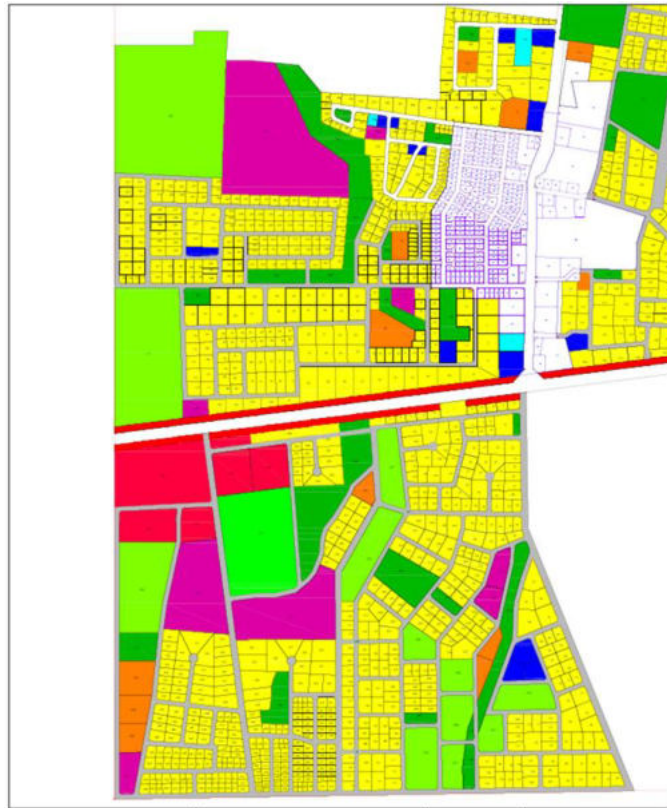


ENVIRONMENTAL IMPACT ASSESSMENT



PROPOSED NDIYONA EXT 1&2 TOWNSHIP ESTABLISHMENT, NDDIYONA SETTLEMENT, KAVANGO-EAST REGION.

MAY 2022

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Appendix B	Background Information Document
Appendix C	Public Meeting Minutes
Appendix D	Kavango-East Regional Consent
Appendix E	Newspaper adverts
Appendix F	Lead Consultant Resume
Appendix G	Township layout Drawings

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

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REPORT STATUS: **FINAL**



1. BACKGROUND AND INTRODUCTION

Ndiyona Settlement is proposing to develop Ndiyona Extension 1&2 in Ndiyona Village, Kavango-East region. The proposed development is aimed at eradicating the informal settlement mushrooming in the Ndiyona Village and accommodating the beneficiaries in formal housing. The proposed development will offer affordable housing in the town to cater for low-income group and those for low-middle income group. Bulk Services and infrastructure that will be installed include provision of sewage, water, electricity, stormwater management and bitumen roads.

Matrix Consulting Services, an independent consultant, has been appointed by Kavango-East Regional Council (Kamau TPDS) to undertake an Environmental Impact Assessment (EIA) on the development/servicing of Ndiyona Extension 1&2 in Ndiyona. The development includes new ervens, several consolidations and subdivisions.

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.

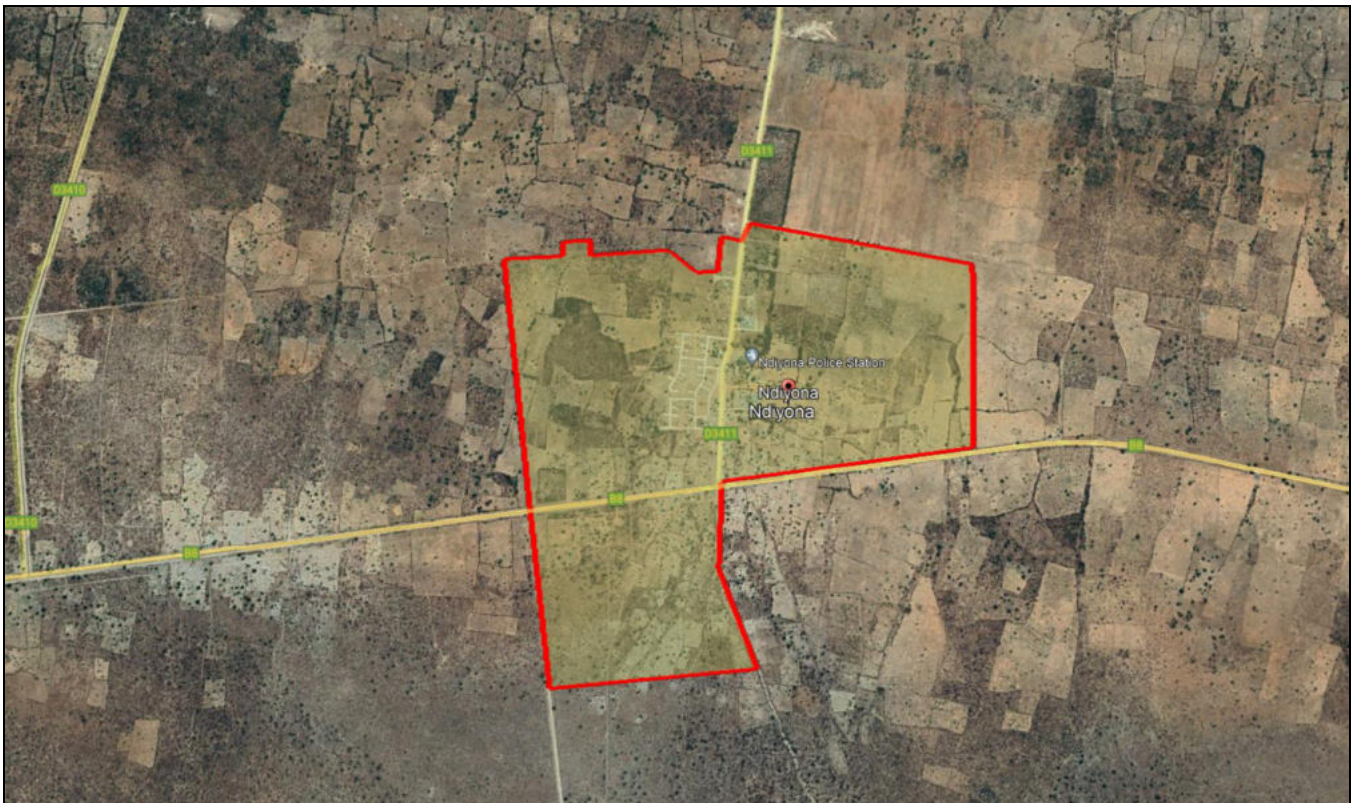


Figure 1. Location Map

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 .

The proposed Ndiyona Extension 1&2 in Ndiyona is partially occupied and Ndiyona Settlement (Kavango-East Regional Council) wishes to apply for the rezoning of Ndiyona Extension 1&2 in Ndiyona from "undetermined" to "residential", "Institutional", "Local Authority" and other zonings to be accommodated in the layout such as "Business" and "Public open spaces", at the same time maintaining sensitive the environmental setting of the area e.g vegetation, groundwater etc. The project will include several consolidation and sub-division of ervens.

This project was registered with the Ministry of Environment and Tourism (MET), as per Environmental Management Act No 7 of 2007 requirements.

2. TERMS OF REFERENCE

Kavango-East Regional Council (Ndiyona Settlement) has commissioned an Environmental Impact Assessment (EIA) for the proposed Ndiyona Extension 1&2 Township in Ndiyona. The proposed project is one of the development mechanism projects that Ndiyona Settlement has engaged to address land scarcity in Ndiyona. The extensions location are indicated on the map (Fig 1).

Matrix Consulting Services was appointed to undertake the Environmental Impact Assessment of the proposed Ndiyona Extension 1&2 Township in Ndiyona. 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).

3. PROJECT INFORMATION

3.1 Project Rationale

Ndiyona Settlement is currently experiencing a scarcity of developable land for residential areas and therefore decided to develop (service) Ndiyona Extension 1&2. The council is swarmed with applications for service land, especially from surrounding inhabitants who could not afford land in bigger towns like Rundu.

The need for the project relate to the strategic plans of Ndiyona Settlement 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 will provide housing for a market that suffers from a lack of housing availability. Other associated land uses of Ndiyona Extension 1&2 are, social services (shops ,churches, schools, community halls, cemeteries) and provision of bulk services. 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 availability and proximity of engineering bulk services, compatibility with adjacent projects, accessibility, size and locality. The proposed development will also create employment, both during the construction and operational phase. The township will be serviced to ensure the provision of all municipal services, such as water, sewerage, roads and electricity. (See appendix G for the township layout drawings).

<u>Extension 1:</u>	
Land Use	No of Erven
Residential	431
Institutional	4
Public Open Space (POS)	1
Streets	26
Total	462

<u>Extension 2:</u>	
Land Use	No of Erven
Residential	141
Business	2
Industrial	2
Municipal	13
Council Land	6
Undetermined	10
Public Open Space	1
Streets	1
Total	178



Other Potential spin-offs from the development of Ndiyona Extension 1&2

:

- ❖ Potential revenue generation from the sale of Ervens by the Ndiyona Settlement.
- ❖ Reduced land scarcity in Ndiyona.
- ❖ 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 37% in the region, this in itself is regarded as a significant benefit to the socio-economic situation in the region (2011, Regional Poverty Profile, Kavango, NSA).
- ❖ Provision of housing and community facilities.
- ❖ Impact on health and safety of Ndiyona Extension 1&2 in Ndiyona residents by providing proper housing, water and sanitation.
- ❖ Change the sense of the place of the area from undeveloped townland to a formal housing development.
- ❖ Increase in economic opportunities in the area.
- ❖ General enhancement of the quality of life in the Kavango-East Region and the surrounding area, should the project be economically viable.



4. Ndiyona Extension 1&2 Township Development Activities.

4.1 Current land-use



Some parts of the proposed development are not developed in any form, besides the track roads and footpaths within them, whereas some areas are occupied although not registered with the surveyor general. About 5% of the sites could be regarded as natural and maybe not have been disturbed, otherwise a large area of the proposed site is previously disturbed, with visible invader plants on some parts of the area and signs previous disturbance.

4.2 Proposed land-use

The proposed Ndiyona Extension 1&2 Township is planned to be within the existing Ndiyona Settlement townlands. The proposed development is aimed at eradicating house scarcity in Ndiyona. The proposed development will offer affordable residential serviced ervens as well as other land-use type erven.

The proposed development will be layed out as follows:

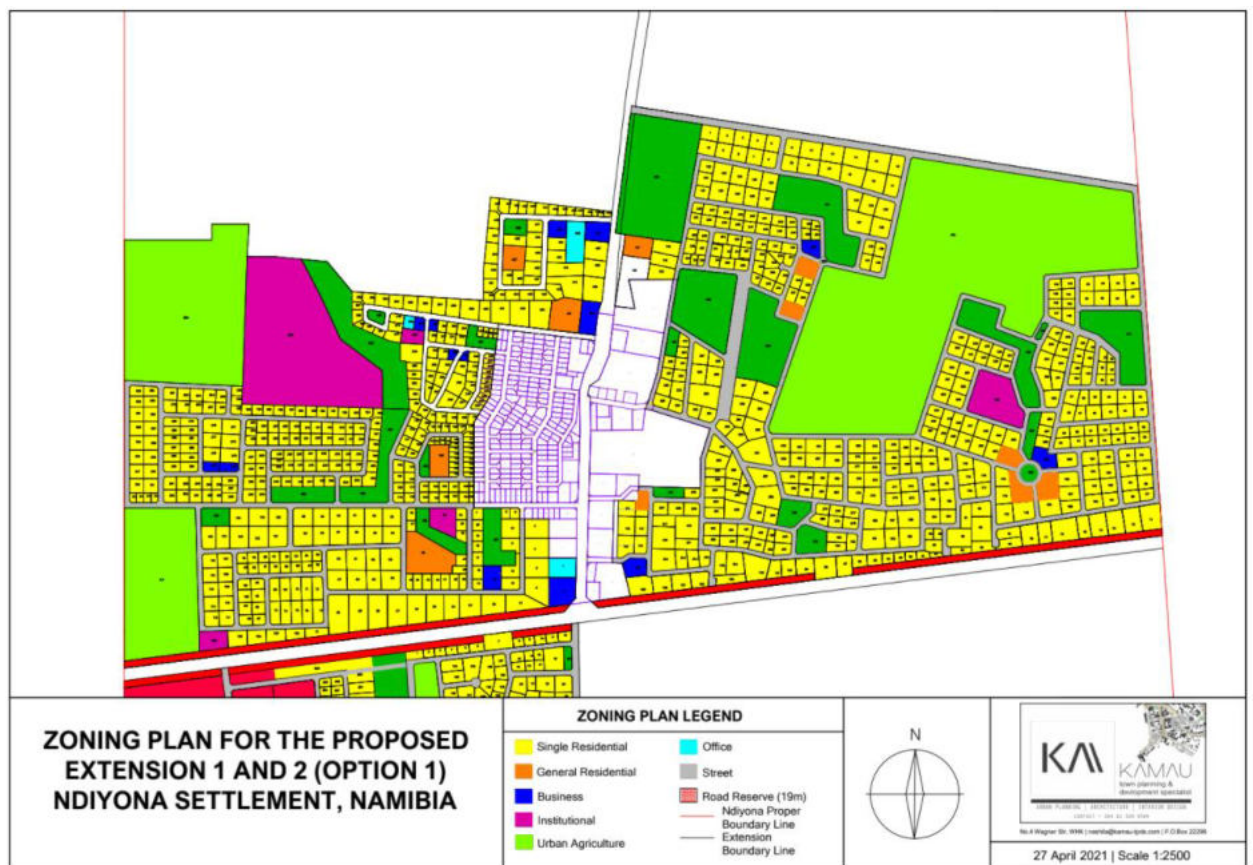


Figure 2: Proposed land-use for Ndiyona Extension 1&2

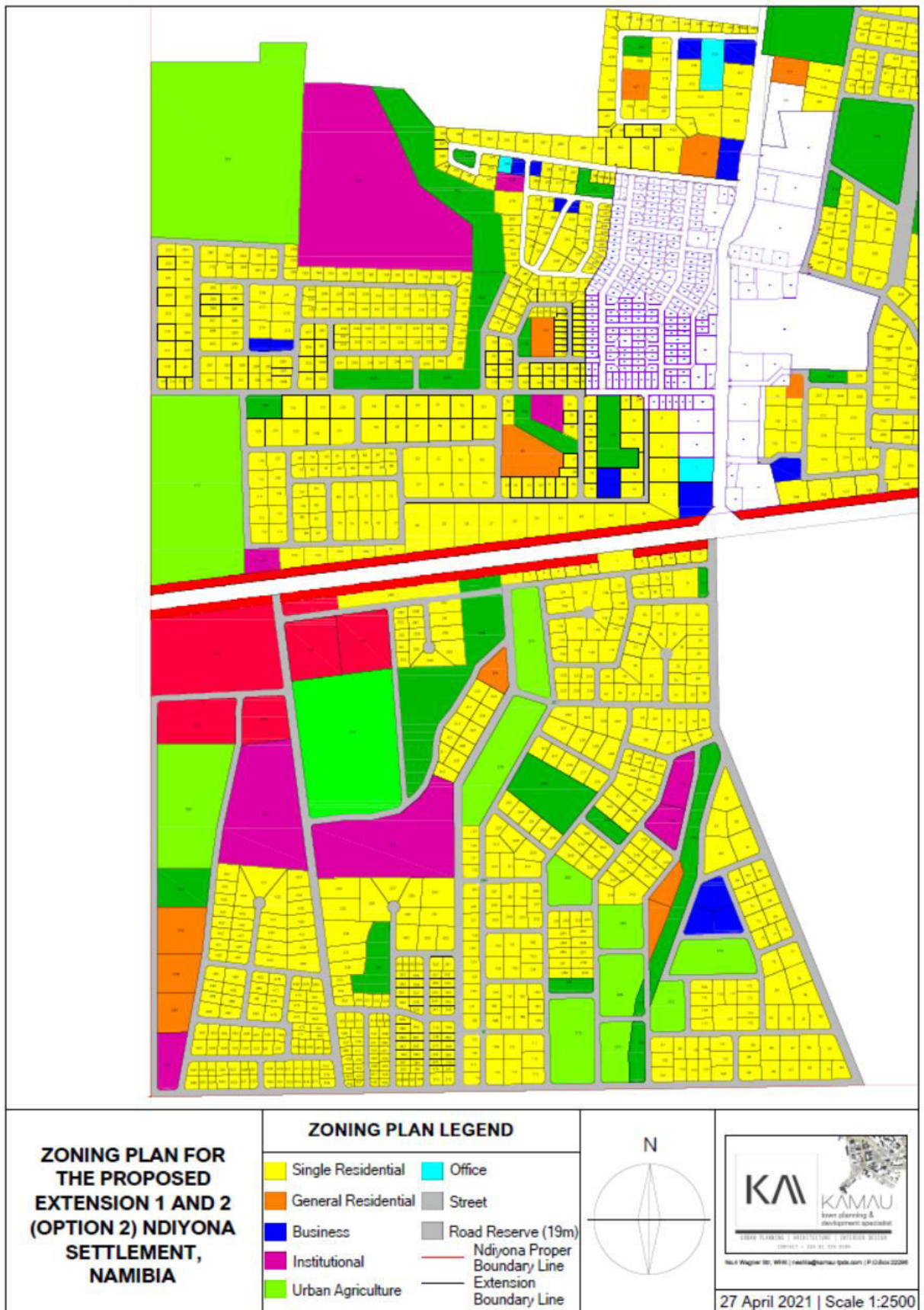


Figure 3: Proposed land-use for Ndiyona Extension 1&2

The establishment of the proposed development requires the installation of supporting bulk services infrastructure. The bulk services required for the construction of the development will include the following:

Sewage: A waterborne sewage system is proposed for most ervens. Excavations for sewer pipelines will have the maximum depth of 2.8m. Sewage generated from the proposed development will be pumped to Ndiyona Oxidation ponds. The bulk sewer network has sufficient capacity to cope with the demand.

Water: Ndiyona Settlement will provide the water for the proposed development from the existing Namwater supply scheme and local boreholes. Water will be provided by connecting to the existing Ndiyona bulk water main system that passes near the site, adjacent to the existing townships. Excavation for water pipelines will be $\pm 1.2\text{m}$, with soil cover of a minimum 600mm.

Electricity: The development will be supplied from the existing Nampower/NORED grid. Power will be connected to the ring network via cables (underground/above-ground) from the Substations. . Excavations for Electrical cables will be $\pm 1.0\text{m}$, with soil cover of a minimum 600mm.

Stormwater Management Sytem: Provision will be been made for stormwater attenuation to reduce the increase in stormwater run-off resulting from the development compared to pre-development phase, through the incorporation of stormwater stormwater management system.

Roads: The existing road network will be utilised to service the proposed development. Street roads and access roads to some extensions will be upgraded to bitumen standards in future.

Waste: Ndiyona Settlement or its waste removal contractors (e.g. Rent a Drum, Kleen Tek, Salute Trading etc) will remove domestic waste.

4.2.1 Construction Activities

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



4.2.2 Operational Activities

- Operation and maintenance of the sewer , water, electrical services and roads.

4.2.2 Housing

No contractors are allowed to camp on site (area to be serviced) during all phases of the project. Contractors should erect their camp at a designated area with permission from Ndiyona Settlement.

4.2.3 Access Road

The site will be accessed using existing roads in Ndiyona.

4.2.4 Waste Management

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

Mobile toilets will be used by the contractors during the construction phase respectively. The sewage from the mobile toilets must be disposed off at Ndiyona oxidation ponds.

4.2.5 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 development of Ndiyona Extension 1&2 from an undeveloped townland to a township, consolidation and sub-suddivision of several ervens in Ndiyona, Kavango-East region. The rezoning of land from open space to any other land use 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.

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

6. DESCRIPTION OF ALTERNATIVES

6.1 No-Go Alternative

The no-development alternative is the option of not going ahead with the development of Ndiyona Extension 1&2 in Ndiyona. The no-go alternative will keep the site in its current state. This alternative is undesirable in terms of the current housing scarcity in Ndiyona. The site is mostly vacant, with visible sign of disturbances. The Ndiyona informal settlement 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.

Should the proposed activity not take place, the region could be deprived of developing a township, and ultimately exacerbating the housing demand in Ndiyona. The proposed activity could yield positive results that could provide an alternative serviced land to Ndiyona's new and potential inhabitants. The No-go option will not be a viable alternative at this stage.

6.2 Site Alternative

The existing Ndiyona Extension 1&2 in Ndiyona is already located on site and belongs to the Ndiyona Settlement. The Regional Council wants to provide serviced land to the people of Ndiyona to address the scarcity of serviced land in Ndiyona . There are engineering services capacity to support the proposed development, 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 Ndiyona Extension 1&2 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



development of Ndiyona Extension 1&2 in Ndiyona will then have minimal impact 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 development of Ndiyona Extension 1&2 in Ndiyona. 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 Ndiyona Extension 1&2 in Ndiyona:

- a) Information about the site and its surroundings was obtained from existing secondary information and site visits.
- b) Neighbours, interested and affected Parties (I&APs) were consulted and their views, comments and opinions are presented in this report.



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



The rezoning of land from open space to any other land use 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

➤ ***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

➤ ***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

➤ ***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

➤ ***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

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 Namibiana Planning Advisory Board and theTownships Board.

Line Ministry: Ministry of Urban and Rural Development

➤ ***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 Urban and Rural Development

➤ ***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.



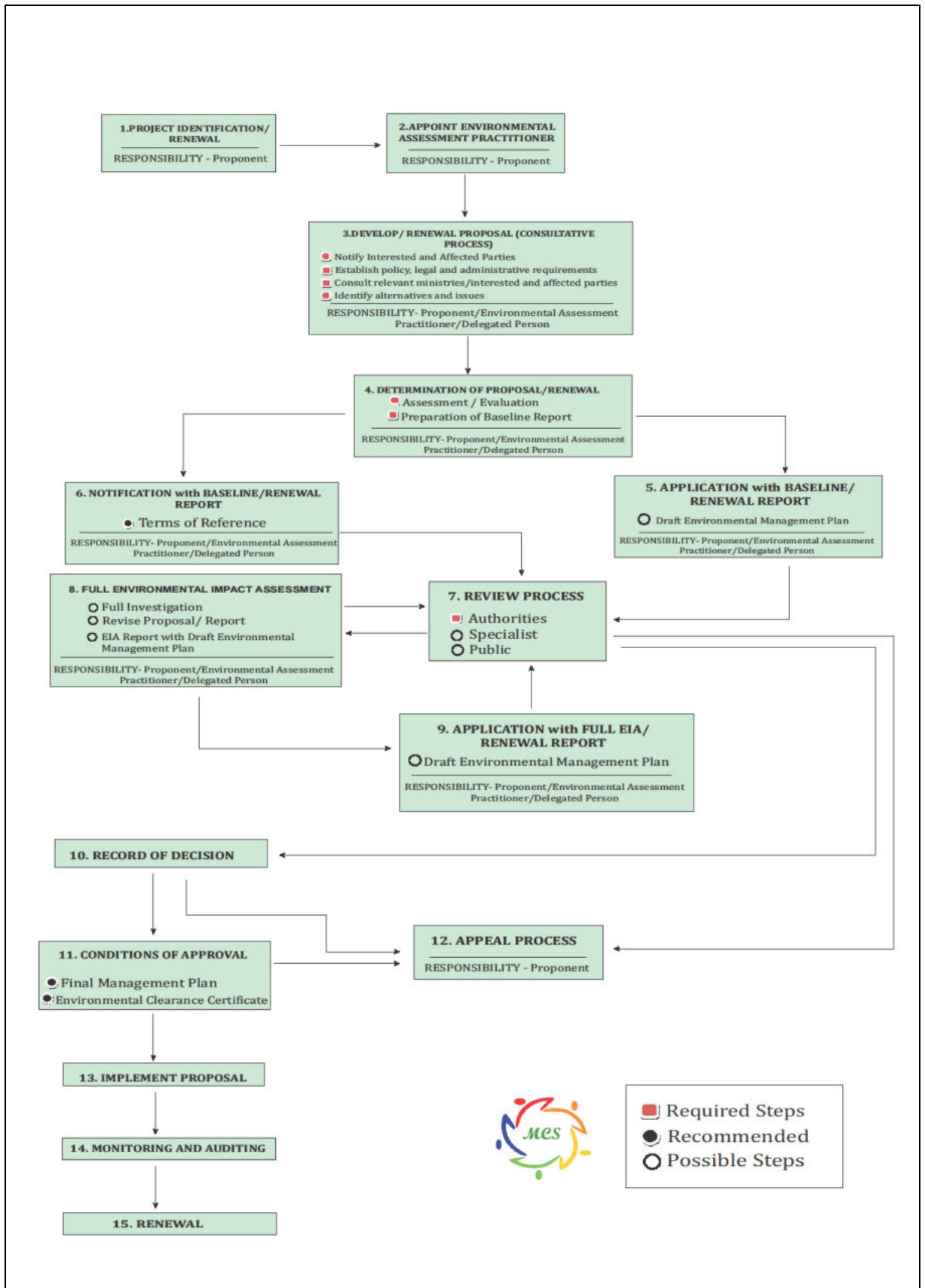


Figure 4. Environmental Assessment Procedure of Namibia (Adapted from the Environmental Assessment Policy of 1995)

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

The proposed project of Ndiyona Extension 1&2 Township Development, 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 Ndiyona Extension 1&2 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 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)

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.



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 project site is located in Ndiyona, Kavango-East Region. See Figure 1.

North- Communal Land, Cuando Cubango River

East- Communal Land

South- Communal Land

West- Communal Land

The site is located within an undeveloped townlands zoned area, as per local municipal regulations, which is surrounded communal land (See Fig 1)

10.2 *Topography and Surface Water*

The site is relatively flat with a gentle slope to the northeast. The landscape is classified as being in the Kalahari Sandveld, an area of paleo dunes and pans. The site is located within the catchment of the Cuando/Cubango River, a perennial river, draining in an easterly direction. The Kavango River is situated approximately 1.5km north of the site.

Proper drainage systems should be developed at the proposed township, in order to control the flow of surface water run-off from the site; thereby preventing any possible surface pollution emanating from operational activities. It is imperative that storm water management systems should form part of the engineering designs.

10.3 *Climate (Mandelsohn et al, 2003)*

Table 1. Climate Data

Classification of climate:	Semi-arid area
Average rainfall:	Rainfall in the area is averaged to be between 550 mm-550 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 2600-2800 mm per year.
Precipitation:	The winters are rainier than the summers in Rundu. The greatest amount of precipitation occurs in February, with an average of 148 mm.
Water Deficit:	Water deficit in the area is averaged to be between 1301-1500 mm per year.



Temperatures:	Temperatures in the area are averaged to be more than 22°C per year. October is the warmest month of the year. The temperature in October averages 25.7°C. The lowest average temperatures in the year occur in July, when it is around 15.9 °C.
Wind direction:	Wind directions in the area are predominantly easterly winds.

10.4 Geology of the Area

The study area is located within the Okavango Basin (a sub-basin to the much large Kalahari basin), north eastern part of Namibia, covering Omaheke, Kavango, west Zambezi and eastern part of Otjozondjupa region. The basin floor predominantly consists of gneissic and granitic basement, overlain by the late Proterozoic Damara rock sequence (Miller, 2008). The Damara sequence is relatively thick, and its overlain by the post carboniferous Karoo sequence (Etjo formation sandstone and Rundu basalt formation) which in turn is overlaid by the Crustaceous to recent (<70Ma) Kalahari Sequence. The Kalahari Sequence forms a blanket of unconsolidated to semi-consolidated sand covering most of the area (Christelis and Struckmeier, 2001).

The site itself consists mainly of sand, calcrete and gravel of Quaternary and Tertiary age, of the Kalahari Group (Tk). The thickness of the Kalahari in the area is not certain. The dominant soil in the area is Ferralic Arenosols. The uppermost consists mostly of unconsolidated windblown sand and sand deposited under fluvial conditions. The middle part is predominantly fluvial sand with minor aeolian deposits. The Kalahari group consists mainly of unconsolidated formations, but some degree of consolidation may be present.

10.5 Hydrogeological Characteristics (Christelis and Struckmeier, 2001)

The Okavango basin comprises of perennial and ephemeral sub-catchments. The Cuando Cubango River, internationally known as the *Okavango*, is one of the three main rivers in Southern Angola. The Cubango and Cuito rivers are in the perennial or active part of the catchment. They originate east of Huambo on the Bie-plateau in southern Angola. Both rivers flow in a south-easterly direction towards the Okavango Delta in Botswana.

The main aquifers are clastic consolidated and unconsolidated formations with high primary, inter-granular porosity in the Karoo System and Kalahari Group formations. Groundwater flow would be mainly through primary porosity and depth to water table is expected to be less than 50m below



ground level in the area. Local drainage patterns may vary due to groundwater abstraction in the area.

According to the Department of Water Affairs database (DWA), There are 2 known boreholes and/or wells that exists within a 3km radius from the site. Water quality is generally good in the area, however shallow perched aquifers with better quality water are present.

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

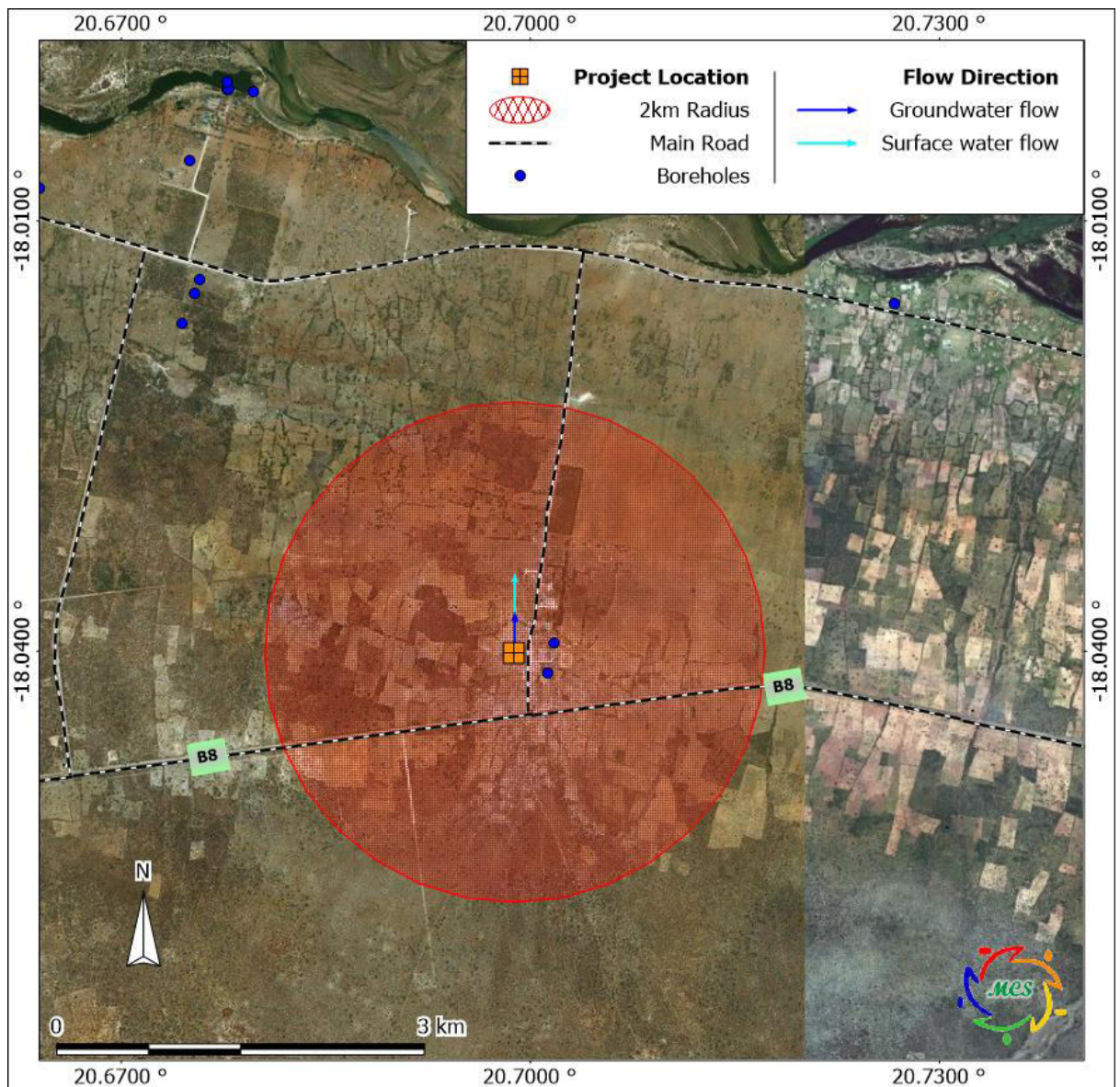


Figure 5: Hydrogeology of the Area

10.5.1 Okavango wetland resource & users

The Okavango River is one of the most pristine river systems in Southern Africa, if not in the world. Although large portions of the catchment in Angola, Namibia, Botswana and Zimbabwe are suitable and are used for stock farming, the effects of land degradation or mining and industrial development have not been a significant threat to the watercourse system.

The Okavango wetland resources support the livelihood of about 140,000 people along the river and about 100,000 in the rest of the catchment in Namibia. At present, Namibia uses about 20 million m³ of water per annum from the Okavango, mainly for domestic use and agricultural purposes. Namibia has an extremely arid hydro climate. The rivers in the interior of the country are therefore ephemeral in nature and the recharge to groundwater sources is limited. This means that Namibia will be looking to its perennial border rivers to augment the scarce water resources in the interior of the country.

Between 1970 and 1974, Namibia experienced growth rates of up to 7% per annum in the central area and an assessment was made of the water demand and supply situation. This led to the development of a proposed national water master plan (Department of Water Affairs, South-West Africa Branch 1974). The plan proposed, among others, the construction of the so-called Eastern National Water Carrier eventually to import water from the perennial Okavango River into the arid interior of central Namibia by 1986. It was decided to develop this project in five phases over time, depending on the actual increase in the estimated water demand, the yield performance of the internal water sources and the availability of capital funds for infrastructure development. To date, only the fifth phase, the proposed Grootfontein-Rundu (*Okavango River*) pipeline, remains to be completed. The Okavango wetland resource should be protected from any possible pollution at all cost.

10.6 General Ecology

The site falls within the Tree and shrub savanna biome, which is characterised by Okavango valley fields and shrublands vegetation type. The dominant vegetation structure is dense shrubland that grow on Eutric Fluvisols soils present in this area.

The site itself has already been disturbed and earmarked for development. The vegetation on site consists mainly of sparsely distributed short grass, few trees and shrubs. A few large trees, present at the site must be conserved. The following photo illustrates the typical vegetation on site.



The consultant recommends that the large tree at the site be incorporated into the project. This will promote a green development and natural physical environment at the site.

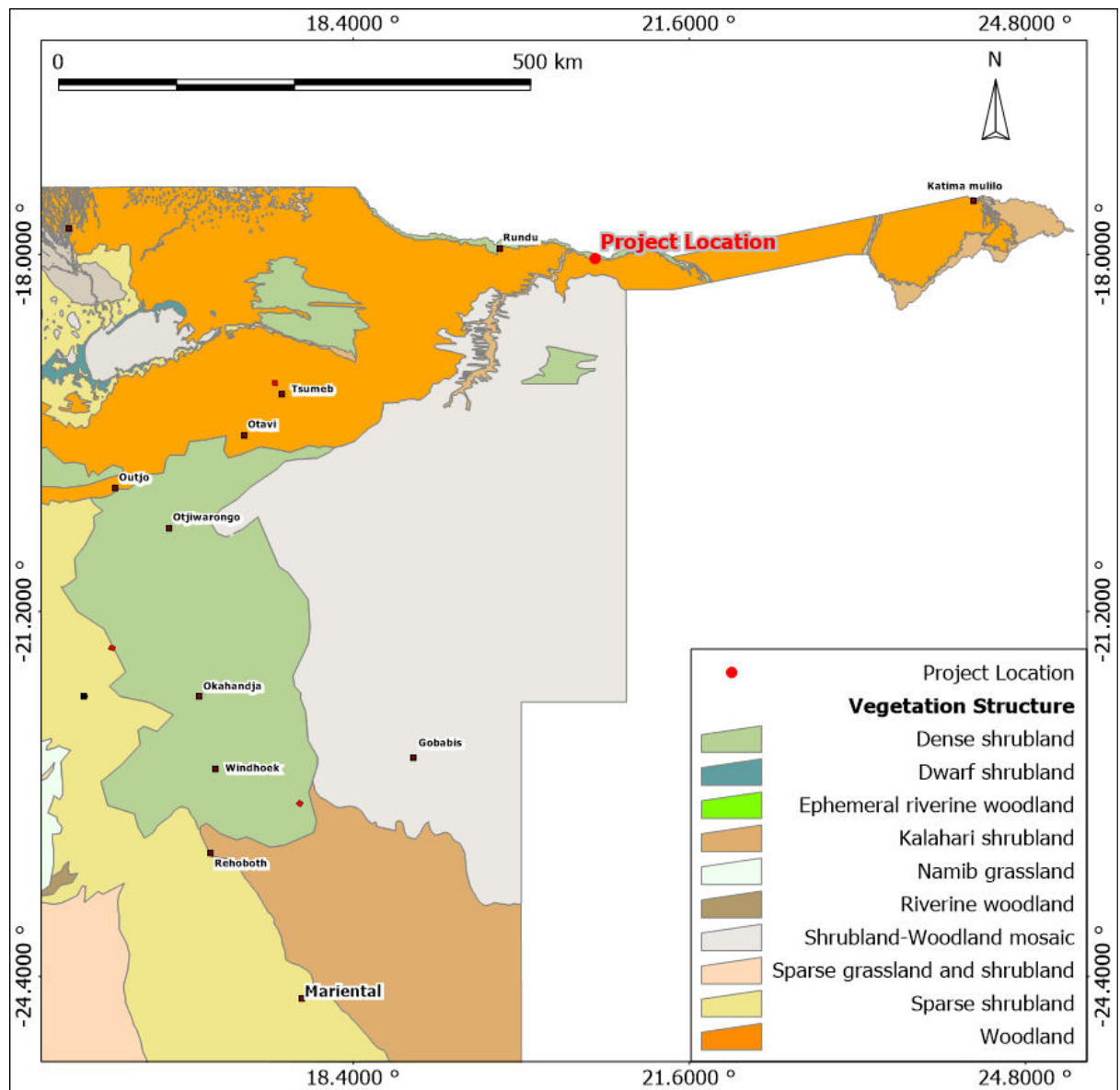


Figure 6. Vegetation map of study area

The Kavango River valley is an important wetland system with some near-endemics, but the formerly occurring *Protea gagedi* is now extinct. The riverine forests have been cleared (over 95 % destroyed) with some isolated islands remaining, e.g. around Popa Falls. The cultivation system in this communal area is destroying vegetation. Deforestation is a problem that is

exacerbated by elephants in the east and southeast. The Green Scheme, which aims at large-scale irrigated crop cultivation involving partnerships between commercial cultivators and local small-scale cultivators, also poses a threat.

The site itself has already been disturbed or cleared in the past and it is earmarked for development. The vegetation on site consists mainly of sparsely distributed short thick grass, acacia thorn bush and short shrubs. The following photo illustrates the typical vegetation on site.

Deducing from the Atlas of Namibia, the proposed site is within an area that is known to have between 100 to 149 plant species (Mandelsohn et al, 2003).

With regards to fauna, an outstanding feature of the area is the high number of large mammal and bird species that are nationally rare (Barnard 1998, Simmons 1998a,b). The area includes rivers, wetlands and dense stands of tall trees in moist woodlands, all of which are rare habitats in the Namibian context. The omurambas and their associated grasslands are habitat for the rare roan (*Hippotragus equinus*), sable (*Hippotragus niger*) and tsessebe (*Damaliscus lunatus*) antelopes. These species are the focus of much conservation effort (Martin 2003a), both because they are nationally threatened and because they are a valuable basis for economic development. The MET aims to increase their numbers in those areas which are ecologically suitable for them (Martin 2003a).

Although the area has a high diversity of more common plains game species (such as impala *Aepyceros melampus* and wildebeest *Connochaetus taurinus*), especially the roan, sable and tsessebe have highly specialised requirements and are thus sensitive to anything that could change their habitat's structure (Martin 2003a, Skinner & Smithers 1990). Impacts on their numbers may therefore interfere both with their continued survival and with the potential to use them as the basis for economic development.

Another feature of the whole region between the Kavango and Kwando Rivers is the occurrence of seasonal movements by several game species. These species, which include elephant, buffalo (*Syncerus caffer*), zebra (*Equus burchelli*), wildebeest and (to a lesser extent) roan, tend to cluster at the rivers during the dry season and move inland during the wet season. This natural seasonal cycle is an important mechanism that maintains vegetation structure, as most vegetation experiences a resting period during some part of the year (Wassenaar & Grossman, In prep). This is a key process, and indeed perhaps the most critical ecological feature, that can be impacted through mining activities.

Apart from their biodiversity value, these species, and more generally the combination of these habitats and relatively high species richness in all taxa, form the backbone of a vibrant and growing tourism economy. The biodiversity of the region is thus considered to be of national importance, and forms the basis for regional economic development plans being developed by



the Namibian Government (Anonymous 1999, Anonymous 2003). Specific aspects of the area that are important for tourism development include proximity to the tourism hub of the Okavango in Botswana and to the popular Mahango National Park, and the intactness of many of the riparian woodlands and thickets, especially on the Buffalo Core Area side of the river.

These riparian areas and the river itself are valued for lodge developments, and are often the habitat for highly prized (by birdwatchers) bird species such as Souza's shrike (*Lanius souzae*), Rock Pratincole (*Glareola nuchalis*) and White-backed Night-heron (*Gorsachius leuconotus*). Indeed, the nearby Mahango Game Reserve is listed as an internationally Important Bird Area (supporting globally threatened species) (Simmons 1998b) and is an avian diversity hotspot (Simmons 1998a).



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 hotel will be situated in the Rundu Urban constituency of the Kavango Region, in Namibia. The total current population is estimated to be 223,352 with 118,591 females and 104,761 males (NSA, 2011). Seventy-nine point four percent (79.4%) of the population living in the Kavango Region over 15 years of age are literate (NSA, 2011). The estimated unemployment rate in Kavango region is 37% (NSA, 2011). The population density in the Kavango Region is 4.6 persons per km².

11.2 Ndiyona

Ndiyona is a constituency in the Kavango East region of Namibia. The district centre is the settlement of Ndiyona. It had a population of 20,633 in 2011, up from 19,565 in 2001.

11.2.1 Economic activities

Economic activities are mainly due to the fact that Rundu is a drive through town or gateway for people travelling to the Zambezi Region; and neighbouring counties such as Angola, Botswana, Zambia and Zimbabwe. The town holds large potential in terms of economic development and business growth for the region and the country at large.

Subsistence farming is commonly practised in the region, with minimal trading of surplus produce taking place.

11.2.2 Employment (Job Opportunities)

Unemployment still hampers most of the developing world and Kavango region is no exception. The skilled agricultural/fishery workers made up the largest occupation group with 59.3% in Kavango region. In, Kavango region 63% of the economically active are employed, while the remaining 37% are unemployed (NSA, 2011).

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. The construction phase of the project will provide job opportunities, of which approximately 80% are expected to be unskilled and semi-skilled people.

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.

11.2.3 Livelihoods

Households in the Kavango Region rely solely on subsistence agriculture, harvesting of natural resources, small scale enterprises such as retail trading and charity from neighbours are generally worse off than other households and are considered "poor".

Households that rely only on charity from the community, own no livestock and harvesting of resources are considered "very poor". Whereas households who own livestock, farms, brick houses and who can afford to eat sufficient food and send their children to school are classified as being "better-off". People living in the rural areas of Kavango region are more affected by poverty than the ones living in the urban areas of the town. The livelihoods of the local community are likely to be positively impacted therefore predicted to be better than before the development of the facility in the area.

11.2.4 Procurement

Local businesses are to benefit from the envisaged construction and operational activities. Ndiyona Settlement and/or its sub-contractors might need to procure services from these businesses e.g. domestic waste removal, transport, security services etc.

11.2.5 Tourism

The area attracts a lot of tourists from all over the world. Game drives to the nearby national park, Mangetti National park and the Khaudum Game Reserves are well known for the diversity of wildlife in typical Savanna landscape. Tourists frequent the Lodges and rest camps which offer a wide range of accommodation facilities.

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

11.2.6 In - Migration

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



11.2.7 HIV & Prostitution

Namibia is one of the ten worst affected countries in terms of the HIV/AIDS epidemic. The HIV prevalence rate for the age group 15 to 49 is estimated at 21.3% for Namibia (UNDP, 2005). The HIV/AIDS prevalence rate among adult pregnant women in the Kavango region is 21%.

The spending powers of locals working for contractors 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 Kavango Region.
- ✓ Diversion of income expenditure to medical care.
- ✓ Increase in orphans and households headed by children.
- ✓ Increase in pregnancy related mortality.
- ✓ The current rate of 11,418 people per doctor could increase.

11.2.8 Infrastructure & Increased Traffic

Rundu is one of the developing towns in Kavango region. The B8 road running through Rundu is used by locals and tourists travelling through to other nearby towns and bordering countries. Over the years, Rundu has had many developments in terms of accommodation facilities, located mostly along the Kavango River. Cellular connectivity and radio broadcasts now reach far rural areas of the whole region.

In Kavango Region, 66.2% of households have access to safe water. Over 74% have no access to toilet facility. Also 84% of all households have access to radio, 84% have access to wood/charcoal for cooking and only 11.4% to electricity. Rundu hospital is the most visited health care facility in the town.

11.2.9 Regional Education Status

Based on the Population and Housing Census of 2011, about 60.3% of school going population aged 5 to 24 years in Kavango Region have enrolled for formal education. The percentage literacy for persons older than 15 years is 79.4% which is outstanding in comparison with the 81% of Namibia. The Kavango Region is known to yield exceptional results when it comes to academic ratings in the country, most schools offer quality education to the young ones as from primary to high schools.



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.

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

- ✓ NewEra Newspaper, 02nd and 09th June 2022
- ✓ Namibia Sun Newspaper, 02nd and 09th June 2022

In the adverts an e-mail address was provided to the general public to register as interested and affected parties; and to request a background information document for the project. Posters were placed at strategic locations to invite interested and affected parties to the meeting, e.g at Settlement offices, Traditional Authority Hall, Ndiyona Police Station.

A public meeting was held at the Ndiyona Traditional Authority Hall, on the 15th of June 2021. An environmental assessment and process presentation were presented at the meeting. The picture below illustrates the open day setup (see appendix C for the minutes).





Some Invited stakeholders did not make it to the meeting in spite receiving invitations and mass media advertising. The public participation meeting attracted a number of people, (see appendix D for the attendance list), besides the client and consultant. The open day session went on from 14:00 to 16:00, and no objections to project were recorded. The general concerns were not environmental related at all, most of them were about socio-economic issues, especially scarcity of land in Ndiyona, preferential options to buy erven, procedure on how the land will be sold, and making sure the Ndiyona Town Council first take care of first-time buyers when selling the erven. Other concerns were :

- **More industrial areas. (Including Heavy Industrial).** They suggested removing urban agriculture areas and turning them into industrial erven (See point two)
- Remove Urban Agriculture in Extension 1 and 2. **(To avoid dispute over farming land)** Committee suggested they'd allocate urban farming land to individuals in areas outside of town.
- Change erf 169 – 171 (Extension 3) into Institutional as well
- Change erf 10 (extension 1) into Institutional (Already sold – plans to construct a community library has begun)
- **Position of the cemetery.** Also the committee where asking if the residential properties around the cemetery could be removed as they seem to be way to close.
- They also want a Sport field (*Suggested they could use one of the Public open space or institutional areas*)

The participants who attended applauded Ndiyona Settlement for taking this initiative. A background information document was available to all interested and affected parties 14 days before and after the meeting (see appendix B for the BID).

Kavango East Regional Council was also consulted and Mr. Ludwig Thikusho, CRO of the regional council, indicated no obvious environmental concerns regarding the proposed project, and advised to look carefully on the environmental sensitivity of the area.

Table 2. Interviewed Stakeholders/I&APS

NAME	ORGANISATION/ERF	OWNER/POSITION
Mr. Leonhard Hamutenya	KTPDS	Town Planning Consultant
Mr. David H. Muronga	Resident	Interested/ Affected Parties
Mr. Augustinus M. Muyambo	Resident	Interested/ Affected Parties
Mr. Stanislaus Kupembona	Resident	Interested/ Affected Parties
Mr. Kristantus M. Kaveto	Resident	Interested/ Affected Parties
Ms. Lipayi A. Nando	Resident	Interested/ Affected Parties
Mr. Kupembona Andreas	Resident	Interested/ Affected Parties
Mr. Kamanou S. Shitango	Resident	Interested/ Affected Parties
Ms. Ludwina Shipapo	Resident	Interested/ Affected Parties
Mr. Leonhard Hamutenya	Resident	Interested/ Affected Parties
Mr. David H. Muronga	Resident	Interested/ Affected Parties
Mr. Augustinus M. Muyambo	Resident	Interested/ Affected Parties
Mr. Stanislaus Kupembona	Resident	Interested/ Affected Parties
Mr. Kristantus M. Kaveto	Resident	Interested/ Affected Parties



13. ENVIRONMENTAL IMPACT EVALUATION

The Environmental Impact Assessment sets out potential positive and negative environmental impacts associated with the proposed Ndiyona Extension 1&2 Township Development. 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

13.1.1 Construction Activities of the proposed Ndiyona Extension Extension 1&2 Township.

13.1.1 Dust Pollution and Air Quality

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 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.

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 servicing of these extensions 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 at proposed 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 bulk servicing of these extensions. 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 through oil leakages, lubricants and grease from the equipment and machinery during the installation and maintenance of bulk services at the proposed site. 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 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 waste 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 servicing activities are expected to have a minor impact on the movement of traffic along B8 an D3411 road. 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.

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 using B8, D3411 roads and surrounding areas. The construction activities would be visible from B8 road, 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 across the proposed area. 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 river 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 township are in an already disturbed area, which is free of any conservation worthy vegetation and fauna. This area was previously disturbed with visible evidence of invader plants. Land will be cleared, leaving the big trees to maintain the vegetation within Ndiyona Settlement. However, 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

Summary of all potential impacts expected during the construction of the bulk services of proposed Ndiyona Extension 1&2 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.



13.1.2 Operational Activities of proposed Ndiyona Extension 1&2 Township

13.2.1 Dust Pollution and Air Quality

Vehicles that will be accessing proposed of Ndiyona Ext 1 & 2 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 failure or maintenance might also occur. All maintenance of bulk services of Ndiyona Township 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 B8 road, D3411 road and surrounding areas. 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

Spillages might also occur during maintenance of the sewer system. This could have impacts on 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 exists. 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	2	2	2	L	L



13.2.5 Generation of Waste

Waste in the form of solid waste from households, businesses and institutions will be generated. Waste will be removed and disposed off at Ndiyona waste disposal site by Ndiyona Settlement or its Waste Removal Contractors e.g. Rent-a-Drum, Kleen Tek etc.

Ndiyona Settlement will have waste skips around proposed of Ndiyona Ext 1 & 2.

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. 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 proposed of Ndiyona ext 1 & 2 project 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 around the proposed of Ndiyona Township should be monitored, to avoid traffic congestion in the area. Speed limits and road signs as set out by Ndiyona Settlement should be adhered to in order to minimise accidents.

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 proposed of Ndiyona Township . Individuals in the community can suffer from noise from maintenance activities around proposed of Ndiyona Township. Accidents on roads as a result of increased traffic and deteriorated.

The contractors is 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 proposed of Ndiyona Township :

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 proposed of Ndiyona Ext 1&2 Township project 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 proposed Ndiyona ext 1&2 Township includes, noise emissions, land disturbance, traffic and possible accidents involving vehicles frequenting the area. 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	L	L

15. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (**EMP**) provides management options to ensure impacts of the proposed servicing of proposed of Ndiyona Zone14 Township are minimised. An EMP is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the township projects are prevented, and the positive benefits of the projects are enhanced.

The objectives of the EMP are:

- ✓ to include all components of the of Ndiyona Ext 1&2 Township project;
- ✓ to prescribe the best practicable control methods to lessen the environmental impacts associated with the of Ndiyona Township 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 township 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 servicing of of Ndiyona Ext 1&2 Township projects 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 these Township projects. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

Should the of Ndiyona Ext 1&2 Township projects 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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May 2022



17. REFERENCES

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