPAC INVESTMENTS CC, Contractors / ECO

Waste Generation (Operational Phase)	
Description	Waste in the form of contaminated soil, rubble and domestic waste. Littering along access roads may also be produced during the operational phase.
Proposed Mitigation Measures	Waste must be removed and disposed off at the landfill by City of Windhoek and/or the proponent's Waste Removal Contractors. Waste must be transported from the point of generation directly to the centralised waste storage area where it can be safely stored prior to offsite disposal. Arrangements must be in place for the regular maintenance and cleaning of waste/recycling storage areas. With regards to the Hotel, avoid purchasing unnecessarily large amounts of fresh produce or other food products which cannot be frozen or preserved. Develop a comprehensive system for waste separation at the relevant generation points. Waste must be separated into items which can be reused, composted or recycled and send the remaining portion to the general waste stream for disposal at the landfill site. All staff should be made aware of the aim to recycle waste by means of posters, training and staff meetings. Skips must be emptied on a weekly basis to prevent the formation of odour.
Proposed Monitoring	Regular visual inspection. Containment area inspections and monitoring.
Responsible Body	City of Windhoek/Contractors

Traffic, Work Sites (Construction Phase)	
Description	The servicing of the intended development activities is expected to have a minor impact on the movement of traffic along the nearby streets. No diversion of traffic or closure of roads is expected. Speed limit warning signs must be erected to minimise accidents. Heavy-duty vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents.
Proposed Mitigation Measures	It is recommended that if the need arises for traffic diversion or road closure, the Contractor should liaise with the Windhoek Traffic Department. Speed limit and site warning signs must be erected to minimise accidents. Construction vehicles must be tagged with reflective signs or tapes to maximise visibility of the vehicles and avoid accidents.
Proposed Monitoring	Observations of the traffic flow on the access road.
Responsible Party	CHAMPAC INVESTMENTS CC, Contractors / ECO

Traffic, Work Sites (Operational Phase)	
Description	Traffic around the proposed development should be monitored, to avoid traffic congestion in the area during maintenance.
Proposed Mitigation Measures	Speed limits and road signs as set out by the Traffic Department of the City of Windhoek should be adhered to in order to minimise accidents.
Proposed Monitoring	Observations of the traffic flow on the surrounding areas.
Responsible Body	City of Windhoek

Stockpiling, Handling & Storage of Building Materials (Construction phase)	
Proposed Mitigation Measures	The Contractor or ECO shall ensure that stockpiles as well as storage yards are separated in areas that already disturbed. The Contractor shall ensure that all operations which may involve the use of cement and concrete are to be carefully monitored. It is recommended that concrete and cement mixing must only take place within construction or specific areas on site and concrete may NOT be mixed directly on the ground. It is also the responsibility of the Contractor to make sure that no empty or open cement bags should be lying around the site. Do not strip the topsoil when it is wet especially that the project area is situated in a catchment area. Topsoil stockpiles must be positioned or stored in approved locations only. Co-ordinate works to limit unnecessarily prolonged exposure of stripped areas and stockpiles. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction or earthworks in that area. Strip topsoil together with grass or groundcover from all areas where permanent or temporary structures are located, construction related activities occur and access roads are to be constructed.
Proposed Monitoring	To ensure that stockpiling only takes place within the site demarcation.
Responsible Party	CHAMPAC INVESTMENTS CC, Contractors / ECO

Ecological Impacts (Construction phase)	
Description	The intended development is free of any conservation worthy vegetation and fauna, besides the protected Camelthorn Trees and Boscia Albintruca Trees that do occur in the area. Impacts on fauna are expected to be minimal.
Proposed Mitigation Measures	Disturbance of areas outside the designated working zone is not allowed. It is the responsibility of the ECO to ensure that no animal (if there's any) is to be killed, removed or interfered with the Contractor together with his workers (employees).

	The Contractor must ensure that no domesticated animals are brought along on sight. It is however recommended that, the site be kept tidy and free of rubbish that will attract animals to the site. Vegetation (if there's any) disturbance and removal must be kept to a minimum and the areas are monitored in order to ensure that areas are exposed for brief of time only. Trees larger than 150mm in girth must be conserved, especially the protected species. Construction activities must be carefully planned and implemented in such a way that facilitates and aids in the rehabilitation and establishment of indigenous plant communities. No vegetation outside of the demarcated areas may be removed.
Proposed Monitoring	Regular site inspection by the Site Manager or Supervisor.
Responsible Party	CHAMPAC INVESTMENTS CC , Contractors / ECO

Ecological Impacts (Operational Phase)	
Description	No impacts are expected from the proposed development of the educational institution during the operational phase. The developer is advised to plant indigenous trees that will form part of the development given that the project area currently a few scattered vegetation.
Proposed Mitigation Measures	Minimise the area of disturbance by restricting movement to the designated working areas during maintenance.
Proposed Monitoring	Regular site inspection by the Site Manager or Supervisor.
Responsible Body	City of Windhoek , Contractors

Excavation, Backfilling & Trenching (Construction phase)	
Proposed Mitigation Measures	The Contractor shall ensure that all excavations are marked with a tape to clearly demarcate the site areas. Do not excavate until all required materials or services are on site, to facilitate immediate laying of services or construction of subsurface infrastructure. Excavation of sand to solid ground must be done carefully and appropriate drainage shall be incorporated. It is recommended that clearing activities be undertaken preferably during the dry season in order to prevent erosion and siltation. Removed soil must be used to backfill areas where required and excess is to be landscaped into natural looking banks that fit the surrounding topography. Monitor backfilled areas for erosion and remediate as required.
Proposed Monitoring	Regular site inspection by the Site Manager or Supervisor.
Responsible Party	CHAMPAC INVESTMENTS CC , Contractors / ECO

Hazardous Materials (Construction Phase)	
Proposed Mitigation Measures	It is the responsibility of the Contractor to make sure that all personnel on site are well trained and educated on how to handle hazardous materials. The Contractor shall establish an emergency procedure when dealing with spills or the release of other hazardous materials. All accidental chemical or fuel spills must be corrected and cleaned immediately. The Contractor shall ensure that hazardous materials are stored safely and are under strict control. Tanks containing oil must have lids which are to remain firmly closed. The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores.
Proposed Monitoring	Regular site inspection by the Site Manager or Supervisor
Responsible Party	CHAMPAC INVESTMENTS CC / Contractor

Vehicles and Equipment (Construction phase)	
Proposed Mitigation Measures	Maintain site vehicles and equipment in an acceptable state of repair. All vehicles must be road-worthy and regularly serviced. Construction staff should only use authorised paths and roads. All drivers employed during the construction phase must be briefed and notified of the potential safety risks posed by construction vehicles to members of the local community. Movement of heavy vehicles and machinery must be limited wherever possible and construction noise reduced wherever possible. Construction vehicles transporting materials to and from the construction site must be covered to reduce the formation of dust. Vehicles used during the construction phase or to transport material or staff on site should have minimum impact on the environment (trees, roads) or other road users. The size, height and weight of vehicles must be kept in mind; the access route will determine the type of vehicle that can be used.
Proposed Monitoring	Regular site inspection by the Site Manager or Supervisor.
Responsible Party	CHAMPAC INVESTMENTS CC , Contractor / ECO

Access Roads (Construction phase)	
Proposed Mitigation Measures	Make use of existing roads and where feasible, rather than creating new routes through natural vegetated areas. Regulate and control movement over the site. Personnel, vehicles and equipment must move along designated routes only. The Contractor must maintain all access and repair these as required. Damage caused to roads during the construction related activities, including heavy vehicles must be repaired before the completion of the construction phase. The costs associated with the repair must be dealt with by the Contractor. Upon completion of the construction phase, it is the responsibility for the Contractor to ensure that the access roads are returned to a state no worse than prior to construction commencing. Construction access roads should not be wider than necessary, they must have a maximum width of 3m.
Proposed Monitoring	Regular visual inspection of traffic flow around the site.
Responsible Party	CHAMPAC INVESTMENTS CC , Contractors / ECO

Site Demarcation & Rehabilitation (Construction phase)	
Proposed Mitigation Measures	The Contractor is to be held responsible for the rehabilitation of all areas disturbed during construction works. Rehabilitation will include stockpile areas, servicing of the roads. All temporary structures erected during construction works as well as materials, waste generated are all removed upon completion of the project. Progressively, rehabilitate (rip, scarify and plant) areas as soon as works have been completed. Ensure that the construction site is rehabilitated using appropriate indigenous vegetation. Salvaged vegetation, rather than the new planting or seeding should be used to the extent possible. With the permission of the local authority and forestry department, seeds from appropriate indigenous species may be harvested for later use during rehabilitation. An ecologist must be consulted in this regard. Vegetation that is removed or propagated during the construction phase may be maintained on site to re-vegetate the disturbed soil. Rehabilitated areas must be monitored regularly to ensure that re-vegetation is successful, plants are maintained, weeds and invaders are removed and that areas where replanting is unsuccessful are replaced.
Proposed Monitoring	Regular inspection of compliance with the proposed mitigation measures.
Responsible Party	CHAMPAC INVESTMENTS CC , Contractor / ECO

Hydrocarbon Spillages (Operational Phase)	
Description	Fuel spillages might occur during delivery during the operational phase.
Proposed Mitigation Measures	This impact can be reduced by the installation of spill containment areas around the pumps and through proper training of the operators. All spills must be cleaned up immediately. The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently.
Proposed Monitoring	Risk of impact from this can be lowered through proper training of staff and the installation of suitable containment structures.
Responsible Body	City of Windhoek

Failure of Reticulation Pipelines (Operational Phase)	
Description	Potential release of sewage, storm-water, water, into the environment due to pipeline/system failure. As a result, the spillage could be released into the environment and could potentially be a health hazard to surface and groundwater.
Proposed Mitigation Measures	Proper reticulation pipelines and drainage systems should be installed. Regular bulk services infrastructure and system inspection should be conducted.
Proposed Monitoring	Regular visual site inspection.
Responsible Body	City of Windhoek

7 CONCLUSION

If the above-mentioned management recommendations are properly implemented, it is anticipated that most of the adverse impacts on the environment can be mitigated. An appointed environmental officer/consultant will need to monitor or audit the site throughout construction and operation phase to ensure that the EMP is fully implemented and complied with. The EMP caters for all project phases, but will need to be reviewed during all phases of project, especially when revisions are made to the project development plans.

The Environmental Management Plan should be used as an on-site tool during all phases of the proposed project. Parties responsible for contravention of the EMP should be held responsible for any rehabilitation that may need to be undertaken.

Clearance Certificates issued on EIA/EMPs are only valid for 3 years and will need to be reviewed and submitted to the Department of Environmental Affairs again for approval.

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