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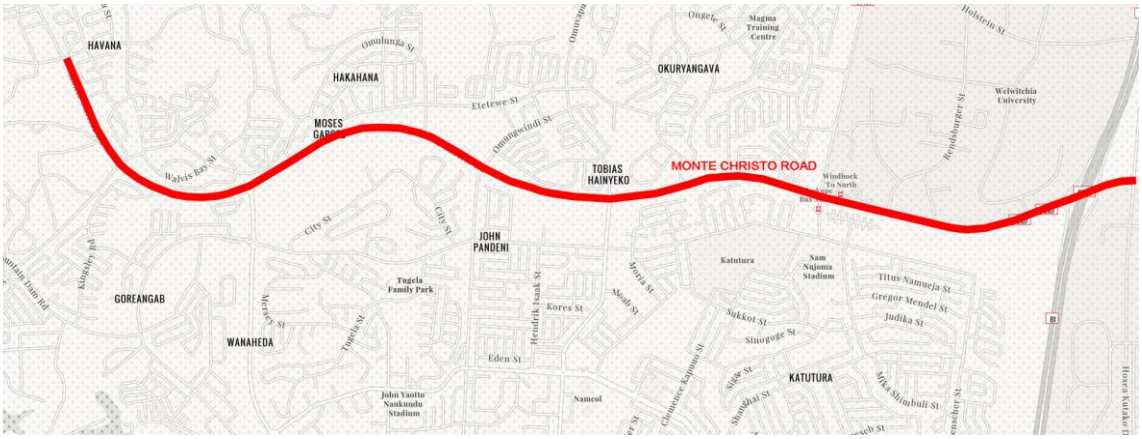
ENVIRONMENTAL SCOPING ASSESSMENT

PROPOSED UPGRADE OF THE EXISTING MONTE CHRISTO ROAD (FROM HOSEA KUTAKO DRIVE TO MATSHITSHI STREET), WINDHOEK

AUGUST 2021



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PROPONENT:

ONGOS VALLEY DEVELOPMENT
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EXECUTIVE SUMMARY

Ongos Valley is proposing to upgrade the Monte Christo Road section from Hosea Kutako Drive to Matshitshi Street. This project is an associated requirement for the development of the Ongos Valley Township. The road will ease traffic along the Monte Christo Road, which is the main route for accessing Ongos Valley.

The Environmental Management Act No.7 of 2007 stipulates that public roads construction be subjected to Environmental Impact Assessments (EIA). Matrix Consulting Services, an independent consultant, has been appointed by Ongos Valley Development to undertake an Environmental Impact Assessment of the proposed Monte Christo road upgrade, in Windhoek.

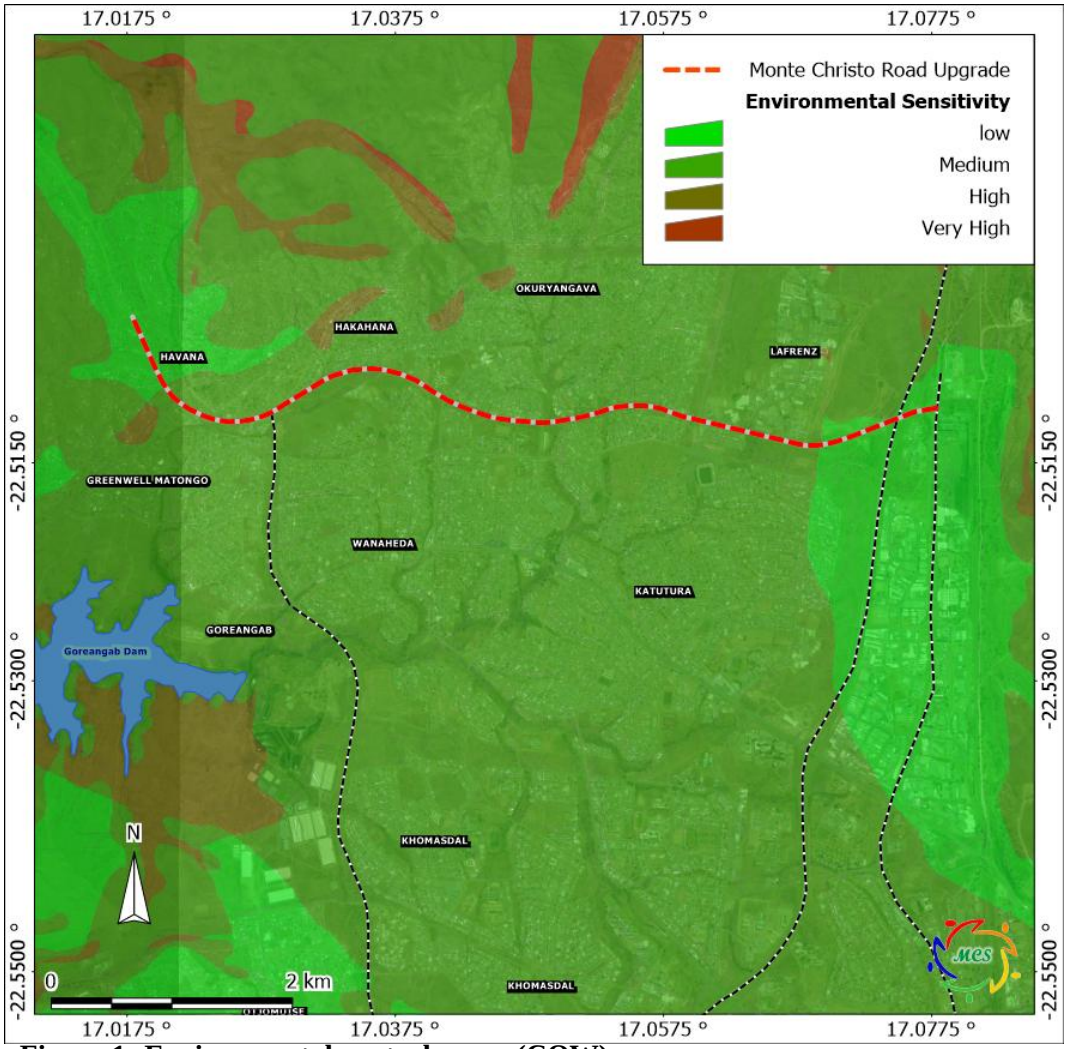

Figure 1. Environmental control zones (COW)

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

All known environmental and social risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that environmental performance be monitored regularly to ensure compliance and that corrective measures be taken if necessary. It is also recommended that this information be made available to the surrounding communities on a regular basis.

In general, the Monte Christo Road Upgrade would pose limited environmental risks, provided the EMP for the activity is used properly during planning, construction and operational phase. Due to the occurrence of faults within the study area, the consultant recommends . The Environmental Management Plan should be used as an on-site tool during all phases of the project. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

Should the project be modified or extended to a different area, it is recommended that a different EIA be done for the probable new location or modifications.

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List of Abbreviations

EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMA	Environmental Management Act
EMS	Environmental Management System
ESA	Environmental Scoping Assessment
I&Aps	Interested and Affected Parties
PPPPs	Projects, Plans, Programmes and Policies

PROJECT DETAILS

TEAM MEMBERS		
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REPORT STATUS:	**FINAL**

1. BACKGROUND AND INTRODUCTION

Ongos Valley Development (Pty) Ltd. is currently developing Portion 9 of Ongos Valley Phase 1, which is a mixed urban development comprising of residential, industrial, business, institutional erven. The Ongos development also necessitates the upgrading of Monte Christo road in order to cater for increased traffic generated and to alleviate the current traffic congestion. The proposed development is aimed at addressing the housing scarcity in Windhoek, and ultimately eradicating the informal settlement mushroming in the Windhoek and accommodating the beneficiaries in formal housing.

Matrix Consulting Services, an independent consultant, has been appointed by Ongos Valley Development(Pty) Ltd to undertake an Environmental Impact Assessment (EIA) on the Upgrading of Monte Christo Road from Hosea Kutako Drive up to Matshitshi Street, on behalf of the City of Windhoek.

An assessment will be undertaken to determine the potential impact of the development on the environment and to determine all safety, health and social impacts associated with the proposed development activities. The project location is indicated on the map.

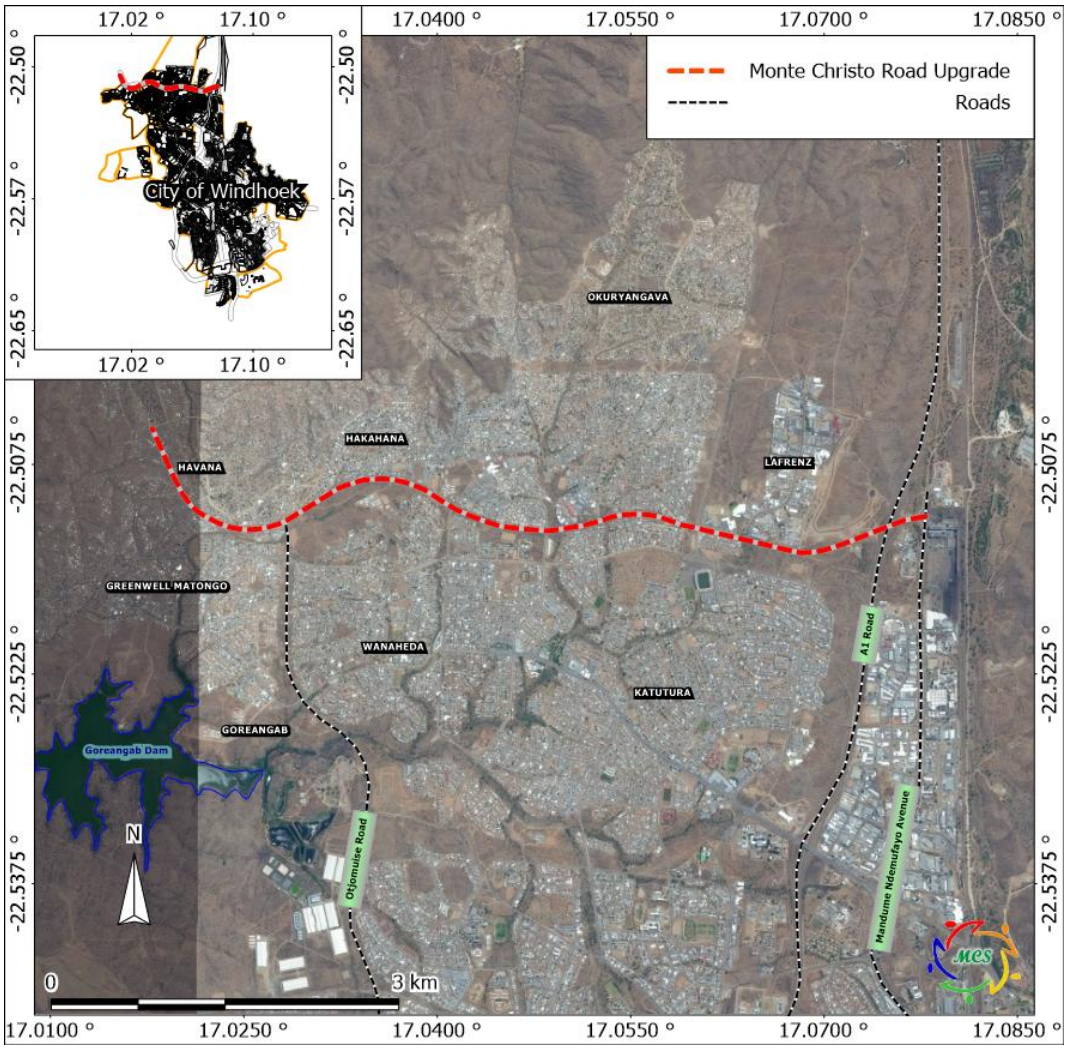


Figure 2. Location Map

The environmental assessment will be conducted as per Namibia's Environmental Assessment Policy and the Environmental Management Act No.7 of 2007 and its regulations of 2012 .

2. TERMS OF REFERENCE

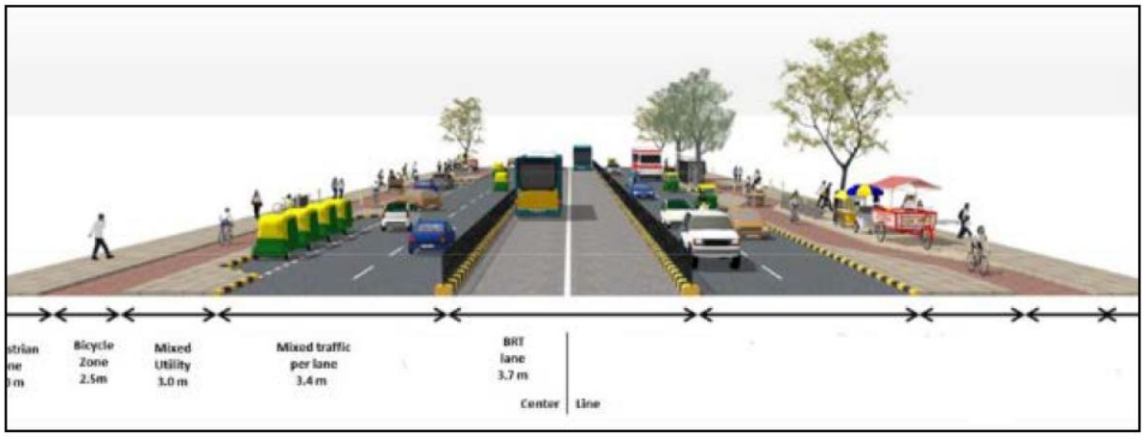
Ongos Valley Development (Pty) Ltd has commissioned an Environmental Impact Assessment (**EIA**) for the proposed road upgrade, in Windhoek. The proposed township is one of the strategic projects that the Ongos Valley Development has engaged to address housing scarcity in Windhoek, and address housing and basic services provision in the informal settlements. The road is located at -22.512042 S, 17.059932 E.

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

3. PROJECT INFORMATION

3.1 Project Rationale

It is the intention to upgrade the Monte Christo Road to a dual carriageway between the said intersection, including future BRT (Bus Rapid Transit) lanes, as shown below.



It is envisaged that the current road will be upgraded with an additional double lane on the southern side of the existing roadway and a BRT system in the middle. The extent of the upgrading design would be from the B1 Off-ramps (near van Eck Power Station) up to Matshitshi Street, a length of about 6,4km.

The need for the project relate to the strategic plans of the City of Windhoek to eradicate or minimize all informal settlements in its area of jurisdiction. The aim is to integrate the residents into housing in a sustainable manner.

The proposed project is a component in a larger picture of the Ongos Valley Development, a project aimed at providing serviced land. Other associated land uses of the proposed townships are general residential , business, institutional, public open spaces and municipal. The development will therefore not only benefit the future residents but also the surrounding areas by providing necessary facilities and social services that are not currently in place.

The proposed development of the site is desirable from the perspective of developing within the existing road servitude. The proposed development will also create employment, both during the construction and operational phase.

Other Potential spin-offs from the development of Road upgrade project as part of the Ongos Valley Development:

- Reduced serviced land scarcity in Windhoek.
- Reduced housing scarcity in Windhoek.
- Creation of job opportunities, training and skills development during construction and operational phase. It is estimated that the new jobs will improve the livelihoods of the workers and their families. Given that the unemployment rate of 31% in the region, this in itself is regarded as a significant benefit to the socio-economic situation in the region (2011, Population and Housing Census, Khomas Region).
- Provision of housing and community facilities.
- Impact on health and safety of residents by providing proper housing, roads and sanitation.
- Change the sense of the place of the area from undeveloped townland to a formal township.
- Increase in economic opportunities in the area.
- General enhancement of the quality of life in the Khomas Region and the surrounding area, should the project be economically viable.

4. Monte Christo Road Upgrade Activities

4.1 Current status of the road

The road and its servitude is previously disturbed, with visible invader plants on some parts. Some parts of the road has been invaded by illegal occupants and informal traders.

Current state of site

Various existing services were encountered along the road reserve. An extensive effort was made during the topographical survey to collect as much as possible information about the existing services. The available as-built information from the different service providers was reviewed during the preliminary design phase and the existing services inside the road reserve were identify. Early indications are that no major services are affected by the new

road alignment designs and proposed upgrading apart from the possible moving of the powerline pylons near Otjomuise Road, which is discussed under the electrical section of the Prelimiary Design Report.

4.2 Proposed Monte Christo Road Upgrade

The Ongos development also necessitates the upgrading of Monte Christo road in order to cater for increased traffic generated and to alleviate the current traffic congestion. The Ongos Development is planned to be within the existing Windhoek townlands. The proposed development is aimed at eradicating the spread of informal settlement in Windhoek by accommodating the beneficiaries in formal housing in a development like Ongos Valley Development. The proposed development will offer affordable serviced land as well as other land-use type erven.

The development will consist of Residential erven, General residential erven, Business erven, municipal, Institutional erven (erven that can accommodate schools, churches, crèches, institutional use, community facilities, children's home), and public open spaces.

Figure 3: Proposed Monte Christo Road Upgrade Section

A Traffic Impact Assessment (TIA) for the entire Ongos, Monte Christo, Brakwater and northern portions of Otjomuise, to evaluate the traffic loadings on the arterial roads, was done. This study was completed in May 2018. Recommendations from the TIA comprised, amongst others, that Monte Christo should be a dual carriage way and deemed a major arterial, as shown below.

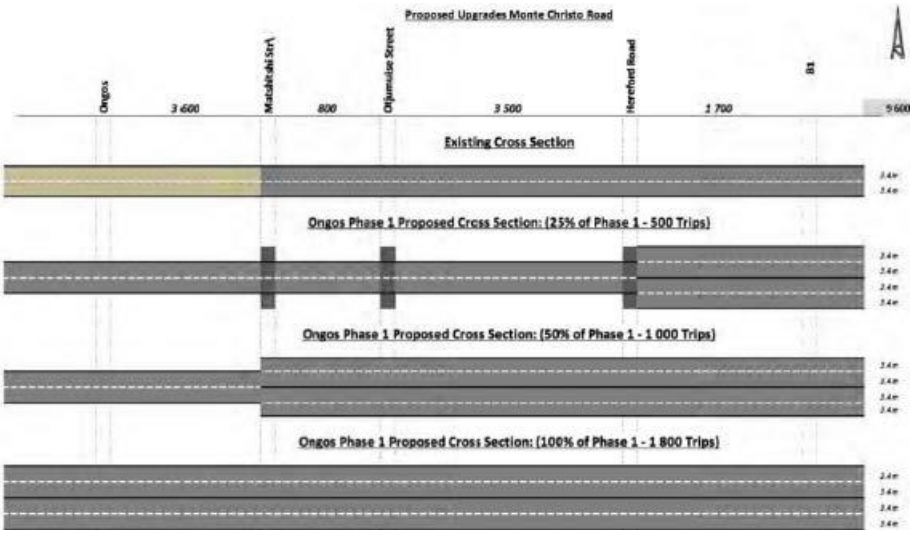


Figure 4: Monte Christo Road Upgrade

The detailed prelimiary design report in attached as appendix D.

4.2.1 Construction Activities

- Transporting relevant building material and equipment.
- Upgrade and installation of associated electrical supply cables.
- Upgrade and installation of associated water pipelines.
- Upgrade and installation of associated sewer lines.
- Installation of stormwater management system
- Roads construction
- Land clearance

4.2.2 Operational Activities

- Operation and maintenance of the road.

4.2.3 Housing

No contractors are allowed to camp on site during all phases of the project.

4.2.4 Access Road

The site will be accessed using Monte Christo road and existing roads.

4.2.5 Waste Management

All waste generated at the site will be collected in plastic or steel drums and removed from site and disposed at Kupferberg Landfill. Hazardous waste will be collected and stored separately, and disposed off at an appropriate hazardous waste cell at Kupferberg landfill.

Mobile toilets will be used by the contractors during the construction phase respectively. The waste must be disposed off at Gammams Waste Water Treament Works.

4.2.6 Site Rehabilitation

After the construction is complete, the site will be cleared of all chemical and hydrocarbon spills, pipe cuttings, electrical cuttings etc. Excavations for bulk services will need to be covered and levelled properly.

5. ENVIRONMENTAL STUDY REQUIREMENTS

According to the Environmental Management Act no. 7 of 2007 the proponent requires an environmental clearance certificate from the Ministry of Environment and Tourism (Department of Environmental Affairs) to undertake the roads construction is a *'listed activity'* as per the *List of Activities requiring an Environmental Clearance Certificate* (Government Notice 29 of 6 February 2012) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted.

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

6. DESCRIPTION OF ALTERNATIVES

6.1 No-Go Alternative

The no-development alternative is the option of not going ahead with the Monte Christo Road Upgrade. The no-go alternative will keep the site in its current state. This alternative is undesirable in terms of the current housing scarcity in Windhoek. The site is vacant, with part of it previously occupied illegally. The informal settlement in Windhoek is growing rapidly. Should the site remain in this state, the possibility and threat of illegal land invasions and squatters settling on the site will persist. The upgrade will largely be done within the existing road servitude , which is purposefully registered to accommodate future expansion of the road.

The Ongos development also necessitates the upgrading of Monte Christo road in order to cater for increased traffic generated and to alleviate the current traffic congestion. Should the proposed activity not take place, the region could be deprived of developing a township, and ultimately reducing the housing demand in Windhoek. The proposed activity could yield positive results that could provide an alternative serviced land to Windhoek inhabitants. The No-go option will not be a viable alternative at this stage.

6.2 Site Alternative

The road servitude already exists and belongs to the City of Windhoek. The City of Windhoek wants to provide a wider road that accommodates various modes of transport. The upgraded road is envisaged to ease traffic along Monte Christo Road. There are engineering services capacity to support the proposed upgrade, thus the site is ideally suited for this type of development.

The area holds less ecological and conservation values, and the best option chosen is to develop with strict consideration of environmental aspects. Mitigation measures on impacts likely to be caused by the activity are incorporated in the planning and execution of the activity. The Monte Christo Road Upgrade will have minimal impacts on the environment. The environmental footprint of this activity is expected to be minimal.

7. SCOPE OF THE EIA

The scope of the EIA aims at identifying and evaluating potential environmental impacts emanating from the proposed Monte Christo Road Upgrade. Relevant data have been compiled by making use of secondary sources and from project site visits. Potential environmental impacts and associated social impacts are identified and addressed in this report.

The environmental impact assessment report aims to address the following:

a) Identification of potential positive and negative environmental impacts.

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

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

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

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

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

g) Present and incorporate comments made by stakeholders.

8. METHODOLOGY

The following methods were used to investigate the potential impacts on the social and natural environment that could arise from the development of Havana Relocation Township in Windhoek:

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

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

9. STATUTORY REQUIREMENTS

9.1 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:

- ***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.

- ***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

Public road construction is a *'listed activity'* as per the *List of Activities requiring Environmental Clearance* (Government Notice 29 of 6 February 2012) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted.

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

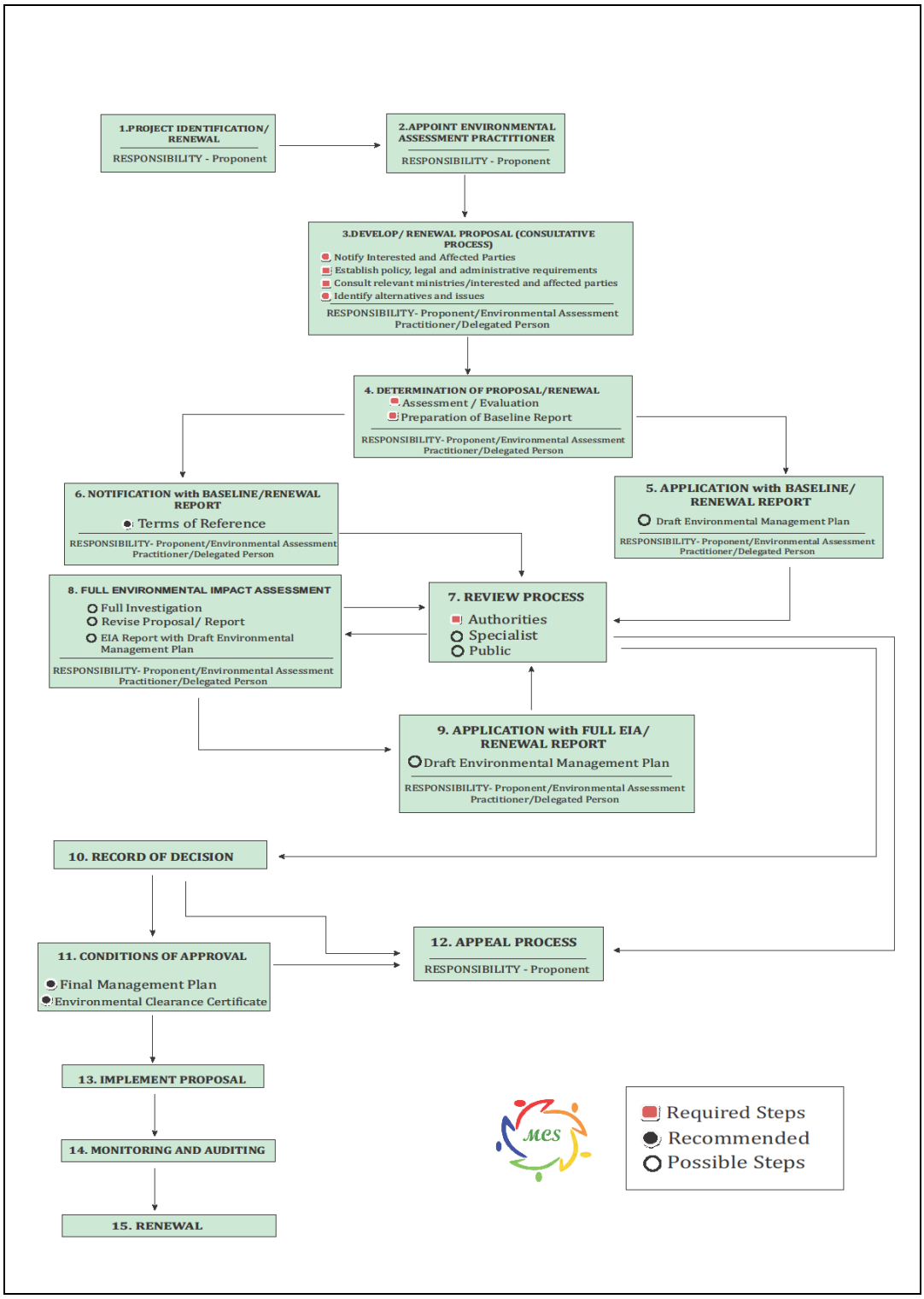


Figure 5. Environmental Assessment Procedure of Namibia

- ***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)

- ***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)

- ***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)

- ***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)

- ***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 as set out in Figure 2.

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

- ***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)

- ***Townships and Division of Land Amendment Act (No.28 of 1992***

Article (l) of this Act stipulates that "Whenever any area of land constitutes, by reason of its situation, a portion of an approved township, or adjoins an approved township, the Executive Committee may, by proclamation notice in the Gazette and after consultation with the Board, extend the boundaries of the township to include such an area". Thus the new township needs to be approved by the Namibian Planning Advisory Board and the Townships Board.

Line Ministry: Ministry of Urban and Rural Development

(Contact: Tel: 061-297 2911)

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

The regulations makes provision for proper construction of pipelines in drainage lines. The regulations also stipualate 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: Tel: 061-297 2911)

- ***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)

- ***Draft Pollution Control and Waste Management Bill***

The proposed project of Monte Christo Road Upgrade, 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.

- ***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

- ***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 Havana Relocation Township project are expected to include dust, air quality impacts, noise nuisance and smoke emissions.

Line Ministry: Ministry of Health and Social Services

- ➢ ***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 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 Namibi)

9.2 International Conventions and Regulations

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.

9.3 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.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

- ***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.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

- ***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.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

- ***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.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

10. GENERAL ENVIRONMENT OF THE STUDY AREA

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

10.1 Location and Land Use

The proposed section of the Monte Christo road (22.512042 S, 17.059932 E.) is indicated the location map in Figure 1.

The road upgrade will occur within an existing road servitude, as per local municipal regulations. The Upgrading of Monte Christo Road will span from Hosea Kutako Drive up to Matshitshi Street. Lafrenz industrial area, Okuryangava, Hakahana, Freedom Land, and Havan lies north of Monte Christo Road. Golgota, Wanaheda and Goreangab Extension 2 lies south of Monte Christo Road.

10.2 Topography and Surface Water

The landscape of the Monte Christo Road Upgrade Section 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 road lies in the Aretaragas River catchment. Drainage is well developed and runoff takes place through small streams (rivers) running through the site. This streams eventually join the Aretaragas River course, flowing towards the north into the Swakop River. Care should be taken to avoid contamination of these surface water bodies in the area, especially during rainy seasons.

10.3 Climate (Mandelsohn et al, 2003)

Table 1. 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.

10.4 Geology of the Area

The project location has a very thin soil cover (less than 35cm), however this differs in the in the rivers and tributaries. The general geology or rock formations underlying the township development consists mainly of mica rich schist and quartz rich schist (quartzite), containing quartz veins. All of the intersected rock formations belong to the Kuiseb formation of the Damara Sequence. In this area the formation is known to have a dip of ±30° in a northerly direction. The schist has an abundance of layers (schistosity) consisting of quartz rich and mica rich layers. Some major Amphibolite intrusions are also present in the area.

North-southerly faults are common in the area. The Aretaragas River that runs through the project location also follows a major north-south striking fault. The Amphibolite intrusions in the area are clearly affected by the faults and large displacements are visible.

The overall complex geology of the Windhoek area is a result of numerous folding and faulting episodes, including thrusting and rifting, to which the area has been subjected. Metasedimentary rocks of the Swakop Group, which is part of the Damara Sequence, constitute the Windhoek Aquifer.

10.5 Hydrogeological Characteristics

A number of north-southerly striking faults and joints found in Windhoek form the major underground water conduits of the Windhoek Aquifer and hence determine the conditions of the aquifer.

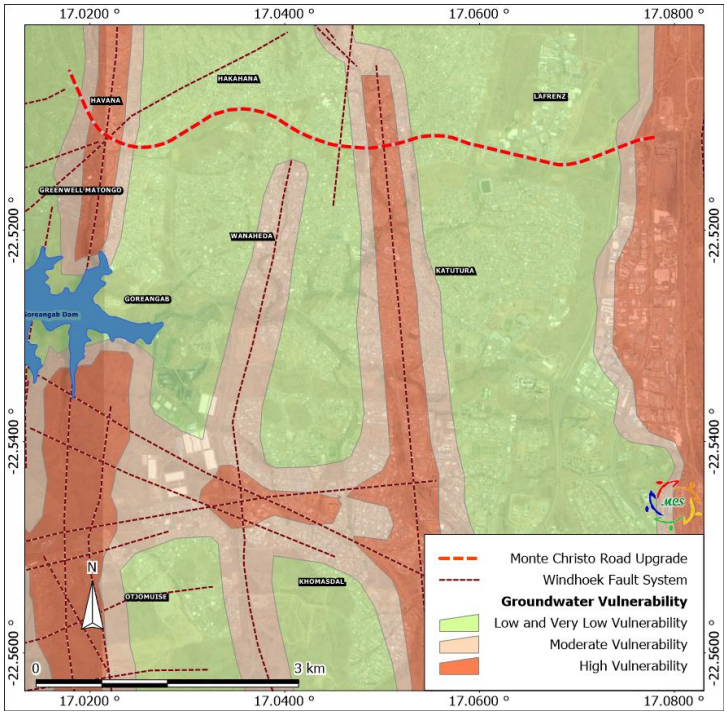


Figure 6: Groundwater vulnerability zones (COW)

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 micaceous schist found in the area, is prone to plastic deformation rather than brittle, fracturing, exhibiting 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.

On the other hand, the more competent quartzite 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.

Groundwater flow from the site is expected from south to north, towards the Goreangab Dam. According to the City of Windhoek, Namwater, Department of Water Affairs (DWA) and MCS database approximately 4 boreholes are present within a 1km radius of the project location. Groundwater table in the area is expected to be about 5m below ground level (mbgl).

Groundwater belongs to the government of the Republic of Namibia; hence the area does fall within the Windhoek-Gobabis Subterranean Water Control Area, of Government Notice 189 of 6 February 1970. This means that Government controls groundwater usage in this area.

The area is outside the mapped area considered in the Vulnerability Study of the Windhoek Aquifer (City of Windhoek, 2000) , However due to the presence of a highly sensitive faults present in the area, it should be regarded as a sensitive area. These geological features might form preferential pathways to the underlying aquifer.

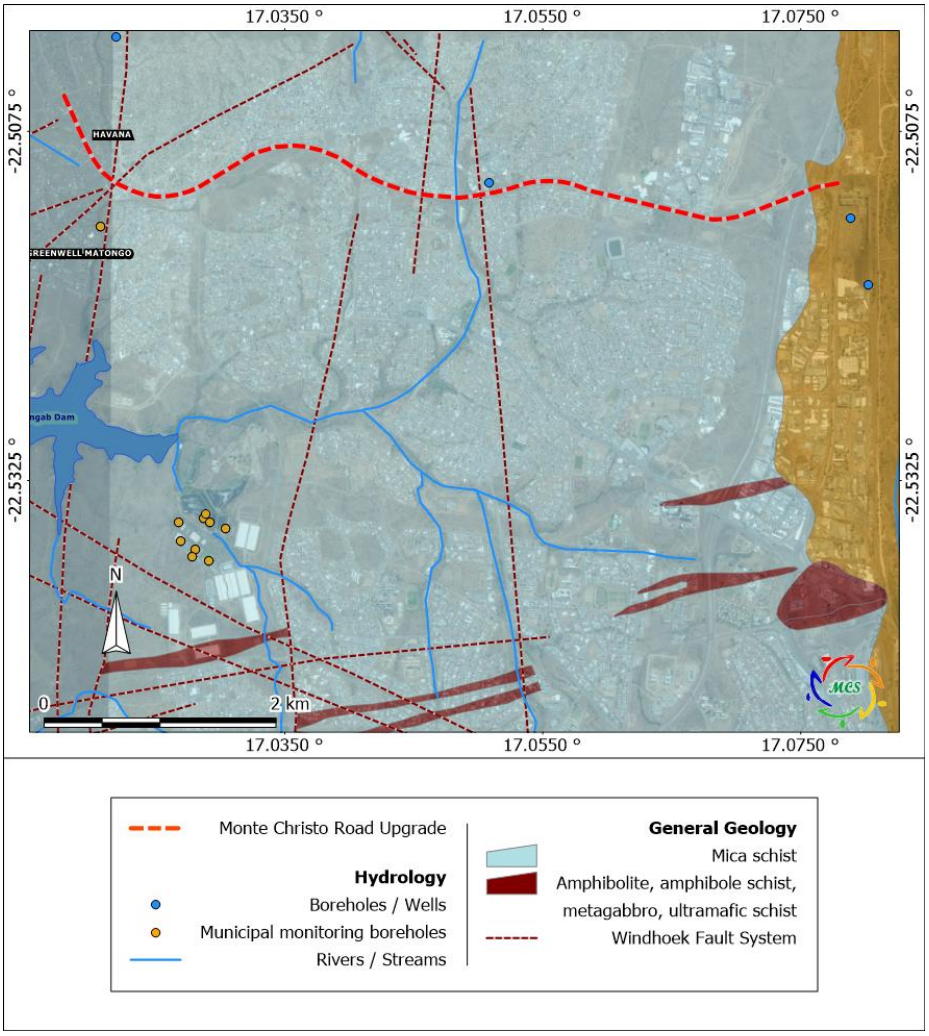


Figure 7. Hydrogeological map

10.6 General Ecology

The vegetation in the study area is typically a highland savannah with a dominance of A. mellifera and *and C.alexandrii* that are known to occur commonly in this area. According to the Windhoek's environmental structure plan, the proposed township lies within low vegetation sensitive zone.

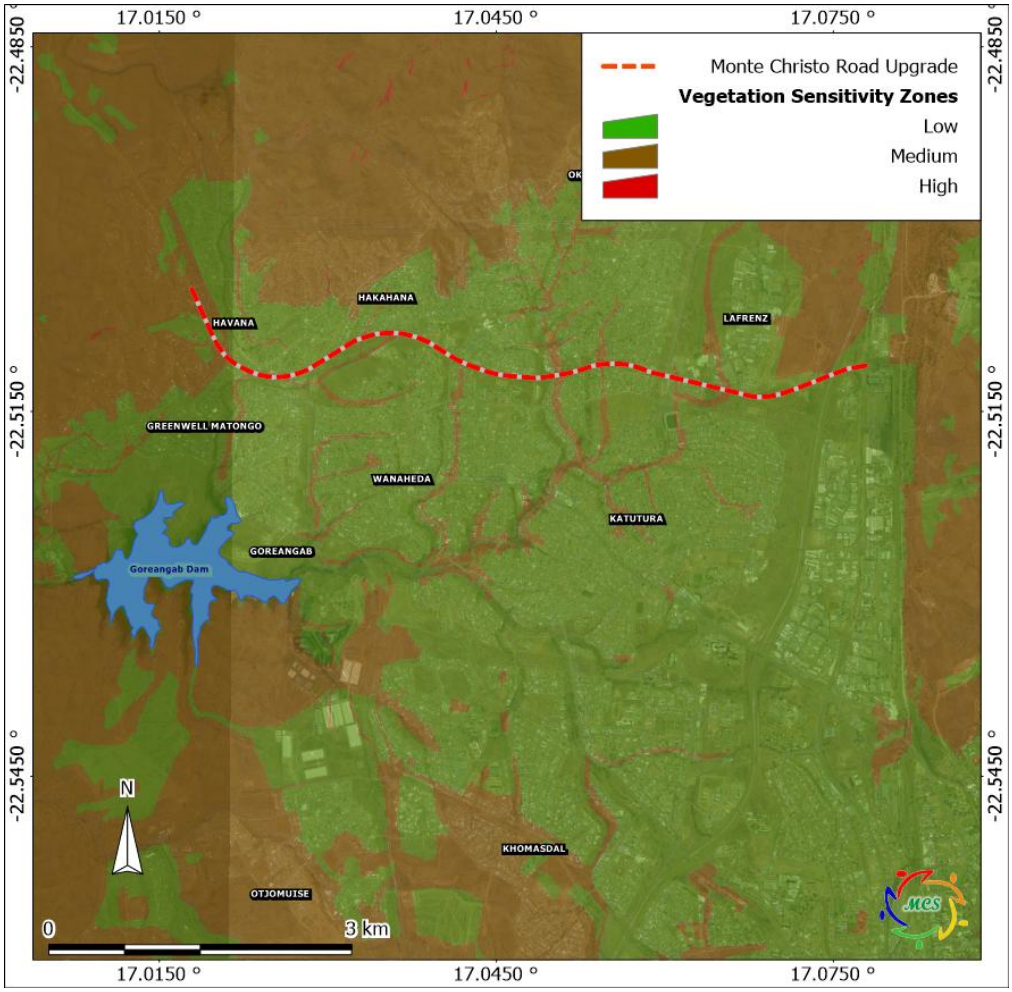


Figure 8: Vegetation Sensitivity Zones (COW)

No red-listed species were encountered during the survey. It is strongly recommended that the remaining trees in the area should rather be factored into the development as far as possible, as they can be used for shade and can contribute positively to the general aesthetics of the proposed development. Invasive species were also encountered at the site, which is a sign of distubance.

The following photos illustrate the vegetation on site.

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Vegetation on site

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 (e.g. Baboons) and 201 to 230 bird species (breeding residents e.g. Guinea fowl) are known to or are expected to occur in the project area of which only a very few proportion are endemics. However, there were very few birds observed at the study area, because of current movements in the highly populated neighbouring informal settlement. The study area falls within low environmental sensitivity zone in term of water. 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

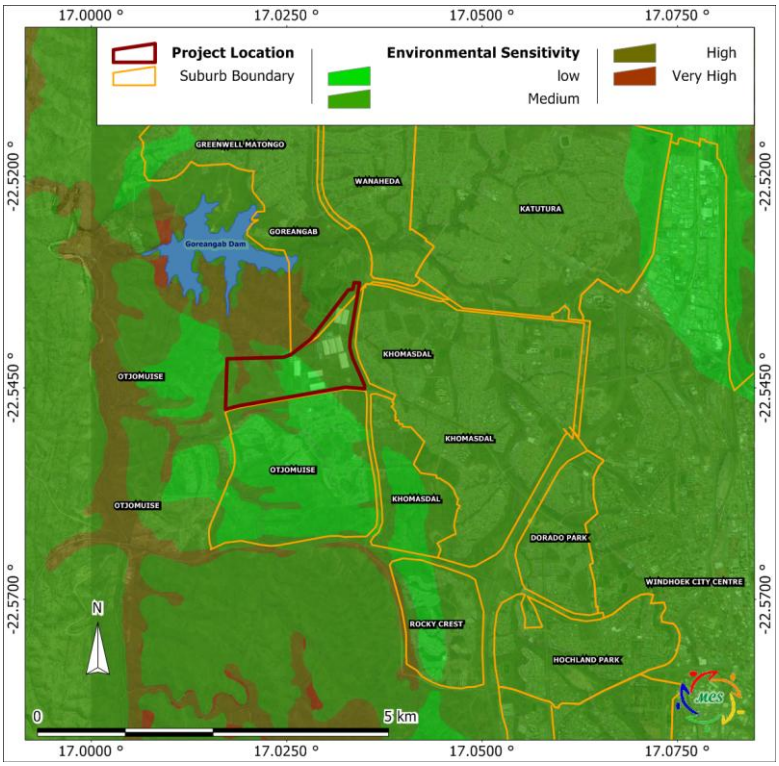

Figure 9: Environmental Sensitivity zone

11. SOCIO-ECONOMIC ASPECTS

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

11.1 Regional Information

The proposed Monte Christo Road Upgrade project will be situated in the Khomas Region of Namibia. The total current population is estimated to be 250,262 (126,648 males and 123,613 females) (NPC, 2001). Ninety-four percent of the population of the Khomas Region over 15 years of age are literate. The estimated unemployment rate in Khomas region is 29%, 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 km2.

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.

11.2 Windhoek

11.2.1 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.

Monte Christo Road Upgrade project is a win-win opportunity for all parties involved, whether they are the potential Ongos Valley residents or the local authority, or the surrounding community. The Ongos Valley project will address the housing scarcity that is currently rife in Windhoek and also cater for the displaced households as a result of the construction of Monte Christo Road.

11.2.2. 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 35 to 40% in Windhoek).

Even before Ongos Valle/City of Windhoek produce profits from the sale of erven or utilities charges, they produce a related benefit for the surrounding communities and the city at large, which is job creation. The

construction activites will involve engineers, construction firms, equipment vendors, and utilities. All of these cost will be spent locally for piping, construction, and operational personnel, contractors, providing additional economic benefits to the community through increased employment and local sales.

Some of the services in the operational phase will be outsourced e.g. maintenance of bulk services, waste removal etc. The outsourcing of these services will strengthen existing business operating in the area and provide employment to people.

11.2.3 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 township project in the area.

11. 2.4 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 is renowned for being one of the cleanest in the world, therefore the Ongos Valley Development Project helps combat the lack of housing available for low-middle-high income groups. The Monte Christo Road Upgrade is an associated project that will improve traffice along Monte Christo Road, which is the main access route to Ongos Valley Development.

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.

11. 2.5 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.

11. 2.6 HIV & Prostitution

Namibia has a high incidence of HIV/AIDS, which has a strong and adverse socio-economic impact on livelihoods of people in the region. The HIV prevalence rate for the age group 15 to 49 is estimated at 21.3% for Namibia (UNDP, 2005).

The spending power 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 3,129 people per doctor could increase.

11. 2.7 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. Infrastructure like roads will be affected due to increased traffic and heavy-duty cargo trucks accessing the site from Monte Christo road and existing road network in the area.

12. STAKEHOLDER PARTICIPATION

Consultation with the public forms an integral component of an EIA investigation and enables I&APs e.g. neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the potential environmental impacts associated with the proposed development and to identify additional issues which they feel should be addressed in the EIA. The primary aims of public participation were:

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

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

The public participation process did not attract enough people to warrant a public meeting. Thus stakeholders interacted using virtual modes of communication.

Most of the comments raised during this process where mostly about access roads to the new development. The participants also suggested new sustainable solutions to be incorporated in the new development, like bicycle lanes, pedestrian walkways, integrated public transport systems.

Table 2. Interviewed Stakeholders/I&APS

NAME	ORGANISATION/ERF	OWNER/POSITION
Mr. V. Tagarira	AIJ Project Costs Consultants	Quantity Surveyor
Mr. M. Shenyangange	City of Windhoek	Environmental Coordinator
Mr. S. Shippiki	MCS	Consultant
Mr. C. Ailonga	MCS	Consultant
Ms. T. Uutoni	NUST	Student
Ms. A. Mbango	Private	Architect

Mr. J. Tjilondelo	Capital Technical Services	Managing Director
Mr. N. Ndjoba	Tesik Engineering	Director
Ms. E. Shatiwa	MCS	Consultant

13. ENVIRONMENTAL IMPACT EVALUATION

The Environmental Impact Assessment sets out potential positive and negative environmental impacts associated with the proposed Monte Christo road upgrade project. The following assessment methodology will be used to examine each impact identified, see Table 3:

Table 3. Impact Evaluation Criterion *(DEAT 2006)*

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

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

13.1 Construction Activities of the Monte Christo Road Upgrade.

13.1.1 Dust Pollution and Air Quality

Dust will be generated during the construction phase of the road upgrade project, and problems thereof are expected to be site specific. Dust is expected to be worse during the winter 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 road construction are also expected to take place. Dust is regarded as a nuisance as it reduces visibility, affects the human health and retards plant growth.

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 road upgrade project is envisaged to have minimal impacts on the surrounding air quality.

Impact Evaluation:

Aspect	**Impact Type**	**Scale**	**Duration**	**Magnitude**	**Probability**	**Significance**

						Unmitigated	Mitigated
Dust & Air Quality	-VE	2	1	2	1	M	L

13.1.2 Noise Impact

An increase of ambient noise levels around the site is expected due to the construction activities. Noise pollution due to heavy-duty equipment and machinery will be generated.

It is not expected that the noise generated during construction will impact any third parties. Ensure all mufflers on vehicles are in full operational order; and any audio equipment should not be played at levels considered intrusive by others. The construction staff should be equipped with ear protection equipment.

Impact Evaluation:

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

13.1.3 Safety and Security

Safety issues could arise from the earthmoving equipment and tools that will be used on site during the construction phase. This increases the possibility of injuries and the contractor must ensure that all staff members are made aware of the potential risks of injuries on site. The presence of equipment lying around on site may also encourage criminal activities (theft).

Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used. The contractor is advised to ensure that the team is equipped with first aid kits and that they are available on site, at all times. Workers should be equipped with adequate personal protective gear and properly trained in first aid and safety awareness.

No open flames, smoking or any potential sources of ignition should be allowed at the project location. Signs such as 'NO SMOKING' must be prominently displayed in parts where inflammable materials are stored on the premises. Proper barricading and/or fencing around the work sites should be erected to avoid entrance of animals and/or unauthorized persons. Safety regulatory signs should be placed at strategic locations to ensure awareness. Adequate lighting within and around the construction locations should be erected, when visibility becomes an issue.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Safety & Security	-VE	1	1	4	2	M	L

13.1.4 Contamination of Groundwater

Groundwater quality could be impacted through oil leakages, lubricants and grease from the equipment and machinery utilised during the road upgrade project. Possibility of contamination from surface sources exist in the proximity of fault zones.

Care must be taken to avoid contamination of soil and groundwater. Use drip trays when doing maintenance on machinery. Maintenance should be done on dedicated areas with linings or concrete floor. The risk can be lowered further through proper training of staff.

All spills must be cleaned up immediately. Excavations should be backfilled and sealed with appropriate material, if it is not to be used further.

Impact Evaluation:

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

13.1.5 Contamination of Surface Water

Contamination of surface water might occur might occur through oil leakages, lubricants and grease from the equipment and machinery during the road upgrade project. Oil spills may form a film on water surfaces in the nearby streams causing physical damage to water-borne organisms.

Machinery should not be serviced at the construction site to avoid spills. All spills should be cleaned up as soon as possible. Hydrocarbon contaminated clothing or equipments should not be washed within 25m of any surface water body.

Impact Evaluation:

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

13.1.6 Generation of Waste

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 contruction 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 waste cell at Kupferberg 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.

Impact Evaluation:

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

13.1.7 Traffic

The road upgrade activities are expected to have a minor impact on the movement of traffic along Monte Christo road and existing road network. Minor diversion of traffic or closure of roads are 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.

Impact Evaluation:

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

13.1.8 Fires and Explosions

There should be sufficient water available for fire fighting purposes. Ensure that all fire-fighting devices are in good working order and they are serviced. All personnel have to 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.

Impact Evaluation:

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

13.1.9 Nuisance Pollution

Aesthetics and inconvenience caused to persons in surrounding areas. The construction activities would be visible from the Monte Christo road section. It would be visible from the nearby properties, thus the supervisor should maintain tidiness on site at all times. Take cognition when parking vehicles and placing equipment.

Impact Evaluation:

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

13.1.10 Erosion and Sedimentation

Vegetation clearance and creation of impermeable surfaces could result in erosion in areas around Monte Christo Road. The clearance of vegetation will further reduce the capacity of the land surface to slow down the flow of surface water, thus decreasing infiltration, and increasing both the quantity and velocity of surface water runoff. The particles in suspension will be transported towards the north and could increase the sedimentation in the Aretaragas river tributary flowing in the northern direction.

The proposed development will increase the amount of impermeable surfaces and therefore decrease the amount of groundwater infiltration. As a result, the

amount of stormwater during rainfall events could increase. If proper stormwater management measures are not implemented this will impact negatively on the water courses close to the site.

Impact Evaluation:

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

13.1.10 Ecological Impacts

The proposed road upgrade will occur in an already disturbed area, with no conservation worthy vegetation and fauna. Land will be cleared, and impacts on fauna and flora are expected to be minimal. Disturbance of areas outside the designated working zone is not allowed.

Impact Evaluation:

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

13.1.11 Heritage Impacts

No heritage artefacts observed during the assessment and should any be found during the construction phase, it must be conserved and reported to the National Heritage Council of Namibia.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Heritage	-VE	1	1	4	1	H	L

Summary of all potential impacts expected during the construction of the bulk services of Havana Relocation Township:

In general, impacts are expected to be low to medium, mostly short lived and site specific. Mitigation options recommended in the Environmental Management Plan (EMP) will guide and ensure that the impacts during the construction activities are minimised.

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

13.2 Operational Activities of the Monte Christo Road

13.2.1 Dust Pollution and Air Quality

Vehicles that will be accessing the site will contribute to the release of hydrocarbon vapours, carbon monoxide and sulphur oxides into the air. Possible release of sewer odour, due to sewer system accidental damage might also occur during maintenance. All road works procedures have to be designed to enable environmental protection .

Impact Evaluation:

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

13.2.2 Noise Impact

Noise pollution already exists around the site in the form of noise generated from vehicles frequenting the existing access road. Noise pollution due to this project in the operational phase is expected to be mainly from generators or pumps, road maintenance machinery during maintenance.

Ensure that 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.

Impact Evaluation:

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

13.2.3 Contamination of Groundwater and Surface Water

Spillages might also occur during maintenance of the road. This could have negative impacts on surface and groundwater especially in cases of large sewer spills.

Potential health impact on groundwater users do exist. Potential impact on the natural environment from possible polluted groundwater also exits. The area is subjected to north-northwest structures, which might act as preferential pathways for any contaminants entering the saturated zone. Proper containment should be used in cases of sewerage system maintenance to avoid any possible leakages.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Groundwater contamination	-VE	2	3	3	3	M	L

13.2.5 Generation of Waste

Waste in the form of solid waste from rubble and bitument will be generated. Waste will be removed and disposed off at Kupferberg Landfill by City of Windhoek Waste Removal Contractors e.g. Rent-a-Drum, Kleen Tek etc.

Impact Evaluation:

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

13.2.6 Failure of Reticulation Pipelines

Potential release of sewage, storm-water, water, into the environment environment due to pipeline/system failure during maintenance. As a result, the spillage could be released into the environment and could potentially be a health hazard to surface and groundwater.

Proper reticulation pipelines and drainage systems should be installed. Regular bulk services infrastructure and system inspection should be conducted.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Failure of Reticulation Pipelines	-VE	1	1	4	2	L	L

13.2.7 Ecological Impacts

No impacts are expected as the proposed road will be in the operational phase. Vegetation in open spaces should not be disturbed or removed during the operational phase. Minimise the area of disturbance by restricting movement to the designated working areas during Maintenance.

Impact Evaluation:

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

13.2.8 Traffic

Traffic along the Monte Christo Section should be monitored, to avoid traffic congestion in the area. Speed limits and road signs as set out by City of Windhoek Traffic Deparment should be adhered to in order to minimise accidents. It is advisable that traffic flow measures be implemented Monte Christo Road on problematic areas to ease traffic flow around the new township.

Impact Evaluation:

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

13.2.9 Safety and Security

A number of health and safety threats exist during operational activities of the Monte Christo Road. Individuals in the community can suffer from noise from maintenance activities around the proposed township. Accidents on roads as a result of increased traffic and deteriorated.

The contractors are advised to ensure that proper personal protective gear and first aid kits are available, at all times. Workers should also be properly trained in first aid and safety awareness.

Impact Evaluation:

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

Summary of all potential impacts expected during the operations of the Monte Christo Road*:*

In general, impacts are expected to be low, short lived and site to local specific. An Environmental Management Plan (EMP) will ensure that the impacts during the operational activities are minimised and includes measures to reduce all impacts identified.

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

14. CUMULATIVE IMPACTS

These are impacts on the environment, which results from the incremental impacts of the Monte Christo Road Upgrade when added to other past, present, and reasonably foreseeable future actions regardless of what person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In relation to an activity, it means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertakings in the area.

Possible cumulative impacts associated with the development of the road upgrade includes, noise emissions, land disturbance, possible Aretegaras River pollution, and traffic impacts involving vehicles frequenting the area. These impacts could become significant. This could collectively impact on the environmental conditions in the area. Cumulative impacts could occur in both the operational and the construction phase.

Impact Evaluation:

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

15. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (**EMP**) provides management options to ensure impacts of the proposed road upgrade are minimised. An EMP is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the Monte Christo Road Upgrade project are prevented, and the positive benefits of the projects are enhanced.

The objectives of the EMP are:

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

The EMP acts as a stand-alone document, which can be used during the various phases of the proposed project. All contractors taking part in the bulk services construction activities should be made aware of the contents of the EMP. An EMP for the construction and operational phases of Monte Christo Road Upgrade project is attached as Appendix A.

16. CONCLUSIONS

All known environmental and social risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that environmental performance be monitored regularly to ensure compliance and that corrective measures be taken if necessary. It is also recommended that this information be made available to the surrounding communities on a regular basis.

In general, the Monte Christo Road Upgrade project would pose limited environmental risks, provided the EMP for the activity is used properly during planning, construction and operational phase. The Environmental Management Plan should be used as an on-site tool during all phases of the Havana Relocation township project. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

Should the Monte Christo Road Upgrade project be modified or extended to a different area, it is recommended that a different EIA be done for the probable new location.

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