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ENVIRONMENTAL ASSESSMENT SCOPING REPORT

Detailed Design, Bidding Documentation and Site Supervision for the Construction of Access Road to Gcaruhwa Clinic and School (21.7km)

Scoping report

MEFT APP-6473

Republic of Namibia
Ministry of Works and Transport

Proponent: Ministry of Works and Transport

6719, Bell Street, Snyman Circle, Ausspanplatz

Private Bag 13341

Windhoek, Namibia

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ENVIRONMENTAL ASSESMENT FOR THE DETAILED DESIGN, BIDDING DOCUMENTATION AND SITE SUPERVISION FOR THE CONSTRUCTION OF ACCESS ROAD TO GCARUHWA CLINIC AND SCHOOL (21.7km)

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Client	**Ministry of Works and Transport- Namibia** **Postal address:** Private Bag 13341, Windhoek, Namibia **Enquiries:** Lewis Andreas **Tel:** +264 61 208 8700 **E-Mail:** Lewis.Andreas@mwt.gov.na Signed……
Lead Consultant	**EnviroPlan Consulting Cc** **Postal address:** P O Box 81042, Olympia **Contact person:** Talent Nyungu **Cell:** +264814087482s **E-Mail:** info@enviroplanconsult.com Signed
Date of release	September 2025
Authors:	Talent Nyungu
Reviewer	Tendai E Kasinganeti
Specialist: Biodiversity study	Shiwayu Kristian NN

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Definitions

Table 1: Acronyms

TERMS	DEFINITION
BID	Background Information Document
CA	Competent Authorities
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EIASR	Environmental Impact Assessment Scoping report
ECO	Environmental Control Officer
EMA	Environmental Management Act of 2007
EMP	Environmental Management Plan
ESMP	Environmental and Social Management Plan
GHG	Greenhouse Gasses
HEC	Helios Engineering Consultants
ISO	International Organization for Standardization
I&APs	Interested and Affected Parties
MEFT: DEA	Ministry of Environment, Forestry and Tourism's Directorate of Environmental Affairs
NEMA	Namibia Environmental Management Act
RE	Resident Engineer
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change

DEFINITION OF TERMS

The 'Consultant' – this refers to the team that is conducting the Environmental and Social Impact Assessment and the preparation of the EMP for the development. The Consultant for the Project / ESIA Study is EnviroPlan Consulting.

The 'Proponent – this refers to the institutions/departments that are directly involved in the implementation of the project, i.e., Ministry of Works and transport.

The 'Stakeholders' – this refers to the people, organisations, NGOs that are directly or indirectly affected and interested to the proposed project.

The 'Environment' – this refers to the ecology, economy, society and politics.

Project – means any activity which has or is likely to have an impact on the environment.

Sustainable utilization – means the use or exploitation of the environment which guards against extinction, depletion or degradation of any natural resource and permits the replenishment of natural resources by natural means or otherwise.

Waste – includes domestic, commercial or industrial material, whether in liquid, gaseous or solid form, which is discharged, emitted or deposited into the environment in such volume, composition or manner as to cause pollution.

i. Purpose of This Environmental Impact Assessment Report

This Environmental Scoping Report (ESR) follows on the scope of work outlined by Ministry of Works and Transport to come up with a detailed Design, Bidding Documentation and Site Supervision for the Construction of Access Road to Gcaruhwa Clinic and off the B10 highway. It is under Musese constituency\s area of jurisdiction and approximately 21.7 km in length including intersections. Existing information and input from commenting authorities, Interested and Affected Parties (I&APs) was used to identify and evaluate potential environmental impacts (both social and biophysical) associated with the proposed project.

Environmental defects associated with the proposed activities were identified through this ESR. A conscious decision was made based on the recommendations and guidelines by the Directorate of Environmental Affairs EIA guidelines in order to assess both significant and less significant environmental impacts proposed by the development. The developed Environmental and Social Management Plan (ESMP) for this proposed activity will have to be effectively implemented by the client, to ensure that adverse environmental impacts are not considered.

The detailed assessment of the anticipated impacts was undertaken with the purpose of highlighting any areas of concern regarding to the proposed project during its construction, and operation.

This report will also be used to motivate and define the previously identified, project alternatives (i.e., site, technology and layout) based on the findings of the environmental baseline study and the suitability of the site to the type of development. This Environmental Assessment scoping report (EASR) has been compiled in accordance with the regulatory requirements stipulated in the EIA Regulations (2012), promulgated in terms of the Namibian environmental legislation (Environmental Management Act (No. 7 of 2007)

The Environmental Assessment (EA) was commissioned because the proposed establishment triggered the application for an environmental clearance certificate as the following listed activity, please refer to table 2 below:

Table 2: Listed activities

3: Mining and Quarrying Activities	10: Infrastructure
3.3 Resource extraction, manipulation, conservation and related activities	10.1 The construction of- (b) public roads

ii. Resource extraction, manipulation, conservation and related activities.

1. The construction phase will encompass -

- The extraction of gravel and related materials;
- Sealing the road surfaces with Armaseal lockcote (Please refer to Appendix (v) for product specifications) and application requirements from Roads Authority.

Anticipated,

Environmental Impacts

- Medium to Low potential environmental impacts are likely to occur at the borrow pits/ gravel extraction points.
- Medium to low potential impact to a Wildlife exclusive zone within the Maurus Nekaro Conservancy. The road is likely will pass through a pocket where migrating or transboundary movement of elephants are seasonally experienced. These zones are often established to protect critically endangered species like elephants, and to promote the movement of wildlife between conservancies and state-protected areas. *(Please refer to the biodiversity report, Appendix (ii))*
- Medium to Low Impact on flora species due to land clearence and road alignment.
- Reversible Occupational Saftey and Heath impacts
- Adding on a management plan has been developed to mitigate all anticipated or possible impacts of the project to the environment.

Social Impact

- Relative or moderate social impact (negative and positive).

The project is generally expected to improve the socio-economic environment of Gcaruhwa as well as the entire Musese constituency through a major boost in business, integrations, employment and improved transport system on the long term. Interested and Affected Parties were notified of the project through word of mouth, site notices and newspaper

notices and all relevant information on consultation is covered in this document and Appendix (ii) of this report. Some of the negative social impacts were testified by a local resident and was broadcasted live on NBC and can be retrieved by the following link: https://www.facebook.com/share/v/1BFv2aPHoo/

Recommendations

Most of the impacts identified during this Environmental and Social scoping Assessment are addressed through the Environmental and Social Impact Assessment Plan (ESMP) that addresses the mitigation and management actions for the upgrading of a sandy track to a standard low volume bitumen seal road. Should the recommendations as stated in this report, Impact Management Plan (IMP) (Appendix (i) and the bio diversity report (appendix (ii) be implemented the severity of the impacts can be reduced to sustainable levels. The Environmental consultant recommends that the project can proceed provided that general mitigation measures as set out in the Impact Management Plan (IMP) are implemented. The Environmental consultant incorporated a bio-diversity study in the project area. Identified biodiversity concerns were addressed in the biodiversity assessment report attached on this report as Appendix (ii).

Proposed route diversion by registered Interested and Affected Parties to the proposed activities was also assessed as an alternative route. Impacts were analysed in both the ESMP and the biodiversity report. The Environmental consultant recommends that the DEA (reviewing authority) make reference to the scoping report, ESMP and the biodiversity report prepared for the proposed project.

NB: The EAP does not accept any responsibility in the event that additional information comes to light at a later stage of the process. The scope of this investigation assessed the bio-physical and social status of the proposed project site environs. A biodiversity study was undertaken to assess and provide recommendations for biodiversity conservation and management within the study area (Refer to Appendix (ii) of this Environmental Scoping report).

1.1. CHAPTER ONE: BACKGROUND

Overview

Ministry of Works and Transport (MWT) has appointed **Helios Engineering Consultants (HEC)** to design and supervise on the proposed construction and operation of a low volume bitumen seal access road project (21.7km). Helios subsequently appointed **EnviroPlan Consulting CC**. EnviroPlan hereafter, on behalf of project proponent, is the independent environmental consultant conducting the Environmental Assessment (EA) for the proposed activity.

In terms of the Namibian environmental legislation (Environmental Management Act (No. 7 of 2007) and the Environmental Assessment Regulations of 2012; an EIA is required to obtain an Environmental Clearance Certificate from the Ministry of Environment and Tourism (MET) before the proposed project can proceed. PART VII of the Environmental Management Act section 27 subsections (2) has listed activities that cannot be undertaken without a clearance certificate.

Furthermore, EnviroPlan Consulting cc will conduct an Environmental Assessment (EA) and develop an Environmental and Social Management Plan (ESMP) for the development. This will be followed by an application for Environmental Clearance Certificate (ECC) to the Ministry of Environment and Tourism (MET): Directorate of Environmental Affairs (DEA).

In this respect, this report forms part of the application to be made to the DEA's office for an Environmental Clearance certificate for the proposed construction of a 21.7km access road, in accordance with the guidelines and statutes of the Environmental Management Act No.7 of 2007 and the environmental impacts regulations (GN 30 in GG 4878 of 6 February 2012).

1.2. The Environmental Consultant

EnviroPlan Consulting cc was appointed as the independent environmental consultant conducting the Environmental Impact Assessment (EIA) and apply for an Environmental clearance certificate from the Ministry of Environment Forestry and Tourism. This ESIA Study and Environmental and Social Management Plan (ESMP) developed was a result of hard work

and determined effort towards a sustainable project implementation by a dynamic team from EnviroPlan Consulting in collaboration with Helios Engineering Consultants.

1.3. Project Location

The proposed project will occur in Musese constituency, Kavango West region. It is within Maurus Nekaro Conservancy. All burrow pits identified will be re-habilitated are within the Musese constituency. Economic activity in this area is centred on Mahangu cultivation, communal livestock farming and sustainable wildlife management (trophy hunting, crocodiles, hippopotamus and elephants). Gcaruhwa (end point of the road) is located approximately 75 km from Nkurenkuru and the proposed road is approximately 21.7 km from the B10 Rundu-Nkurenkuru highway.

Please refer to the map overleaf (Fig 1) portraying a locality layout of the proposed project site in red and can be identified as Access Road.

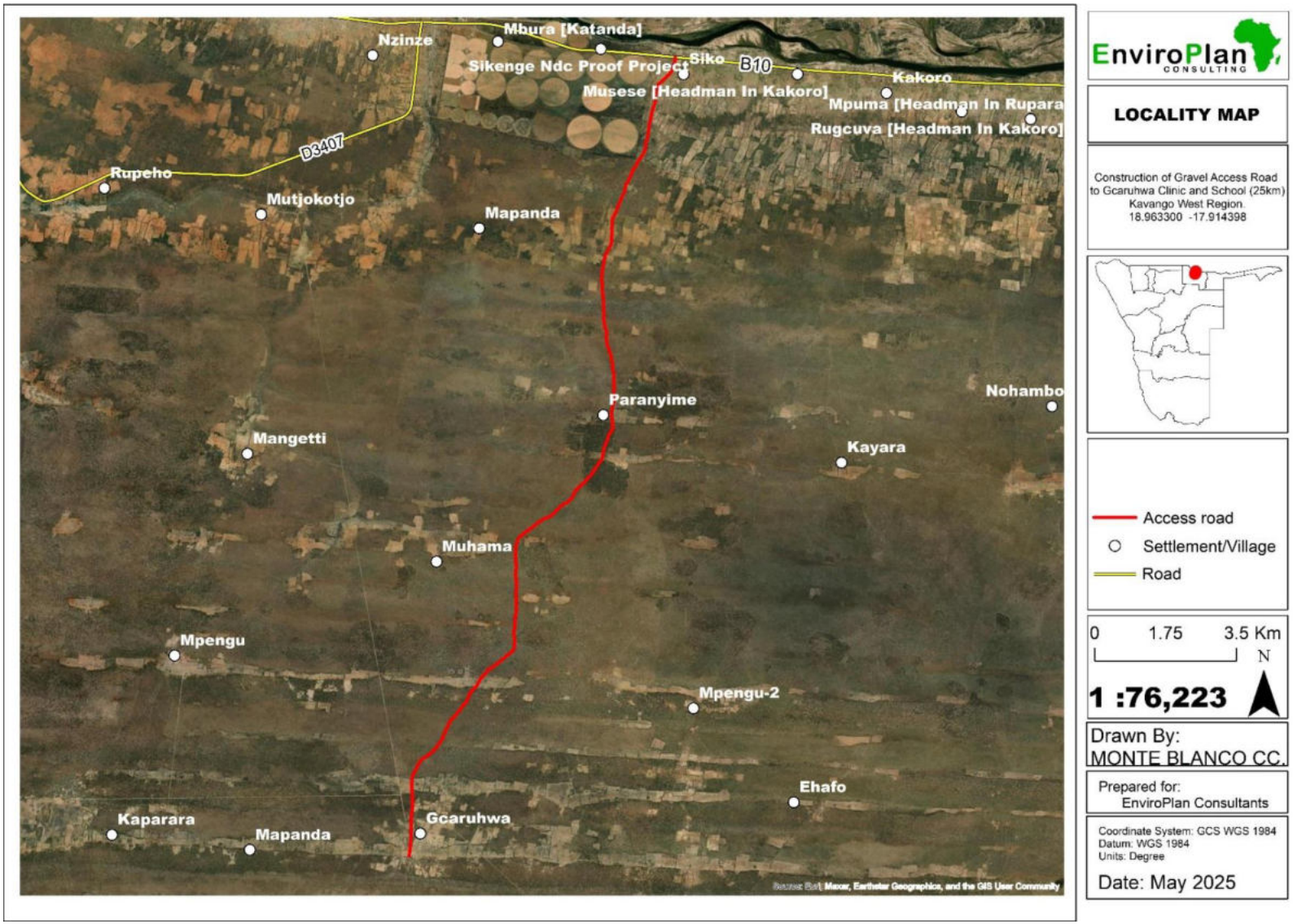

Figure 1: Locality Map

1.4. Project Overview

The proposed road construction will upgrade an existing sandy track to an all weather low volume Sprayco Armaseal LOCKCOTE preservative/rejuvenator which is a rapid setting water-based polymer bitumen compound designed to lock-in the chippings, seal and restore aged asphalt surfaces to prolong the life of asphalt pavements. Simple spray application of Armaseal penetrates and seals fine cracks while locks in the aggregates, sealing the asphalt surface, arresting oxidation of the existing bitumen binder and restoring the cohesion and stability of surface aggregate in the existing pavement.

Environmentally sensitive areas identified

The proposed access road is within a communal protected area that is Maurus Nekaro Conservancy since August 2017. The conservancy is one of the identified relevant stakeholders for the project. The conservancy gave consent to the construction of the road as discussed jointly with the Kavango West Regional Council on a consensus meeting (please refer to meeting munites and consent attached on the list of appendices). The project activities will directly impact the existing flora and fauna along the existing sandy track to be upgraded. Figure 2 below shows a Communal- Conservancy Map.

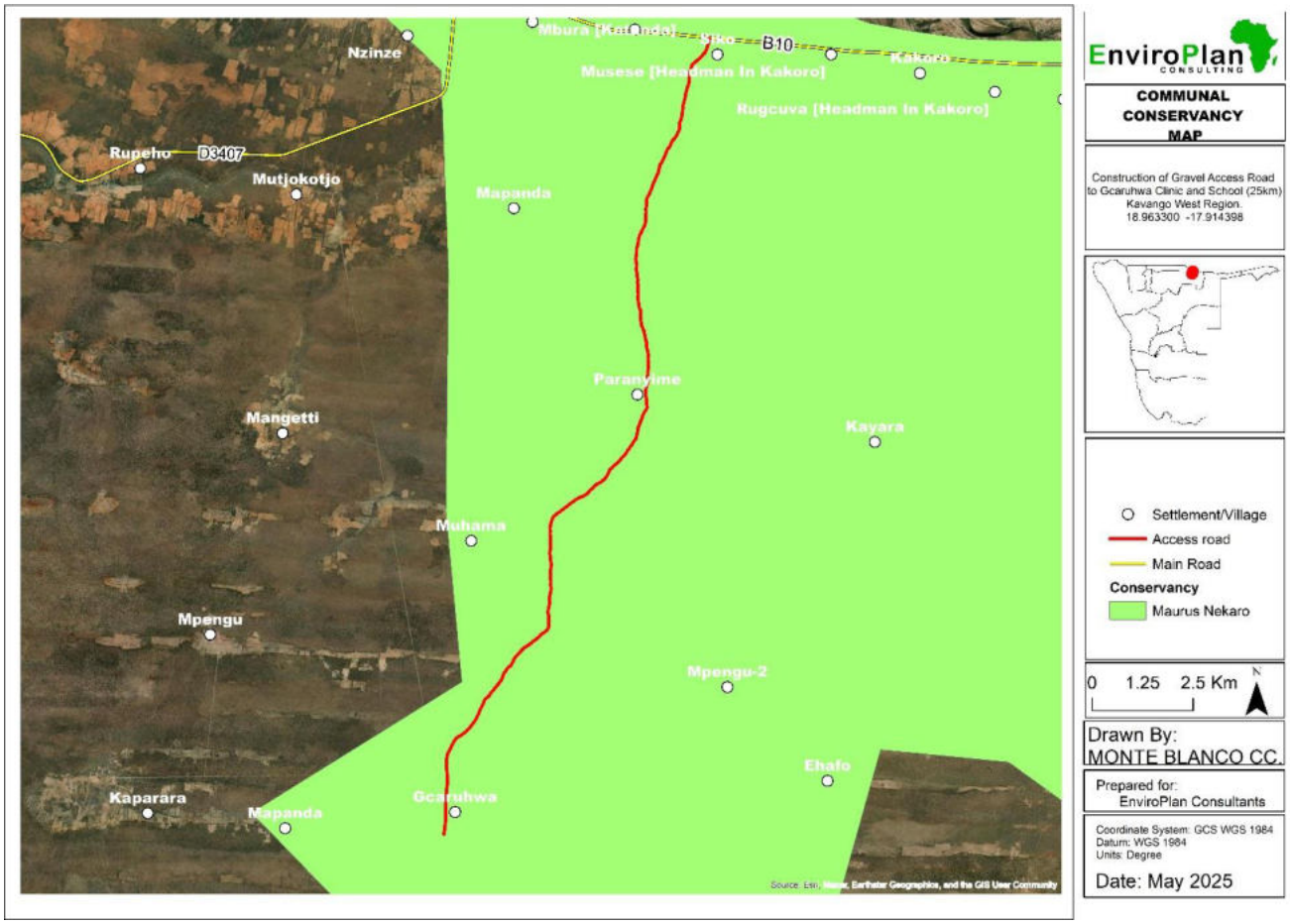

Figure 2: Communal- Conservancy Map

Socio-Economic issues identified

Socially, the proposed activities will impact the marginalized communities through employment opportunities, improved accessibility to key economic and health and social places. Upgrading the proposed access road is likely to directly affect two (2) existing houses at Siko village, a church at Muhama and several mahangu fields. It is an infrastructural development project and by any means possible should be supported. The entire project will have a direct impact to five (5) settlements namely Siko, Kayara, Muhama, Paranyime and Gcaruhwa. The settlements have a breakdown of households as follows: Kayara (3), Paranyime (17), Muhama (11), Gcaruhwa (57) and Siko (220). From the beginning of the proposed access road to the end are existing houses, mahangu fields, cattle kraals and a Church at Muhama that are most likely to be affected. A compensation plan will be done by the project proponent to ensure relocation and reallocation of the affected community. By

implementation of the proposed project, it will improve the socio- economic activities of the marginalized communities.

1.4.1. Infrastructure and Services-

Figure 3: (A) Signpost showing direction to Muhama one of the settlements in the constituency and (B) existing sandy track from Siko to Ngcaruhwa

***Water*:** The village has a total of three (3) settlements and has two (2) functional solar boreholes. In case of increased demand, the proponent will seek for extra borehole(s)/ water from elsewhere e.g., Okavango River. User pays principle will be applicable to the water use by the contractor.

***Ablution*:** A portable sewer ablution system will be established on the camp site to cater for construction phase.

Communication: The site is connected with MTC, TN Mobile and satellite phones.

***Accessibility**:* An existing B10 road network is directly linked to the proposed project area with easy access and connectivity at the project's convenience.

***Electricity*:** The study area will make use of solar power as well as gasoline generators during the construction phase.

Figure 4 overleaf shows infrastructure map reflecting all key infrastructure within the project area of influence.

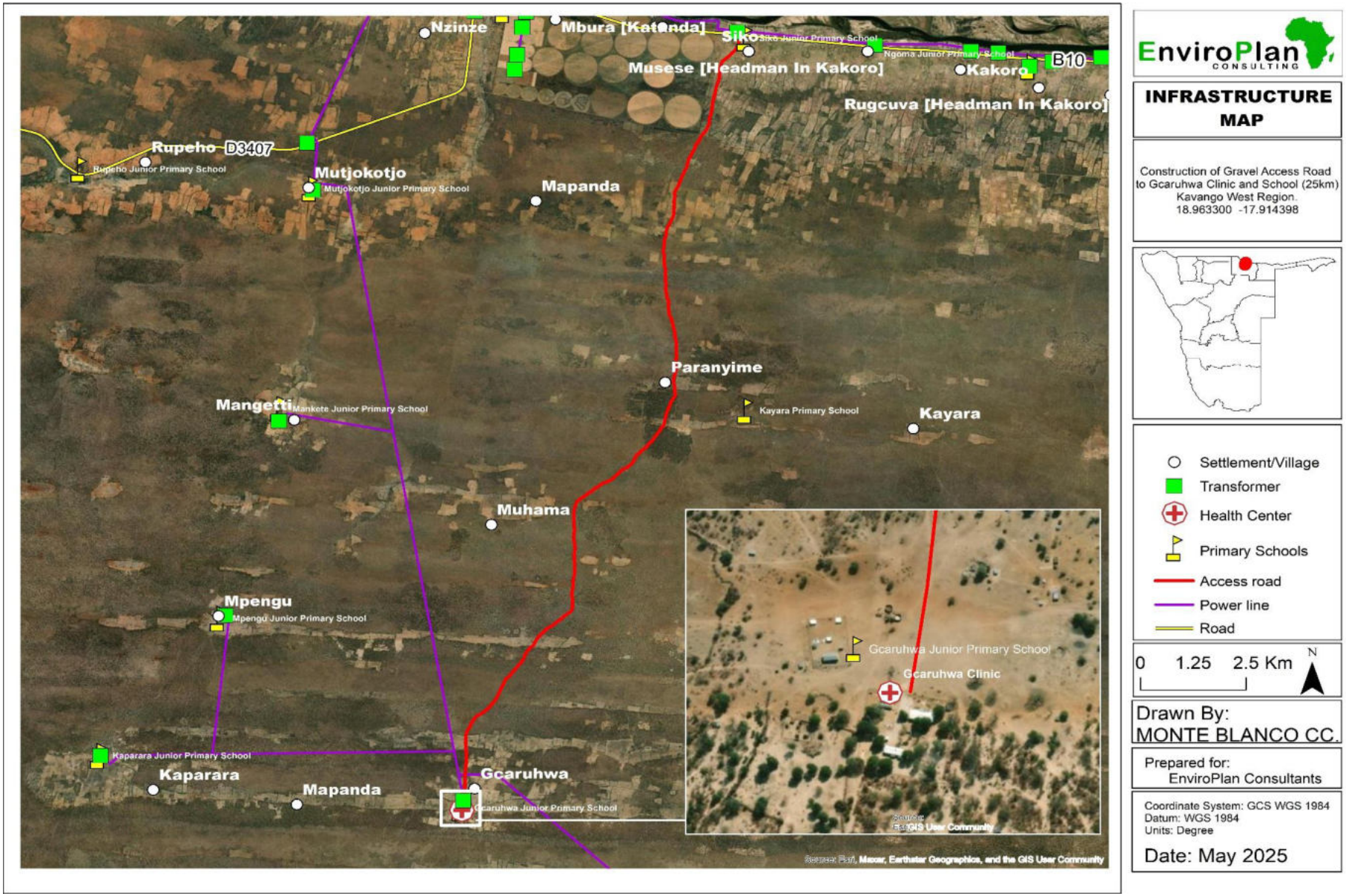

Figure 4: The Map showing existing infrastructure/ services around project site

1.4.2. Proposed road, Geometric design standards

The project designs will incorporate most applicable designs and standards as recommended by the Roads Authority (RA). Sprayco Armaseal technologies was chosen as the most appropriate design for the project site. Figure 5 below shows the cross section of the proposed road layout.

SprayCo Armaseal Polymer- Modified Bitumen Emulsion

Sprayco Aramaseal is a specialized sealing product used in road construction and maintenance. It is typically designed to protect and extend the life of surfaces layer. Below are the steps taken to incorporate Sprayco Aramaseal into road construction:

The process begins with the preparation and construction of the road structural layers, which include the roadbed, sub-base, and base layers. Apply a tack coat or penetration coat over the base surface to enhance the bonding between layers and improve aggregate adhesion. Follow this with the spreading of appropriate aggregates. Apply SprayCo Armaseal as the final surfacing treatment.

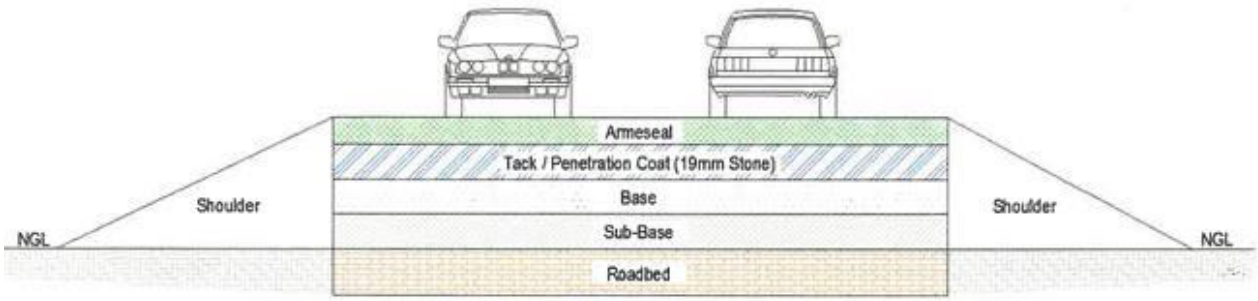

Figure 5: Proposed typical cross-section of road layers constructed with SprayCo Armaseal, (Adopted by HEC

According to RA, this polymer- modified bitumen emulsion acts as a sealant, effectively sealing surface cracks, preventing moisture ingres, and protecting the underlaying road layers from deterioration. The expected service life of Armaseal ranges from 5 to 10 years before requiring maintenance.

1.5. Need and Desirability

Access roads are crucial for transportation, infrastructure development, and economic activity, providing essential connectivity to areas like construction sites, businesses, and remote locations, facilitating the movement of people, goods, and equipment, (Rodrigue et al 1998- 2025). Namibia

requires improved access roads, especially in rural areas, to facilitate economic development, improve quality of life, and ensure access to basic services and government institutions. The proposed route for the project in Musese constituency plays a very important role as follows:

(a) Connectivity and Accessibility:

- **Connecting to remote areas:**

A pre-existing sandy track is currently used for connecting remote settlements in the new constituency. Settlements to be connected are Siko, Muhama, Paranyime, Kayara and Gcaruhwa which does not have any standard road as compared to other settlements in neighboring constituencies enabling access for people and resources.

- **Facilitating transportation:**

Access roads provides essential pathways for the movement of vehicles, equipment, and materials, ensuring smooth and efficient transportation. In this scenario the proposed route will play a vital role towards improving transportation of patients from Gcaruhwa clinic to the referral Hospitals in the Region by improving ambulance services.

- **Supporting economic activity:**

Access roads are crucial for supporting economic activities, such as construction projects, resource extraction, and trade, by facilitating the movement of goods and services.

Applicability to the proposed activity: The access road will greatly support the community by providing essential services like Health and care, transport and it will improve the remoteness of the above-mentioned settlements which is the major objective for the proposed route.

(b) Construction and Infrastructure Development:

- **Supporting construction projects:**

Access roads are essential for construction projects, allowing for the timely delivery of materials, equipment, and personnel to the construction sites.

(c) Other Important Functions:

- **Providing access to businesses:**

Access roads are essential for providing access to businesses, schools, shops, and other commercial premises.

- **Supporting emergency services:**

They are crucial for enabling emergency services, such as fire trucks and ambulances, to reach remote areas quickly.

- **Facilitating maintenance operations:**

Access roads are necessary for facilitating maintenance operations on infrastructure, such as pipelines and power lines.

- **Supporting rural development:**

Investments in rural roads have significant potential for promoting local economic and social development, creating jobs, and supporting local commerce.

Figure 6: Existing sandy track connecting the Gcaruhwa, Muhama, Paranyime and Siko settlements

Applicability: *The proposed standard low volume bitumen road will link the entire constituency to access key economic, social as well as improve accessibility of medical needs thus promoting rural development.*

1.6. Project Alternatives

Alternatives are defined as: “different means of meeting the general purpose and requirements of the activity” (Environmental Management Act (2007) of Namibia and its regulations (2012)). This section will highlight the different ways in which the project can be undertaken and identify the alternative that will be the most practical but least damaging to the environment. The project component design underwent a number of iterations based on technical aspects and the environmental and social considerations assessed during the EIA process. From a site location perspective, the position of the proposed road infrastructure was determined by the consideration of the following aspects:

-Local geographical conditions.

-Accessibility by the vulnerable communities/ existing settlements

-Pre-existing supporting infrastructure (sandy track), connecting the targeted settlements.

The project proponent's intended route focuses on the socio-economic benefit of the marginalized communities of Gcaruhwa, Siko, Muhama, Kayara and Paranyime residents which are inaccessible due to the nature of existing sandy tracks.

During stakeholders' consultation an alternative site route was proposed. The alternative site is an **18.5 km** route off the D3407 Nepara road. There is an existing service road for the electric powerlines to Gcaruhwa clinic and school. This identified alternative route does not support the proponent's vision to improve the accessibility of the above-mentioned settlements in the Musese constituency but rather it will directly serve Gcaruhwa only. According to the bio diversity study for the project, it does not have more mature forest vegetation than the proposed route. However, this route passes through flood-prone areas, grazing areas, and seasonal water channels making it costly to construct and maintain. That is against the Minister of Works and Transport's aim to avoid

Figure 7: (A-D) Overview to the proposed alternative route by the I&APs

construction of high maintenance costly road designs especially rural roads. The alternative identified alternative route also runs near four (4) households and several *mahangu* crop fields.

NOTE: The proposed alternative route by the I&APs will not improve accessibility to the intended marginalized communities/ settlements in Musese Constituency than the proposed route by the project proponent. It is likely to directly improve accessibility to Gcaruhwa Clinic and School yet sidelining the other intended marginalized communities of Siko, Muhama, Kayara and Paranyime settlements that are desperately waiting for the development.

Figure 8 overleaf shows the locality map with a nominated route by the I&APs in green.

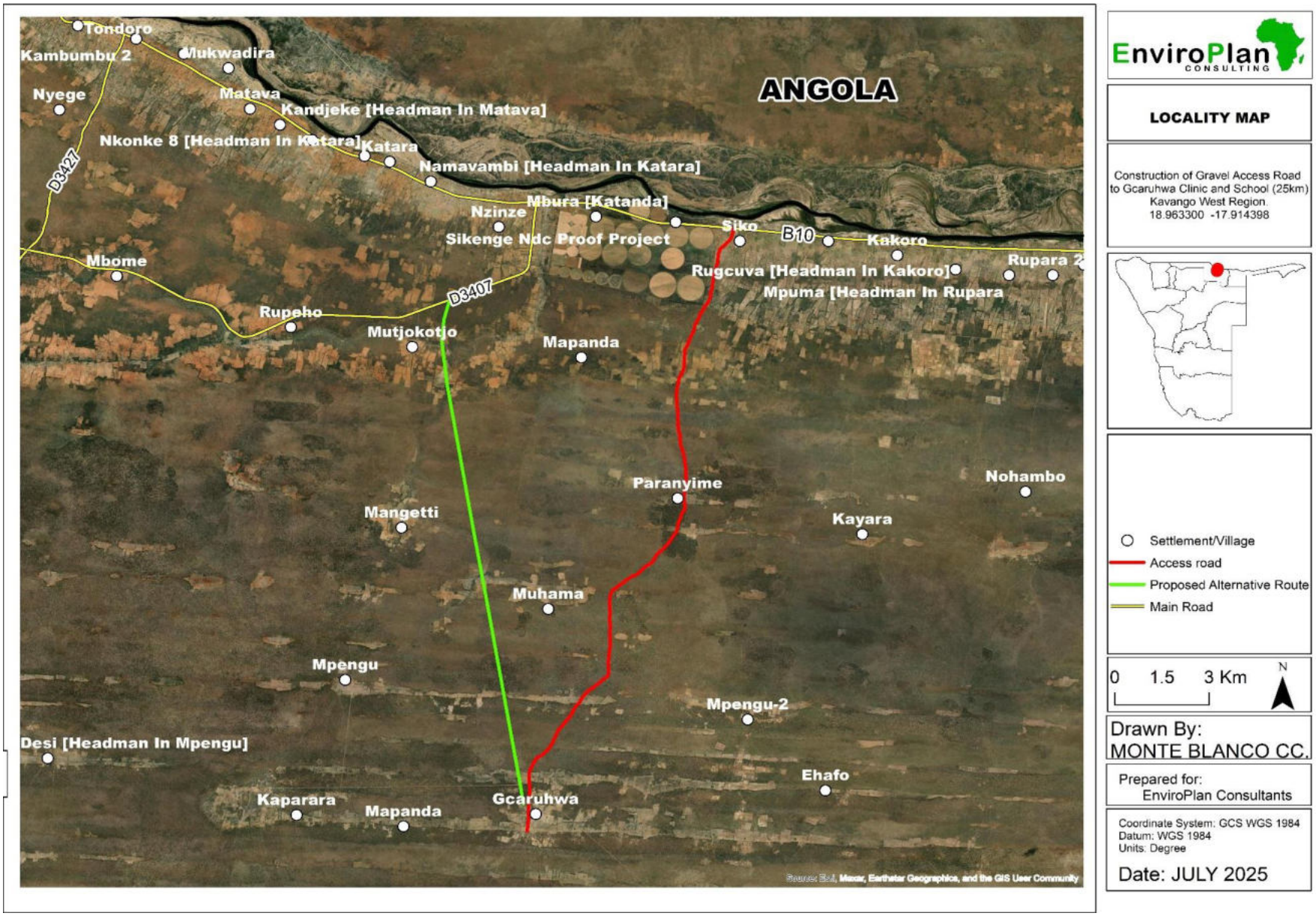

Figure 8: Locality map with an identified/proposed alternative route in green

1.6.1. Comparison of the proposed route by the project proponent and the proposed alternative route by an I&AP.

Table 3: Advantages and disadvantages of the proposed and identified alternative routes.

Proposed route by the proponent	*Identified alternative route by the I&APs*
Advantages	
• *Proposed project route is intended to improve accessibility to the marginalized communities i.e., Siko, Muhama, Paranyime, Kayara and Gcaruhwa settlements of the Musese constituency.*	• *The route has less matured trees/ vegetation and does not have a direct impact to the Wildlife Exclusive zone within the conservancy (please refer to the bio diversity report attached as appendix (ii)*
• *There is an existing sandy track making it already disturbed and easy to realign the proposed access road.*	
• *It is the most voted or wanted development within the Musese constituency and has been planned for over 15 years ago.*	
Disadvantages	
• *It is likely to impact the Maurus Nekaro conservancy's one of the Wildlife Exclusive zones that is characterized by elephant migration.*	• *The identified alternative route by an I&AP is prone to seasonal flooding due considering the geology and physical characteristics of the route.*
• *The route has several matured protected tree species that needs harvesting permits.*	• *The route will not service the intended marginalized communities within the Musese constituency but rather it will improve accessibility to the neighboring Tondoro constituency which has already well-established roads.*
	• *The route will have a direct impact to NAMPOWER's existing electric transmission line's service road to Gcaruhwa.*
	The alternative route is likely to increase the costs of construction and maintenance due to the following: • *Redoing the preliminary designs and land surveying* • *Increased number of culverts and maintenance costs.* • *Prolonged finishing period*

1.6.2. No-Go Alternative

The "No-Go" alternative by the project proponent is an option of not proceeding with the activity, which typically implies a continuation of the status quo. This would mean that the proposed road upgrade will not be done, and potential job opportunities will be lost. The socio-economic advantage

to the intended communities will be lost and local economy will not be improved. The No- Go Option will be directly associated with an anti-developmental perspective. Access roads in remote areas plays a vital role and without all-weather roads, remote areas remain disconnected with the rest of the world mostly during rainy seasons. In considering the proposed project, the 'no-go' option cannot be the preferred alternative.

Recommendations:

It is recommended that the first proposed route be implemented that is considering the positive socio-economic impacts to the intended marginalized settlements in Musese constituency and due to the fact that it has existing sandy tracks which makes it cost effective and strategically positioned within the constituency. The Assessment team designed an ESMP and undertook a biodiversity study to address the impact(s) on biodiversity and the wildlife conservation pocket. If the project proponent follows the recommendations as highlighted, will help to reduce the proposed activity's impact on biodiversity and to be precise the elephant seasonal migration yet improving the accessibility to the isolated settlements.

Figure 5 overleaf shows a constituency map and the proposed access road will be in Musese constituency making it a crucial access road from Siko, Paranyime, Muhama, Kayara and Gcaruhwa settlements. The access road will service more than 500 households and their respective farmlands. It will as well make the government institutions at Gcaruhwa accessible, that is the Clinic and school. Reports from the regional leadership postulates that, **"people are dying un attended because of bad roads"** within the proposed route's target communities. It is believed that ambulances are struggling to reach out to the nearest hospital in Nkurenkuru in time due to a bad access road. The neighbouring Tondoro constituency has existing upgraded all weather roads and most settlements and government institutions are fairly accessible as compared to the site under study, thus justifying the proposal.

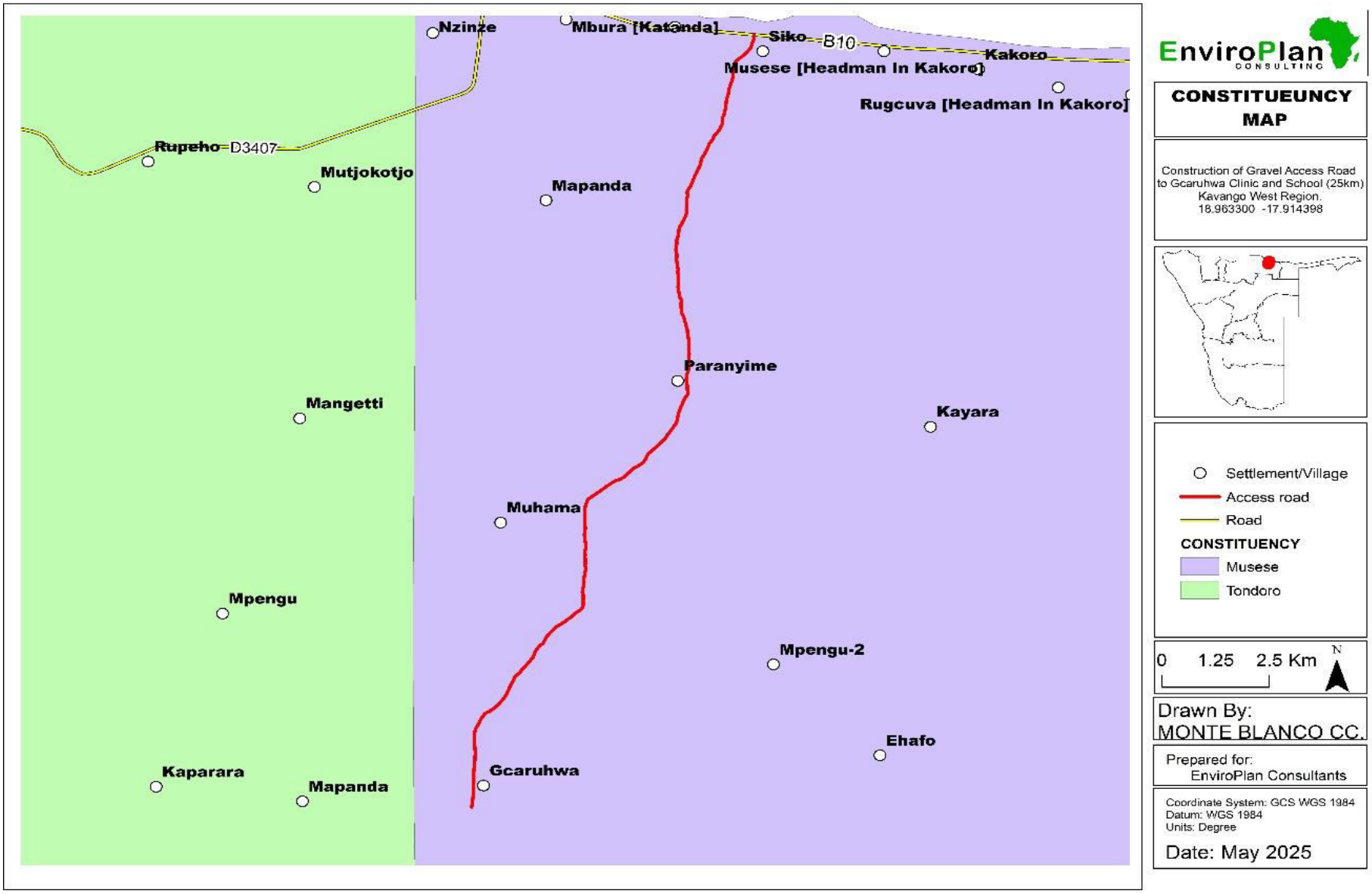

Figure 9: Constituency Map

Consideration of the site selection criteria resulted being used, the proposed route is a preferred site by the project proponent. No further site location alternatives are considered by the project proponent.

1.6.3. Resources alternatives

In terms of the resources that may be required for the proposed access road construction activities, their alternatives are presented in Table 3 overleaf.

Table 4: Alternatives considered in terms of services infrastructure

Services	Proposed source	Alternative source
Water	Water to be sourced from nearby existing boreholes.	Piping water from other sources out of the project area, e.g., the nearby Okavango River which is approximately 2 km away from the beginning of the project under discussion. This would be done to supplement local water supplies
Power	Electric energies and generators	Solar
Power for cooking	Gas stoves	Solar
Worker's accommodation	Campsite at the project site	Avoidance to employ foreign residents to the project especially when hiring non- and semi-skilled labourers. Commitments to for work was shown by manual labourers within the community to do a food for work to clear the existing path of the access road. The skilled workers from other parts of the country might find accommodation in the nearest town, which is Nkurenkuru (depending on commuting and accessibility)
Waste Management		
Sewage	Portable toilets – these are easily transportable and have no direct impact on the environment or ecology (if waste is properly disposed of)	Ventilated improved pit (VIP) latrine.
Domestic waste	Onsite waste bins, regularly emptied at the nearest landfill (Nkurenkuru landfill site)	Driving waste daily to the nearest town landfill (Nkurenkuru municipality landfill site)
Hazardous waste (chemicals)	Waste generated is to be transported to and disposed of at an appropriate facility in the nearest town (Nkurenkuru) equipped for the disposal of hazardous waste	None

1.7. Environmental Impact Assessment Methodology

The set of potential tools include risk assessment, life-cycle assessment, benefit-cost analysis, ecosystem-services valuation, integrated assessment models, sustainable impact assessment, environmental justice, and present and future scenario tools;

The project proponent used Cost-Benefit Analysis and Cost Effectiveness methodologies for decision making in the pre-planning phase of the project. The Environmental assessment team used Leopold Matrix to do the impact assessment. This matrix is used to identify potential impacts associated with a project or alternatives. It assists performing a comprehensive review of the variety of interactions between project elements and environmental parameters, to identify important environmental factors, data needs, and less damaging alternatives.

The assessment team also made use of the World Bank Environmental Impact checklist. These checklists are designed to be used in identifying significant environmental impacts, project alternatives, and special issues associated with development projects. They are qualitative and predictive in nature

1.8. Expected Social and Environmental Impacts

From previous experience with developments of this nature and comments received from Affected Parties, establishing an access road might have the following key impacts on the receiving environment:

Socio-economic impacts:

- Additional employment will be created during construction and operation (positive impact)
- Noise and dust pollution from construction operations. (Negative impact)
- Community health issues - transmission of diseases from construction team and support staff to local community (Negative impact)
- Increase in criminal activities (Negative impact)
- Cultural dilution (Negative impact)
- Increase of traffic on nearby roads (Negative impact)
- Relocation and compensation to affected parties (Negative impact)

- Improved access to marginalized communities (health, social amenities etc.) (positive impact)

Biophysical impacts:

- Surface drainage and stormwater impacts including sedimentation and erosion (flow of surface draining systems might be disturbed)
- Impact on surface water resources
- Possibility of air pollution (dust during construction)
- Possibility of noise pollution
- Visually the site might be unpleasing (during construction)
- Effect on natural and general ambiance of the area and surroundings
- Effect on vegetation (grass, shrubs and trees directly in areas to be cleared for construction of infrastructure)
- Impact on agricultural resources
- Effect on movement of animals
- Concerns if the area/ burrow pits can be restored / rehabilitated to an acceptable status once the construction phase is over.
- Impact of construction waste on the environment
- Storage of hazardous substances on site

1.9. Conclusion

The Environmental consultant recommends that the project go ahead and consider sustainable technologies. The consulting engineers will ensure a proper designing and implementation to ensure minimal environmental impacts as a result of the project development. Bi annual reporting as well as compliance to the ECC terms and conditions should guide the project implementation. Monitoring of elephant movement and realigning the road from the known water points like the Kayara water point that is likely to be used by elephants is highly recommended. The identified impact on biodiversity resources and seasonal elephant migration are addressed in the ESMP.

2. CHAPTER TWO: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1. Introduction

An important part of the EIA is identifying and reviewing the administrative, policy and legislative frameworks concerning the proposed activity so as to inform the proponent about the requirements to be fulfilled in undertaking the proposed project. This section looks at the legislative framework within which the proposed development will conform to; the focus is on operational the compliance with the legislation during the planning and construction phases. All relevant legislations, policies and international statutes applying to the project are highlighted in the table 4 as specified in the Environmental Management Act, 2007 (Act No.7 of 2007) and the regulations for Environmental Impact Assessment as set out in the Schedule of Government Notice No. 30 (2012).

The project's activities are undertaken in a biophysical and social environment. It is therefore necessary to consider the legislations and legal requirements governing the project and its associated activities.

The main legal framework presented herein is that of Namibia for the relevant project component under the scope of this document – detailed legislation that are applicable to the project are given in the EIA Report and then a summary of these that require permitting and licensing for certain project activities. **Local and National Legislation (Acts, Polices, Regulations, etc.) and the Environmental Management Act No. 7 of 2007.**

The Environmental Management Act No.7 of 2007 and its 2012 EIA Regulations aims to ensure that the potential impacts of the development on the environment are considered carefully and in good time; that all interested and affected parties have a chance to participate in the environmental assessments and that the findings of the environmental assessments are fully considered before any decisions are made about activities which might affect the environment.

The Act aims at promoting sustainable management of the environment and use of natural resources. The Environmental Management Act (EMA) is broad; it regulates land use development through environmental clearance certification and/or Environmental Impact Assessments. The Act provides for the clearance certification for ''***construction of public roads***".

2.1.1. Namibia's Green Plan, 1992

In 1992, Namibia's Green Plan was drafted by the Ministry of Environment, Forestry and Tourism. The document analysed the main environmental challenges facing Namibia and specified actions required to address them. This included a strategic plan for integrated and sustainable environmental management, which outlines key focus areas for sustainable development.

Relevance to the project

The project is entitled to upgrade an existing sand track from off the B10 highway (Siko village to Gcaruhwa) which is approximately 25km. The project design must will be guided by Namibia's Green Plan, 1992.

2.1.2. Climatic Change Polices

National Climate Change Strategy & Action Plan 2013 – 2020

The climate change action plan which identifies Climatic Change as a critical threat to sustainable development. Therefore, it must be addressed in a holistic and multisector manner.

Relevance to the project

There are several activities to be done as a result of project development. In respect to the Climate Change strategy, appropriate measures to combat climate change have been implemented from the initial stages of project designing and HEC will deploy the most appropriate construction methods to execute the project.

(a). *Deforestation*

The project activities will include clearance of trees and bushes on the proposed site. Basing on the conclusion drawn during the site visit, the EIA team observed certain tree species both protected and un protected. The project will not remove matured trees. Most of vegetation to be cleared are shrubs and it is very important to note that the area/ project path is already disturbed by numerous existing sand track, grazing as well as mahangu cultivation.

(b). *Making use of renewable sources of energy*

The proposed project will make use of solar energy in the campsite. Many industrialized nations have installed significant solar power capacity into their grids to supplement or provide an alternative to conventional energy sources while an increasing number of less developed nations have turned to solar to reduce dependence on expensive imported fuels.

(c). *Emissions of Green House Gases (GHGs)*

There are four main types of forcing greenhouse gases: carbon dioxide, methane, nitrous oxide and fluorinated gases. The main feedback greenhouse gas is water vapor. The general physical layout of the proposed project minimizes all possible activities contributing to global GHGs emissions in either way. All relevant legislation that was consulted and applicable to the proposed development are presented in Table 5 overleaf.

For this Report, Table 4 presents the information on the legal obligations (legislations, policies, and guidelines) in terms of legislation, where permitting and/or licensing that may be required from different applicable regulatory authorities as a requirement to the ECC.

2.1.3. The United Nations Convention to Combat Desertification (UNCCD) 1992

The Convention addresses land degradation in arid regions with the purpose to contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change.

The convention's objective is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability.

***Project requirement/applicability*:** The project activities should not be carried out in such a way that they contribute to desertification.

2.1.4. The Convention on Biological Diversity 1992

Convention on Biological Diversity 1992 Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use. It promotes the protection of ecosystems, natural habitats, and the maintenance of viable populations of species in natural surroundings.

***Project requirement/applicability*:** Removal of vegetation cover and destruction of natural habitats should be avoided and where not possible minimised.

2.1.5. Stockholm Declaration on the Human Environment, Stockholm (1972)

It recognizes the need for: "a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.

Project requirement/applicability*:* Protection of natural resources and prevention of any form of pollution.

Table 5: Policies, Legal and Administrative regulations

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
The Constitution of the Republic of Namibia (1990)	The articles 91(c) and 95 (i) commits the state to actively promote and sustain environmental welfare of the nation by formulating and institutionalising policies to accomplish the sustainable objectives which include: *Guarding against over utilization of biological natural resources,* *Limiting over-exploitation of non-renewable resources,* *Ensuring ecosystem functionality,* *Maintain biological diversity.*	Proposed activities can interfere with ecological processes. Attention should be given to the water resources and biodiversity.
Environmental Assessment Policy of Namibia 1994	The Environmental Assessment Policy of Namibia states Schedule 1: Screening list of policies/ plans/ programmes/ projects subject to environment must be accompanied by environmental assessments. “The development activities" are on that list.	The activity triggers an environmental impact assessment prior to commencement.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	The policy provides a definition to the term "Environment" broadly interpreted to include biophysical, social, economic, cultural, historical, and political components and provides reference to the inclusion of alternatives in all projects, policies, programmes, and plans.	The proposed development requires the assessment of all possible environmental and social impacts to avoid, minimise or compensate environmental damage associated with the activities.
Environmental Management Act No. 07 of 2007	Requires that activities with significant environmental impact are subject to an environmental assessment process (Section 27). Requires for adequate public participation during the environmental assessment process stakeholders to give their opinions about a project (Section 2(b-c)). According to Section 5(4) a person may not discard waste as defined in Section 5(1)(b) in any way other than at a disposal site declared by the Section 3 (2) (b) states that "community involvement in natural resources management and	The nature of the proposed road construction and interrelated activities has potential to cause adverse environmental impacts to the surrounding environment. Activities such as excavation and trenching can cause significant environmental impacts. Therefore, proper assessments should guide project planning The EIA study considered full stakeholder participation. Stakeholder consultation was fully conducted. The proposed development is involving the utilisation of natural resources (water and land). Therefore, benefits from the implementation of the project must be shared equally.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	the sharing of benefits arising from the use of the resources, must be promoted and facilitated" is key. Section 3 (2) (e) states that "assessments must be undertaken for activities which may have a significant effect on the environment or the use of natural resources".	Environmental cost relating to project shall not be borne by communities found in the project area and surroundings. Project shall not commence without a valid environmental clearance certificate
EIA Regulations GN 57/2007 (GG 3812)	Details requirements for public consultation within a given environmental assessment process (GN No 30 S21). Details the requirements for what should be included in an Environmental Scoping Report (GN No 30 S8) and an EIA report (GN No 30 S15).	The implementation of the project triggers the need for consultation of all affected and interested stakeholders regarding the development at all project development phases from planning to operation of the facility. A stakeholder and I&APs consultation meeting were held in respect to this, and all the concerns and issues were noted and addressed in this report.
The Water Act 54 of 1956	The Act was formulated to consolidate and amend the laws relating to the control, conservation and use of water for domestic, agricultural, urban, and industrial purposes; to make provision for the control, in certain respects, of the use of sea water	The activities directly affecting water conservation, management and use therefore, requires the implementation of water conservation measures.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	for certain purposes; for the control of certain activities on or in water in certain areas.	
SANS 1929: 2005	Dust particulates from excavations that are smaller than 1mm are deemed dangerous to both plants and humans. As such a dust monitoring following the ASTM D1739 method should be used for monitoring dust emissions from any crushing plant anticipated. Dust chemical analysis and fallout quantities are specified for industrial and residential environs.	A dust fallout monitoring plan can be instituted around project area
Pollution Control and Waste Management Bill	The bill aims to "prevent and regulate the discharge of pollutants to the air, water and land" Of particular reference to the Project is: Section 21 "(1) Subject to sub-section (4) and section 22, no person shall cause or permit the discharge of pollutants or waste into any water or watercourse."	The proposed activity triggers Section 21 and 22 of the bill. Activities such as excavations, primary road works may require the robust adoption of in-situ pollution mitigation measures. Contractors of the civil works of the project should make it mandatory that they manage their waste in a manner that do not

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	Section 55 "(1) No person may produce, collect, transport, sort, recover, treat, store, dispose of or otherwise manage waste in a manner that results in or creates a significant risk of harm to human health or the environment."	cause environmental harm and risk both to the surroundings and the local communities.
Atmospheric Pollution Prevention Ordinance 11 of 1976	The law provides for the prevention of atmospheric pollution and for matters incidental thereto. The law regulates and prohibit pollution from industries particularly smoke and dust. The ordinance considers air pollution from point sources but does not address air quality standards,	Excavation activities will most likely affect ambient air quality. Efforts to suppress and monitor dust should be adopted as recommended in the ESMP.
National Solid Waste Management Strategy	The Strategy ensures that the future directions, regulations, funding, and action plans to improve solid waste management are properly co-ordinated and consistent with national policy, and to facilitate co-operation between stakeholders.	Construction of roads and associated activities can potentially generate significant amount of waste material that need careful management. The obligation to meet waste management objectives should be tolerated by both proponent and contractors. The proponent and the appointed contractor should limit the exposure of waste to the natural environment and surrounding.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	Waste disposal presents a challenge to solid waste management in Namibia. The top priority is to reduce risks to the environment and public health from current waste disposal sites and illegal dumping in many areas of Namibia.	In-situ waste management plans should be adopted and implemented prior the commencement of operations. Rock waste and other construction waste should be stored and disposed in an environmentally friendly manner. Waste should be carted away to licenced waste disposal sites.
Soil Conservation Act 76 of 1969	The Act established to consolidate and amend the law relating to the combating and prevention of soil erosion, the conservation, improvement, and manner of use of the soil and vegetation and the protection of the water sources in the Republic of Namibia.	The construction of auxiliary infrastructure such as access roads or tracks to borrow pits should include systems and mechanism for preventing erosion.
Road Traffic and Transport Act, No. 22 of 1999	The Act provides for the establishment of the Transportation Commission of Namibia; for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, the control and regulation of road transport across	Mitigation measures should be provided for if the roads and traffic impacts cannot be avoided. Should the proponent wish to undertake activities involving road transportation or creation new access adjoining national roads, relevant permits will be required from the

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	Namibia's borders; and for matters incidental thereto.	Ministry of Works and Transport which is again the project proponent.
Forest Act 12 of 2001	Section 10 (1) set out the aim of the forest management as to: The purpose for which forest resources are managed and developed, including the planting of trees where necessary in Namibia is to conserve soil and water resources, maintain biological diversity and to use forest produce in a way which is compatible with the forest's primary role as the protector and enhancer of the natural environment.	The proposed project will likely result in the disturbance of indigenous vegetation of conservation significance including the disruption of biological processes. The is an existence of both protected and unprotected Flora along the proposed road route. Harvesting/ de-bushing operations for clearing up for the road construction activities should be following the Forestry permitting and requirements.
	(b) Any living tree, bush or shrub growing within 100 metres of a river, stream, or watercourse.	The project will not result in the removal of living trees, bushes and shrubs growing within 100m of a river, stream, or watercourse.
	(2) A person who wishes to obtain a licence to cut and remove the vegetation referred to in subsection (1) shall, in the prescribed form and manner, apply for the licence to a licensing officer who has been	The removal of trees in the above instances would require the contractors or sub-contractors to acquire necessary forestry permits first.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	designated or appointed for the area where the protected area is situated.	
National Policy on Climate Change for Namibia (2011)	The National Policy on Climate Change pursues constitutional obligations of the Government of the Republic of Namibia, namely for "the state to promote the welfare of its people and protection of Namibia's environment for both present and future generation."	Measure should be adopted by MWT (proponent) to prevent or minimise toxic emissions into the atmosphere. Dust suppression and monitoring will be employed, to ensure those air quality objectives tied to climate change mitigation are met.
National Climate Change Strategy & Action Plan 2013 – 2020	The Strategy outlines Namibia's response to climate change. The strategy aims to address and plan for action against climate change, both through mitigation and adaptation actions. In its adaptation strategy, the Strategy recognises the role of a sustainable water resource base.	The development should adopt measures that strengthen sustainable utilization of water resource. The implementation should be very careful on not to cause harm to the available water resources but improve the management through various conservation technics.
	The Strategy proposed strategies that aim to: Strategic Aim 1: Further improve the overall climate change understanding and related policy responses in water resources sector.	The proponent should invest capital on strengthening climate change and adaptation through cleaner production systems implementation.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	Strategic Aim 2: Monitoring and data collecting technologies of surface and underground water are developed and implemented at basin/watershed level.	Certification by international standards such as ISO14001 can help with climate sustainability, and is recommended.
Nature Conservation Ordinance (1996)	This ordinance relates to the conservation of nature; the establishment of game, parks, and nature reserves; the control of problem animals; and highlights matters incidental thereto.	The activities of the project are highly localized. It is most likely that project activities will interfere with nature reserves within the conservancy. However, there is need for proper education and awareness against poaching and make sure all activities are not in conflict with the provisions listed in the Nature Conservation Ordinance. All species of birds are protected except the game birds mentioned in *Schedule 6* which can be hunted.
National Biodiversity Strategy and Action Plan (NBSAP2) 2013 – 2022	The action plan was operationalized in a bid to make aware the critical importance of biodiversity conservation in Namibia, putting together management of matters to do with ecosystems protection, biosafety, and biosystematics protection on both terrestrial and aquatic systems.	The proposed project during construction potentially triggers ecosystem threats from pollution. As such mechanisms for environmental compliance and monitoring will be put in place, ultimately aimed at protecting biodiversity.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Labour Act 11 of 2007.	Empowers the minister responsible for labour to publish regulations pertaining to health and safety of labourers (S135). Details requirements regarding minimum wage and working conditions (S39-47).	Proposed all weather road will require significant amount of laborious work. Therefore, there is need to ensure that proponent ensures employees a working environment that is safe, and adequate facilities provided for the upkeep of employee welfare standards. The Ministry of Labour and Safety demands that a health management policy will be drafted and instituted.
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety requirements.	-Occupational health and safety provisions during construction and operational phases should be clearly outlined. -Compliance monitoring and responsibilities for compliance monitoring should be clearly stated
Public Health Act 36 of 1919	Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."	Compliance to the Public Health Act will be ensured in relation to the following: - Sanitation facilities -Communicable diseases -Emergency healthcare provision - COVID 19 workplace measures
Public and Environmental Health Act 1 of 2015.	To provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters.	

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
National Heritage Act 27 of 2004	Section 48(1) states that "A person may apply to the (Heritage) Council for a permit to carry out works or activities in relation to a protected place or protected object" Protects and conserves cultural heritage and cultural resources with special emphasis on places and sources of National heritage including graves, artefacts, and any objects older than 50 years.	The project will encompass upgrading an existing sand track to a standard all weather road. However, if heritage resources (e.g., human remains etc.) discovered during implementation, guidelines dictate that a permit be acquired from the National Heritage Council of Namibia for relocation of any artefacts or specimen.

2.2. Conclusion

These pieces of regulations should be observed throughout the project's life cycle. Any deviations from these policies, regulations and administrative frameworks may have catastrophic results to the environment (including man power) and the work environment. These laws bring about rational work ethics that support the protection of the environment. Strict monitoring by relevant authorities will bring about sound environmental practices. Ministry of works appointed Helios Engineering consultants to supervise and enforce these regulations hence constant monitoring will be done in form of inspections and audits during the construction phase**.**

3. CHAPTER THREE: RECEIVING ENVIRONMENT

3.1. Introduction

In this chapter, the findings of the EIA team on baseline surveys, public consultation and desk reviews undertaken are in respect to the ecology, society, economy and geo-political set up of the proposed project area. The geological structure and meteorology of the project site will also be discussed in this chapter to give an in-depth understanding of the project area in question. All climatic data which was used were collected at Nkurenkuru which has the most reliable data collected over time.

3.2. Socio-Economic status

Kavango West Region is one of the fourteen regions of Namibia. Its capital and only self-governed settlement is Nkurenkuru. The Region was created in 2013 when the Kavango Region was split into Kavango East and Kavango West. In the north, Kavango West borders the Cuando Cubango Province of Angola. Domestically, it borders the regions of Kavango East to the east, Otjozondjupa to the south, Oshikoto to the west and Ohangwena to the northwest. The region contains a multi-country conservation park and six locally managed wildlife reserves.

Because of its rather high rainfall compared to most other parts of Namibia and its location on the Kavango River after which it was named, this region has agricultural potential for the cultivation of a variety of crops, as well as for organised forestry and Agro-forestry, which stimulates furniture making and related industries. Kavango West and its sister region Kavango East are nevertheless the poorest regions in Namibia. **Musese** is a constituency in the Kavango West region of Namibia. The administrative capital is the settlement of Rupara. As of 2020 the constituency had 6,494 registered voters. Musese was formed from the north-eastern part of the former Kahenge Constituency. The region is characterized by an extremely uneven population distribution. The interior is very sparsely inhabited, while the northernmost strip, especially along the Kavango River, has a high population concentration.

3.2.1. Land Use

The proposed project will be developed off the B10 road Siko village to Gcaruhwa clinic and school which is approximately 21.7 km. There are five (5) settlements within the project's area of influence namely Siko, Muhama, Kayara, Paranyime and Gcaruhwa. The project area is also within a Conservancy (Maurus Nekaro). The current land use is characterized by livestock production (such as sheep, goats, donkeys and cattle), integrated wildlife conservation (spotted in the village were antelopes and elephants were reported as migratory) and horticultural activities. The means of libvelihood in Kavanggo West is rain fed subsistence farming, with two green schemes, Sikondo and Musese. Sikondo is made up of small-scale farmers and Musese is privately owned. The projects focused on agricultural production, particularly maize farming, and aims to contribute to food security and skills development. They utilize irrigation from the Okavango River and Musese has infrastructure including centre pivots and a pump station. It also involves livestock farming, with cattle purchased locally, fattened, and then sold to abattoirs. The scheme is managed by **Agribusdev,** which leases the project assets to investors.

Figure 10: ***(Plate A and B)*** **Project area practices Mahangu cultivation and animal rearing respectively.**

3.3. Climate

Kavango West has a subtropical steppe climate (Köppen classification: BSh) characterized by hot, dry summers and mild, dry winters. The average annual temperature is around 25.67°C (78.21°F). The region experiences relatively high temperatures from January to February, with mild nights and daytime highs peaking around 37°C (98°F). As the seasons shift into April and May, nights become cooler, with temperatures potentially dipping to 4°C (40°F) in May. The coldest months, June and July, see consistently low minimum temperatures of 4°C (39°F) alongside mild daytime highs, creating a brief winter chill. Climate and vegetation report for the year 2023/2024 attached to this report as Appendix (v) was published by Namibian Association of CBNRM support Organisations (NASCO).

3.3.1. Precipitation

According to weatherspark.com, A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Nkurenkuru varies very significantly throughout the year. The wetter season lasts 4.4 months, from November 19 to March 30, with a greater than 27% chance of a given day being a wet day. The month with the most wet days in Nkurenkuru is January, with an average of 16.0 days with at least 0.04 inches of precipitation.

The drier season lasts 7.6 months, from March 30 to November 19. The month with the fewest wet days in Nkurenkuru is July, with an average of 0.0 days with at least 0.04 inches of precipitation. Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. The month with the most days of rain alone in Nkurenkuru is January, with an average

of 16.0 days. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 55% on January 30.

Based on the beach/pool score, the best times of year to visit Nkurenkuru for hot-weather activities are from April 20 to April 28 and from late August to mid-October.

3.3.2. Rainfall

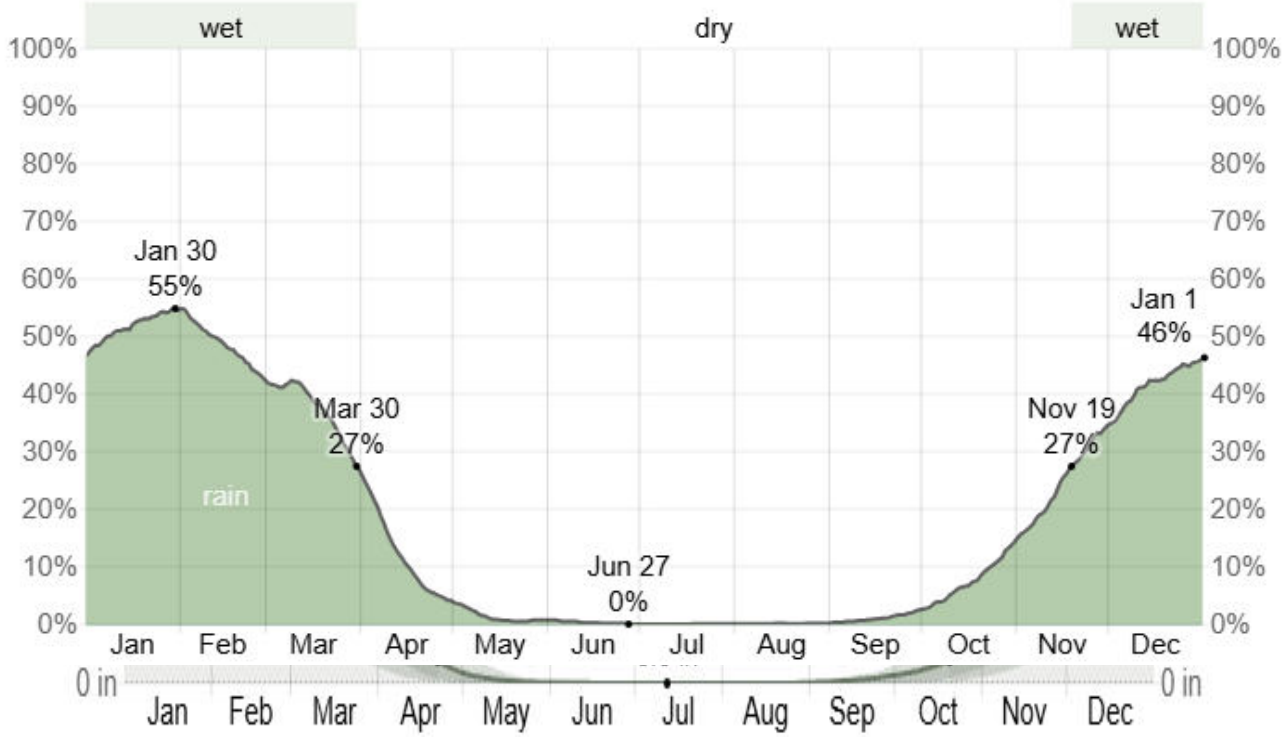

Figure 11: Average Monthly Rainfall in Nkurenkuru, https://cedarlakeventures.com/weatherspark

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Nkurenkuru experiences extreme seasonal variation in monthly rainfall. The rainy period of the year lasts for 6.0 months, from October 20 to April 22, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Nkurenkuru is January, with an average rainfall of 5.1 inches. The rainless period of the year lasts for 6.0 months, from April 22 to October 20. The month with the least rain in Nkurenkuru is July, with an average rainfall of 0.0 inches.

3.3.3. Temperature

The hot season lasts for 2.1 months, from September 13 to November 16, with an average daily high temperature above 95°F. The hottest month of the year in Nkurenkuru is October, with an average

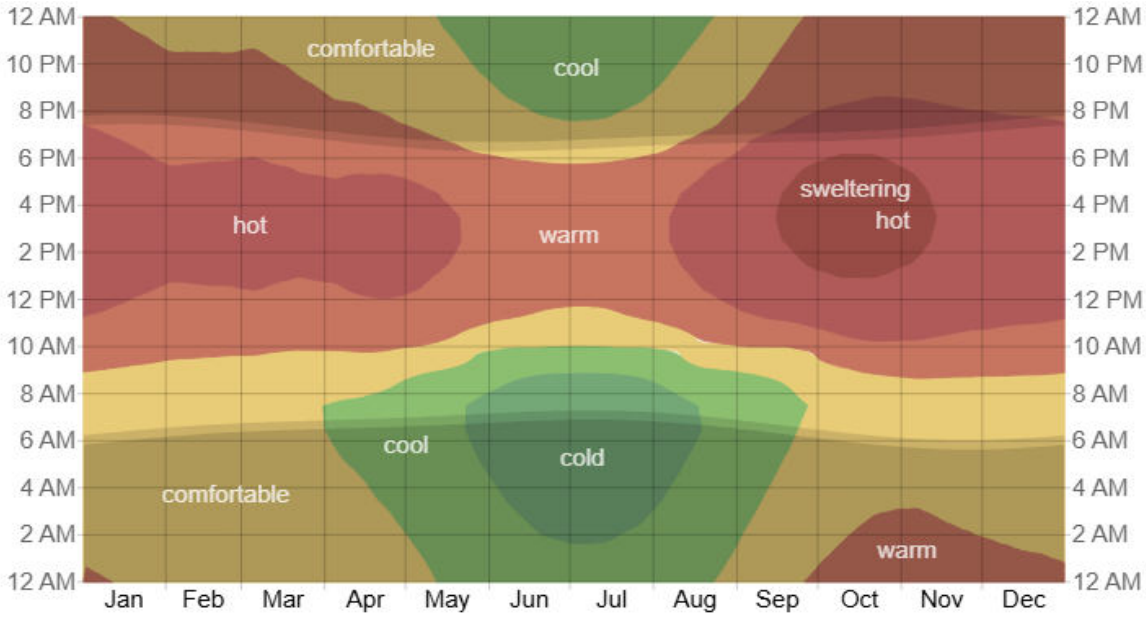

Figure 12: Figure 12: Average High and Low Temperature in Nkurenkuru, Source https://cedarlakeventures.com/weatherspark

high of 98°F and low of 69°F. The figure above shows you a compact characterization of the entire year hourly average temperatures. The horizontal axis is the day of the year, the vertical axis is the hour of the day, and the colour is the average temperature for that hour and day.

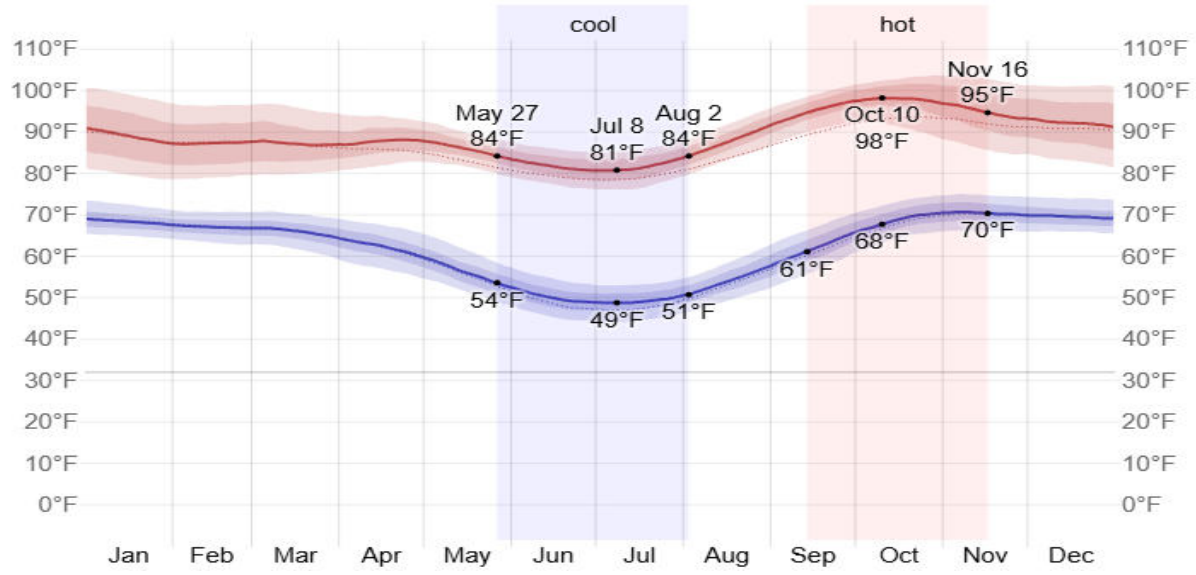

Figure 133: Average Monthly Temperature in Nkurenkuru, Source https://cedarlakeventures.com/weatherspark

The cool season lasts for 2.2 months, from May 27 to August 2, with an average daily high temperature below 84°F. The coldest month of the year in Nkurenkuru is July, with an average low of 49°F and high of 82°F.

3.3.4. Data Sources

This report illustrates the typical weather in Nkurenkuru, based on a statistical analysis of historical hourly weather reports and model reconstructions from January 1, 1980 to December 31, 2016. Nkurenkuru is further than 200 kilometres from the nearest reliable weather station, so the weather-related data on this page were taken entirely from NASA's MERRA-2 satellite-era reanalysis . This reanalysis combines a variety of wide-area measurements in a state-of-the-art global meteorological model to reconstruct the hourly history of weather throughout the world on a 50-kilometer grid. The temperature and dew point estimates are corrected for the difference between the reference elevation of the MERRA-2 grid cell and the elevation of Nkurenkuru, according to the International Standard Atmosphere.

Land Use data comes from the Global Land Cover SHARE database , published by the Food and Agriculture Organization of the United Nations. Elevation data comes from the Shuttle Radar Topography Mission (SRTM) , published by NASA's Jet Propulsion Laboratory. Names, locations, and

time zones of places and some airports come from the GeoNames Geographical Database . Time zones for airports and weather stations are provided by AskGeo.com

3.4. Flora and Fauna

3.4.1. Flora

The Kavango West area is home to a diverse array of tree species, each contributing to the region's unique ecosystem. From towering **Baobabs** to the resilient **African teak** trees, the flora of Kavango West plays a crucial role in supporting local wildlife and maintaining the ecological balance. The trees not only provide shelter and food for various animals but also offer resources for local communities.

Kavango West's woodlands are characterized by dry, medium to tall savanna and woodland, with a notable presence of Pterocarpus angolensis and Guibourtia coleosperma trees. The region also features fine-leaved savanna dominated by Acacia species, particularly in the south. The Okavango River and its floodplains contribute to the area's green landscape. According to the vegetation structure map, on beginning of the proposed access road is characterised by dense shrublands. The reason being closer to the mighty Okavango River basin (approximately 2km from the river). Dense shrublands are characterized by a dominance of shrubs, with trees covering less than 40% of the area. They often feature a sparse herbaceous layer, and can include vines that contribute to the overall density. Shrublands provide a range of ecosystem services, including carbon storage, soil stabilization, and habitat for wildlife.

The rest of the project area as well the entire constituency can be classified as a woodland. Woodlands are characterized by their open structure with widely spaced trees, allowing sunlight to reach the ground and supporting a diverse understory of shrubs, native grasses, and other herbaceous plants.

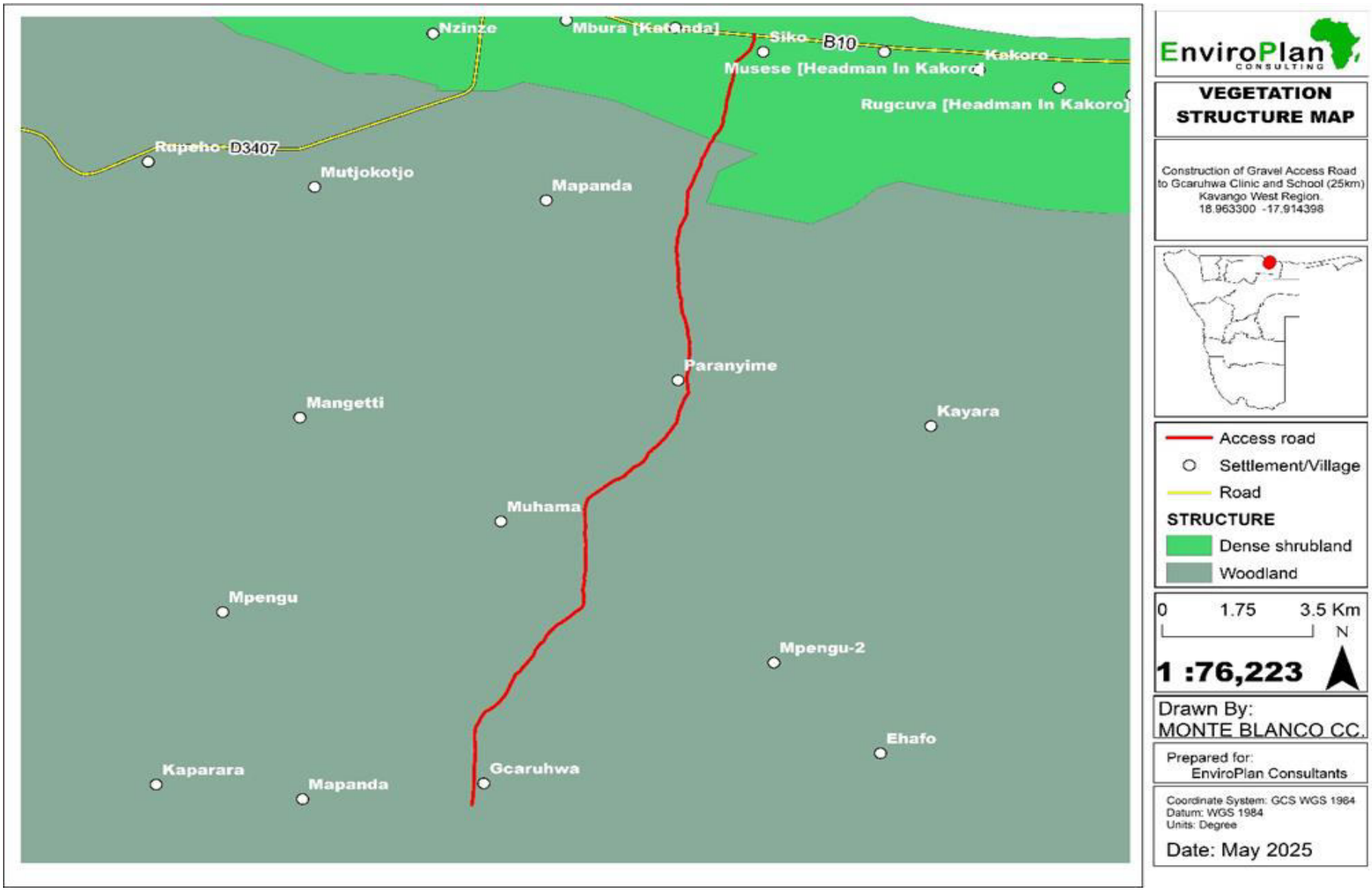

Figure 14: Vegetation structure Map

Figure 15: Plate A and B shows the common *Pterocarpus angolensis (*Usivi*) and* Uguva respectively near the project site area

3.4.2. Existing flora near project site

During a site investigation, the Environmental Assessment team combined a tree list. It was aiming to identify the exiting tree species within the project area. Table below provides a list the identified tree species that are most likely to be affected and their abundance.

Table 6: Identified Tree species in the project area and their abundance

Tree species (local, English and Scientific names)	Abundance status within the project area	Protection status Forest Act, 2001 (Act No. 12 of 2001)
Uguva- Kiaat (*Pterocarpus angolensis),*	Abundant shrubs and less matured trees	**Protected**
Uhahe- The Zambezi teak's (*Baikiaea plurijuga*)	Limited	**Protected**
Rosewood	Limited	
Usivi- False mopane *Guibourtia coleosperma*	Abundant shrubs and less matured trees	**Protected**
Mugoro- red bushwillow *Combretum apiculatum*	Abundant shrubs and less matured trees	
Ugongo- manketti nut *Schinziophyton rautanenii (Schinz) Radcl.-Sm.*	Limited	**Protected**
Marula-*Sclerocarya birrea* (A. Rich.) Hochst.	Limited	**Protected**

Schedule 7 of Forest Act, 2001, Regulations, 2015, Government Notice 170 of 2015 has listed that harvesting such trees for the sake of road construction is liable to a permit renewable after 6 months. The project proponent or appointed contractor is entitled to apply for such permits before commencement of the project. Failure to do so is punishable by law.

Importance of Protected Tree/Plants identified

Namibia, a country known for its diverse landscapes and unique flora, takes conservation seriously to protect its natural heritage. Among the many plant species found in the project area which are protected under the Forest Act.

3.4.3. Fauna

Kavango West in Namibia is characterized by a rich diversity of fauna, particularly within its woodland and savanna ecosystems. Notable species include elephants, buffalo, roan antelope, kudu, impala, and Burchell's zebra, along with predators like leopard and hyena. The area is also known for its abundant birdlife, with over 400 species recorded. The Kavango River and its associated wetlands support aquatic life like crocodiles and hippos, and unique species like sitatunga and red lechwe.

It was reported that elephants migrate from as far as The Mangethi National Park in search of food and water. The conservancy indicated that they do trophy hunting on elephants, crocodiles and Hippos. Human encroachment and settlement into the project area have made shy animals to relocate whilst nocturnal animals and migrating elephants make seasonal/frequent appearance.

Nevertheless, the community proved their effort to sustainable wildlife conservation by registering the Maurus Nekaro Conservancy which is dedicated to an integrated approach to wildlife protection. Anti-poaching campaigns, education and awareness programs are in place through the conservancy management team which includes the Wildlife and conservation rangers.

3.4.4. Habitat categorization

The proposed project site consists of open plains with deeper soil and scattered bushes and shrubs. The plains are used for cattle grazing and mahangu cultivation. The rest of the constituency can be characterized into two, a woodland and a dense shrubland. It relatively consists of the least vegetation or least species richness. It as well has watercourses that are perennial within the vicinity of the project area (The Okavango River). The watercourses are marked by having more bushes and scattered trees along their length, and the substrate is usually sandy and un-compacted.

Each of these habitats has its own distinctive food, shelter and refuge characteristics, but each harbor almost the same faunal component. In comparison, watercourse habitats and open plains are more widespread and more homogeneous. Therefore, avoidable disturbance in any of the area should be minimized, since they all support different types of flora and fauna species.

3.4.5. Amphibians Diversity

According to the desktop research, AI overview, the Kavango River is home to a diverse range of amphibians, including various frog and toad species. Some notable examples include the Kavango Pygmy Toad, the African Bullfrog, and several species of reed frogs and platannas. The river and its surrounding wetlands provide vital habitat for these creatures, supporting a complex ecosystem. Amphibian Diversity in the Kavango River can be grouped as follows:

- **Kavango Pygmy Toad:**

This toad, specifically named for the Kavango region, is a common inhabitant of the area.

- **African Bullfrog:**

A large and prominent frog species, the African Bullfrog is another well-known resident of the Kavango River ecosystem.

- **Reed Frogs:**

The Kavango River basin supports a variety of reed frog species, including the Longnose Reed Frog, Benguella Reed Frog, and Water Lily Reed Frog.

- **Platannas:**

Several species of platannas, also known as clawed frogs, are found in the Kavango River, including Peters's Platanna and Müller's Platanna.

- **Other Frogs and Toads:**

The Kavango River also hosts a range of other frog and toad species, such as the Guttural Toad, Lemaire's Toad, and various ridged frogs and rain frogs.

- **Challenges:**

While the Kavango River provides a rich habitat, the amphibians face challenges like habitat loss, pollution, and the impacts of climate change.

3.4.6. Mammals Diversity

Kavango West, Namibia, is home to a variety of mammal species, including elephants, buffalo, hippos, and various antelopes like lechwe, roan, and sable. Other notable mammals include lions, wild dogs, and various smaller species like jackals, monkeys, and porcupines. The region's proximity to the Kavango River and the Okavango Delta contributes to its rich biodiversity, AI overview.

3.4.7. Reptile Biogeography

The Kavango region of Namibia boasts a rich reptile biodiversity, particularly along the Okavango, Kwando-Chobe, and Zambezi rivers, which provide essential aquatic and wetland habitats. These rivers support diverse reptile species, including terrapins (like Pelusios sp.), aquatic snakes, and water monitors (Varanus niloticus). The area also hosts Nile crocodiles (Crocodylus niloticus).

3.5. Avifauna

Kavango West region in Namibia boasts a rich variety of birdlife, with over 676 of Southern Africa's 887 bird species potentially found within its diverse habitats. The area is known for its green floodplains along the Kavango River, which supports a wide range of bird species, including those that favours wetland environments. Some notable species include the African fish eagle, darter, black-crowned night herons, and various heron species.

Here's a more detailed look at the avifauna:

- **Wetland Habitats:**

The Kavango River and its floodplains are crucial for many bird species, particularly those that rely on aquatic environments. These include the African fish eagle, darters, herons, and various cormorant species.

- **Diverse Habitats:**

The region's varied landscapes, from floodplains to woodlands, support a wide array of birdlife.

- **Endemic and Near-Endemic Species:**

Namibia is home to 15 endemic and near-endemic bird species, some of which may be found in the Kavango West region.

- **Birding Hotspot:**

The Kavango area is recognized as a prime birding location, attracting birdwatchers eager to spot sought-after species like the Rüppell's Korhaan, Hartlaub's Spurfowl, Rüppell's Parrot, and Violet Wood-hoopoe.

3.6. Potential Ecological Impacts of the proposed access road

According to the Biodiversity study, the proposed activity will pass through a legally designated exclusive wildlife zone, where no human activity is allowed. These areas are deliberately set aside to enable wildlife breeding, seasonal dispersal, and sustainable hunting activities. Any disturbance

in these zones undermines their conservation purpose, leading to long term ecological degradation and potential violation of management agreements with the Maurus Nekaro Conservancy.

Ecological Significancy:

- The proposed road intersects a spatially critical migratory corridor used seasonally by elephants moving between water points and feeding areas, particularly around:
- Paranyime in Elephant Route 1 (17°54’44” S, 18°57’50” E),
- A water point near Muhama in Elephant Route 2,
- Gcaruhwa area in Elephant Route 4.

These corridors are part of the broader Kavango–Zambezi Transfrontier Conservation Area (KAZA TFCA) and traverse the Maurus Nekaro Conservancy. Additional risks arise from the location of borrow pits (at km 1+500, 9+400, 11+400, and 20+000), some of which lie within or near elephant routes and exclusive zones. This creates severe risks of habitat blockage, physical barriers to elephant movement, and potential accidents. Borrow pits that are left open, steep, or poorly rehabilitated could act as entrapment hazards for large mammals. Fencing is not an appropriate mitigation measure, as it creates permanent obstructions in elephant corridors and increases the risk of elephants attempting dangerous crossings.

3.6.1. Recommendations

Might the proponent go ahead with the project and we recommend that they follow the recommendations as stipulated in the ESMP and biodiversity report to address the impact on bio-diversity.

3.7. The General Geology, Surface and Ground Water

3.7.1. Local Geology

The Kavango West region in Namibia is characterized by Kalahari Group geology, with extensive sand deposits and dune formations. Specifically, the region features aeolian sand and dune formations overlying calcrete erosion surfaces. Dominant soil types are sands, and the region's landforms include stabilized seif dunes and sand plains.

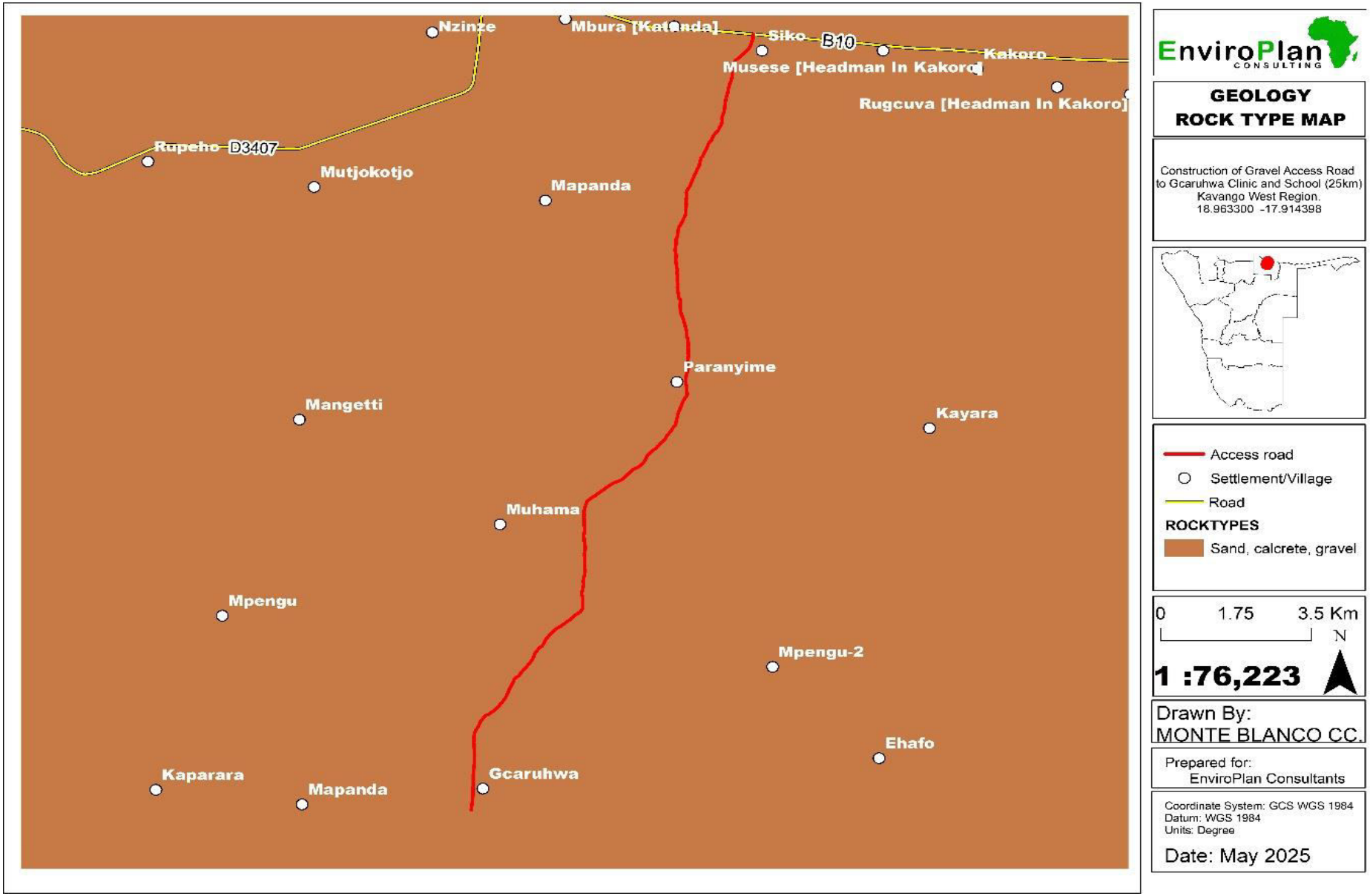

Figure 16: Geology map around project area.

3.7.2. Water Sources

The project area is likely to have underground water aquifers sources due to its proximity to the mighty Okavango River. The proposed activities will be done in a way that reduces surface runoff. The area has existing underground water boreholes to service the marginalized communities living within the project area.

3.7.3. Water Vulnerability

The proposed project is likely to have no major negative impacts on the water resources. The local area does not seem to have economic water resources. Therefore, the development of the proposed project is likely to have no negative impacts on water resources. The combined effects of unsaturated and saturated flow probabilities were used as indicator for groundwater vulnerability. However, groundwater or surface water will only be vulnerable to contamination if the following three (3) component are all present at the same time and at a site-specific area within project area:

(i) Contaminant sources resulting from proposed construction program;

(ii) Potential pathways for contaminant migration such as major high order discontinuities (ephemeral river channels, valleys and gullies;

(iii) Targets (economic water resources) present within the project area. Overall, the limited local groundwater resources found in the area form part of the poorly developed metamorphic rocks based confined and unconfined aquifer system that is moderately vulnerable to any sources of pollution

During designing and construction flood protection measures should be implemented.

3.8. Topography

For the purposes of this report, the geographical coordinates of Nkurenkuru are -17.617 deg latitude, 18.600 deg longitude, and 3,602 ft elevation. The topography within 2 miles of Nkurenkuru contains only modest variations in elevation, with a maximum elevation change of 180 feet and an

average elevation above sea level of 3,617 feet. Within 10 miles also contains only modest variations in elevation (322 feet). Within 50 miles also contains only modest variations in elevation (446 feet).

The area within 2 miles of Nkurenkuru is covered by grassland (85%), within 10 miles by grassland (65%) and shrubs (17%), and within 50 miles by grassland (61%) and shrubs (20%).

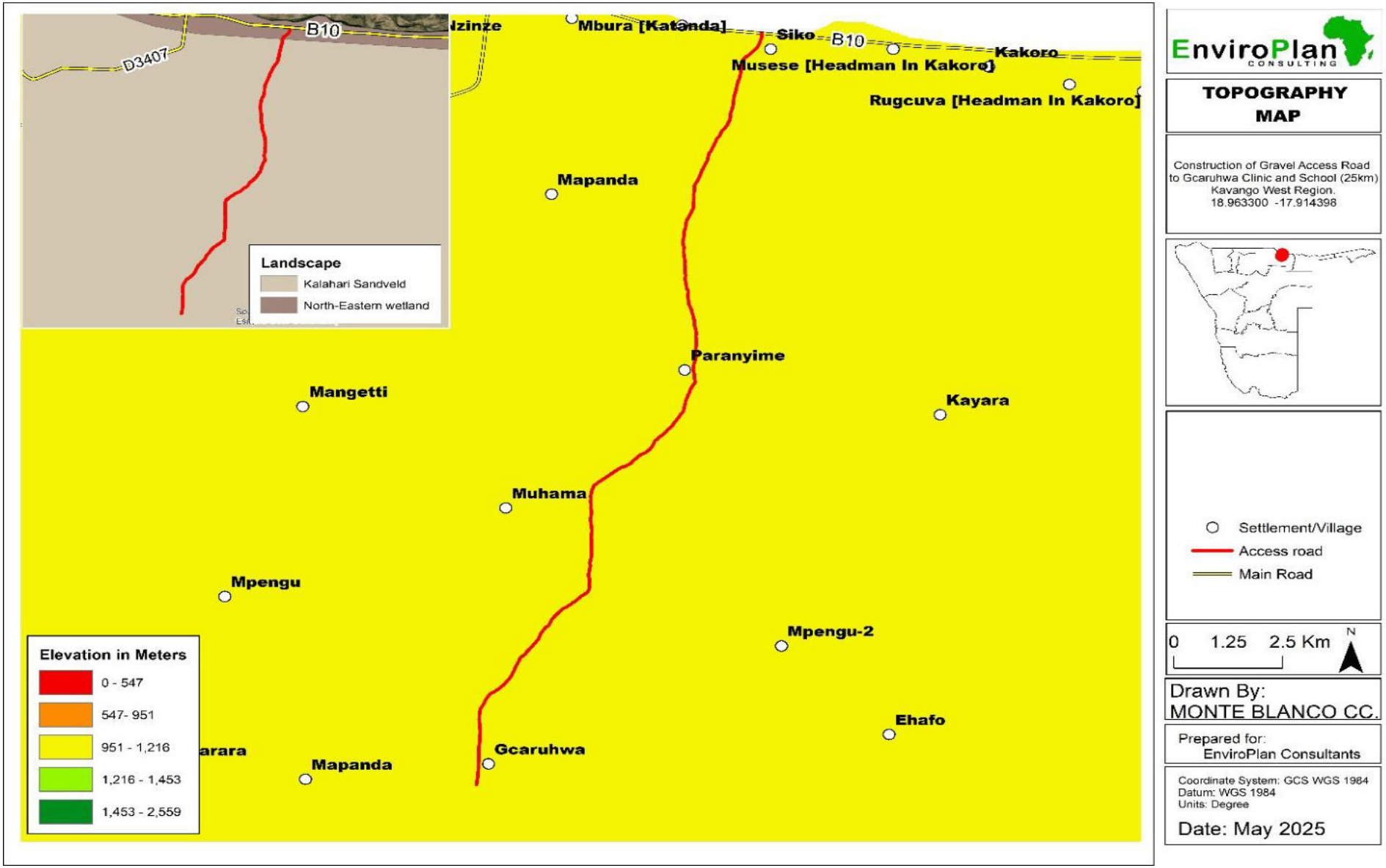

Figure 17: Topography Map

4. CHAPTER FOUR: PUBLIC CONSULTATION

Public and Stakeholder involvement, is a key component of the EA process. The public consultation process, as set out in Section 21 of Regulation No 30 of EMA, has been followed during this assessment and the details thereof documented below. This assessment process incorporated various means of publicity like newspaper public notices, site notices, stakeholder and public meeting and electronic mails were used; Appendix (ii) of this report outlines more evidence which depicts the widely used methods to integrate the public and keeping a strong stakeholder database. The Environmental consultant kept records and contact numbers of all the consulted parties.

4.1. Printed Media

4.1.1. Background Information Document

A Background Information Document (BID) was drafted at the onset of the EA process to act as a useful information handout about the proposed project development. In addition, the BID provided details on the public consultation process with contact details for further information. Please refer to Appendix (ii) of this report.

4.1.2. Newspaper Advertisements & Articles

Newspaper notices about the proposed project and related Environmental Assessment processes was circulated in two newspapers for two weeks. These notices appeared in the “The New Era” and “Confidante” newspapers as evidenced in the appendix ii of this report. Further call for public consultations was advertised through the word of mouth, through telephonic ways prior to the meeting by the respective headmen and respective coordination team. The project will as well be made available for commenting on MEFT EIA application online platform.

4.1.3. Site Notices

A site notice was placed at the project site. These provided information about the project and related EA while providing contact details of the project team.

4.1.4. Building a Stakeholder Database

A stakeholder database for the project collected through a variety of means. During the advertisement of the project (though public notices in local newspapers and site-notices) the list was augmented as Interested & Affected Parties (I&AP) registered and contact information of stakeholders updated, please refer to Appendix (ii).

4.1.5. Stakeholder Meetings & Key Conversations

On the 23 of April 2025 the Consulting engineers and Environmental Consultant attended an inception meeting with the key stakeholders for the project. Attached as Appendix (ii) are consultation evidence such as attendance list, organisations represented and minutes for the meeting. Figure 15 below shows a picture taken during the meeting.

Figure 18: Inception meeting held on the 23rd of April 2025 as part of the Stakeholders meeting

4.1.6. Public and community meetings

The Assessment team conducted meetings (3) and as well Focus group discussions with the residents of Siko, Muhama, Gcaruhwa and Paranyime who were notified through the telephone and word of mouth by their traditional leaders. Questionnaires were administered during the public meeting and an attendance register was made available for recording purposes.

Figure 19: Plate A, B and C showing community engagement through public meeting in pictures at Muhama, Siko and Gcaruhwa settlements respectively

Further consultations will be done by providing for an online platform for commenting through email to all members who registered as well the MEFT provided the general public to comment on the proposed activities. The EC was satisfied with the coverage held to capture public; stakeholders view on the proposed activity.

4.1.7. Comments and review period

From the onset of the public consultation process and the initial information sharing through the BID, newspaper and site notices, various stakeholders have registered and provided comments. The Scoping Report and Environmental Management Plan was made available to the public and stakeholders for comment and review. All comments were incorporated in the EMP (Appendix i) for the proposed activity. Questionnaires and proof of stakeholder's engagement are attached in appendix (ii) of this EAR.

The Environmental assessment team recorded a number of comments from both the stakeholders and the community. Attention was given to the impacts of the proposed project to the immediate community and were identified as positive and negative impacts. The EA team recorded the community and stakeholders' concerns as follows:

Raised concerns

- Employment opportunities- Preference should be given to locals when it comes to non- and semi-skilled tasks. Bringing foreigners would likely to increase illegal activities like poaching.

The Consulting Engineering team will ensure that the employment of locals is addressed in the contract with the appointed contractor.

- Infrastructural Development to the constituency
- Noise and Dust issues- nearby houses to the project are likely to be affected by dust and noise if they are not relocated (The IMP will address the issues of dust and noise).
- Impact on bio-diversity (Biodiversity study addresses the project's impact on biodiversity)
- Relocation of affected houses- at least two (2) affected houses and a Church at Muhama are likely to be relocated since they are too close to the proposed access road just at the beginning of the access road.
- Needy for a compensation plan to affected houses, church at Muhama and Mahangu fields- the community raised concerns that the proponent should address the compensation issues and all most every community member owns a Mahangu field to some of them are likely to be affected.

4.1.8. Conclusion

The EA team gathered the community grievances and were all addressed to through EMP design for the project. The proponent should by all means follow the guidelines as per IMP to ensure a sustainable project implementation.

5. CHAPTER FIVE: ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

5.1. Overview

The Ministry of Works and Transport has committed to sustainability and environmental compliance through coming up with a corrective action plan for all anticipated environmental impacts associated with the project. This is also in line with the Namibian Environmental Management legislation and International best practices on sustainable project implementation. The proponent will implement an Environmental Management Plan (EMP) in order to prevent, minimise and mitigate negative impacts. The environmental management plan is being developed to address all the identified expected impacts, the plan will be monitored and updated on a continuous basis with aim for continuous improvement to addressing impacts.

5.2. Assessment of Impacts

This section sets out the overall approach that was adopted to assess the potential environmental and social impacts associated with the project. To fully understand the significance of each of the potential impacts each impact must be evaluated and assessed. The definitions and explanations for each impact criteria are set out in table 5 below.

Table 7: **Assessment Criteria**

Duration – What is the length of the negative impact?	
None	**No Effect**
Short	**Less than one year**
Moderate	**One to ten years**
Permanent	**Irreversible**
Magnitude – What is the effect on the resource within the study area?	
None	**No Effect**
Small	**Affecting less than 1% of the resource**
Moderate	**Affecting 1-10% of the resource**
Great	**Affecting greater than 10% of the resource**

Spatial Extent – what is the scale of the impact in terms of area, considering cumulative impacts and international importance?	
Local	In the immediate area of the impact
Regional / National	Having large scale impacts
International	Having international importance
Type – What is the impact	
Direct	Caused by the project and occur simultaneously with project activities
Indirect	Associated with the project and may occur at a later time or wider area
Cumulative	Combined effects of the project with other existing / planned activities
Probability	
Low	<25%
Medium	25-75%
High	>75%

(Adopted from ECC-Namibia, 2017)

Table 8: Impact Significance

Class	Significance	Descriptions
1	Major Impact	Impacts are expected to be permanent and non- reversible on a national scale and/or have international significance or result in a legislative non- compliance.
2	Moderate Impact	Impacts are long term, but reversible and/or have regional significance.
3	Minor	Impacts are considered short term, reversible and/or localized in extent.
4	Insignificant	No impact is expected.
5	Unknown	There are insufficient data on which to assess significance.
6	Positive	Impacts are beneficial

(Adopted from ECC-Namibia, 2017)

Table 9: Environmental Impact and Aspect Assessment

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
TOPOGRAPHY	Landscape Scenery	Visual aesthetic impact	Construction	Moderate	Moderate	Local	Direct	Medium 25 - 75%	Minor	Access Road (borrow pits)
SOIL	Soil	Contamination to soil from waste disposal	Construction	Moderate	Small	Local	Direct	Low <25%	Minor	Access Road
	Soil	Spillages of fuel, oil and lubricants.	Construction	Short	Small	Local	Direct	Low <25%	Minor	Access Road
	Soil	Erosion	Construction and Operation	Moderate	Small	Local	Direct	Low <25%	Minor	Access Road
LAND CAPABILITY	Terrestrial ecology and aquatic ecosystems	Change in land use	Construction and Operations	Permanent	Moderate	Local	Direct	Low <25%	Moderate	Access Road
	Carrying capacity	Increase in human activities in the environment	Construction	Moderate	Moderate	Regional	Direct	Medium 25 - 75%	Moderate	Access Road
WATER	Surface water quality	Water pollution from oils and lubricants from vehicles and machinery.	Construction and Operations	Moderate	Moderate	Local	Direct	Medium 25 - 75%	Moderate	Access Road
	Surface water quality	Turbidity and high sediment load	Construction	Moderate	Small	Local	Direct	Low <25%	Moderate	Access Road

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
	Soil, Vegetation, Infrastructure	Flooding	Construction& Operation	Permanent	Moderate	Local	Direct	Medium 25 - 75%	Moderate	Access Road
AIR QUALITY	Air Quality	Construction phase dust	Construction and Operation	Short	Small	Local	Direct	Low <25%	Minor	Access Road
WASTE	Groundwater quality	Hazardous waste such as waste oil and lubricants.	Construction and Operation	Short	Small	Local	Direct	Low <25%	Minor	Access Road
	Surface water quality	Threatened from construction plant stormwater discharge into the river.	Construction and operation	Moderate	Moderate	Regional	Direct	Medium 25 - 75%	Moderate	Access Road
	Topography and Landscape	Visual impacts due to use of unsustainable disposal methods	Construction and Operation	Short	Small	Local	Direct	Low <25%	Minor	Access Road
FAUNA	Terrestrial ecology and biodiversity	Loss of habitat and disturbance to migrating elephants	Construction and Operation	Moderate	Moderate	Local	Direct	Medium 25-75%	Moderate	Access Road
	Avifauna	Birds can encounter physical crashes	Construction and Operations	Moderate	Small	Local	Direct	Low <25%	Minor	Access Road
	Aquatic life	Antifouling paints	Construction	Moderate	Small	local	Direct	Low <25%	Minor	Access Road

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
	Terrestrial ecology and biodiversity	Destruction of vertebrate fauna (e.g., road kills	Construction and Operations	Long	Moderate	Local	Direct	Low <25%	Minor	Access Road
FLORA	Terrestrial ecology and biodiversity	Proliferation of invasive species inland	Construction	Long	Small	Local	Direct	Low <25%	Moderate	Access Road
	Terrestrial ecology and biodiversity	Illegal collection of firewood	Construction	Long	Moderate	Local	Direct	Low <25%	Minor	Access Road
	Terrestrial ecology and biodiversity	Loss of unique flora and special habitats in the local environment because of general nuisance and animal migrate.	Construction	None	Small	Local	Direct	Low <25%	Moderate	Access Road
	Terrestrial ecology and biodiversity	Uncontrolled fires	Construction	Long	Great	Regional / National	Direct	Low <25%	Major	Access Road
SOCIAL	Noise Pollution	Increased noise levels	Construction and operations	Moderate	Small	Local	Direct	Low <25%	Minor	Access Road
	Socio Economic Activities	Temporary and permanent	Construction and operations	Long	Moderate	Regional	Direct	Medium 25 – 75%	Positive	Access Road

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
		employment prospects.								
	Relocation	Relocation of households, a church and mahangu fields disturbance	Construction	Long	Moderate	Regional / National	Direct	High >75%	Positive	Access Road
	Contribution to National Economy	Employment, local procurement, duties and taxes.	Construction and Operations	Short	None	Regional / National	Direct	Low <25%	Positive	Access Road
Heritage/Archaeology	Artefacts, archaeological high value components	Destruction or affecting paleontological and archaeological artefacts	Construction	Moderate	Moderate	Local	Direct	Medium 25 – 75%	Moderate	Access Road
HEALTH AND SAFETY	Health Sanitation	Poor ablution and waste management facilities may be detrimental to human health.	Construction	Moderate	Moderate	Local	Direct	Medium 25 – 75%	Moderate	Access Road
	Property and human life	Electrocution, fires resulting in fatalities, damage to	Construction	Moderate	Great	Local	Direct	Medium 25 – 75%	Major	Access Road

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
		properties, veldt fires and power surges. Occupational Safety and Health								

6. References

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7. APPENDIX (i): Environmental and Social Management Plan (Impact Management Plan)

8. APPENDIX (II): Biodiversity Study

9. APPENDIX (iii): Public and Stakeholders consultations evidence

10. APPENDIX (iv): Curriculum Vitae of the EnvironmentaL Assesment Practitioner(s)

11. APPENDIX (v): Pictures, site layout plans and Maps

12. Appendix (vi): Climate and Vegetation report by Maurus Nekaro Conservancy 2023/2024 season, source NACSO.