

**ENVIRONMENTAL IMPACT ASSESSMENT (EIA): FINAL SCOPING REPORT  
FOR THE  
UPGRADING TO BITUMEN STANDARDS: DR 3403 IN MUKWE CONSTITUENCY,  
KAVANGO EAST REGION (NAMIBIA)**

**PROJECT PROPONENT:**



SAFE ROADS TO PROSPERITY

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## **CHAPTER 1: INTRODUCTION**

### **1.1 Executive Summary and Overview**

The protection of the environment is a concept which receives increasing attention as understanding of the consequences of human action on the planet grows. Although the concept is enshrined in the Namibian constitution, development of the necessary legislation and regulation was somewhat slow. The insistence by aid agencies that environmental issues be addressed for externally funded projects, even before the local legislation was in place, was certainly instrumental in raising environmental awareness amongst practitioners in the fields of road design and construction.

Hence the Roads Authority (RA) produced its own manual (Environmental manual, 1st Edition October 2014) that seeks to inform practitioners as to the legal and contractual framework within which roads must be designed and built. But also to give guidance regarding the requirements of the RA in respect of environmental issues.

Therefore the RA is fully committed to environmental protection, and complement national legislative framework, while fulfilling its mandate; which is "The Roads Authority aspires to manage a sustainable road sector which is ahead of national and regional socio-economic needs in pursuit of Namibia's Vision 2030." The proposed upgrading of the DR3403 to bitumen standards is just one of the many initiatives for 2021/2022.

The proposed project is located in the Kavango East Region in Northern Namibia. It involves the upgrading to bitumen standard of the District Road 3403 stretching from Divundu via Bagani and ending at Mohembo Border Post in the Kavango East Region in Northern Namibia (Figure 1). The District Road 3403 starts at the junction with TR8/4 in Divundu and follows a south easterly direction for 8km to Bagani. From Bagani the road follows a southerly direction towards the Mohembo border post between Namibia and Botswana.



The road is approximately 32.3km long. The first 13.5km of the road is dust palliated/ low seal level tar road, meaning that the gravel road was surfaced with a light seal of a 13mm slurry seal. The remaining 18.8km is a gravel portion and was re-graveled in 2013. Both sections will form part of the upgrade to bitumen standards.

The entire road is made up of 150mm of fill material and 150mm of G5 wearing course material. This road (DR3403) provides accesses to several public services found along the road. This includes Rukonga Vision School, Mukwe Constituency office, Divundu Village Council, New NaTis office, Malaria Camp and school all found in the first 6km of the first section. Numerous lodges and camps are situated along the road namely; the Popa Falls National Park (smallest national park in Namibia), Rainbow River Lodge, Divava River Lodge, Ngepi Camp, Nunda River Lodge, Shometu Lodge, Mahangu Lodge and Ndhovu Lodge. The project route also passes through the Mahango National Game Park for approximately 13km that obviously contribute substantially to the road usage. There are no fences along the road within the Mahango game park thus allowing animals to cross the road freely. At Bagani, a clinic, Bagani combined school, police station and a 1.4km airstrip exists that could be lined to the Trans-Caprivi Highway. At 18.8km, there is an inland fishery institute contributing to the fishing sector.

There are low-level water crossing structures over a perennial stream from the Kavango River at kilometre 30.7 with six (6) barrels of 1200x1200 box culverts that were constructed during the 2013 re-gravelling programme. There are also numerous small pipe culverts (600mmx600mm) of which some have masonry headwalls and wing walls. These culverts would need to be upgraded to increase their capacity and provide additional structures, widening and replacement works applicable to the specific drainage structures. There are several existing borrow pits (5.4, 13.2, 17.5 and 23.0) which were not rehabilitated and should be investigated for use and rehabilitation.

The proposed works will affect an already developed road way with no new realignment needed, apart from a possible 2km realignment required toward the border post. At least 4700 people leaving along the development will experience long-term benefits, and also the many thousands who will be travelling between Namibia and Botswana will



benefit too. Especially considering that 54% of the residents in the region are unemployed.

Trinity Environmental Solutions (TES) was appointed by EMCON Consulting Engineers on-behalf of the Proponent to conduct an independent Environmental Impact Assessment (EIA) for the proposed development. In terms of Namibia's Environmental Management Act (No. 7 of 2007, Section 27 (2a&c)), Government Notice No. 29 of 2012 (Listed Activities, No. 3.1 & 10.1b) and the Government Notice No. 30 of 2012 (EIA Regulations), the latter proposed activity constitutes a number of listed activities which require Environmental Clearance prior to commencement of the project.



Figure 1: Location of DR 3403 (Google earth, 2021)



## **1.2 Project Proponent**

In accordance with the Roads Authority Act (Act 17 of 199) the Roads Authority was given the mandate to develop and preserve the national road network with a view of attaining a safe and efficient roads sub-sector. The purpose is to support the national, social and economic development agenda. Road transport is the dominant mode of transport for goods and people, and the condition of roads affect all sectors of the economy and every inhabitant of this vast country. Constructing new roads for providing access and for enabling trade and other economic activities, upgrading existing roads to higher standards to reduce transport costs, travel times and accidents and improve the competitiveness of Namibia's economy are activities that all require large financial resources.

Over the past years, the RA has implemented important road development programmes as part of the Harambee Prosperity Plan. Progress on most of these projects has been affected by timely flow of funding to these projects which delayed completion.

The RA must maintain all sections of some 43,000 km of the road network to the required standards with the view to preserving the asset and in so doing minimising the cost of road transport to the economy. The financial resources allocated to the RA for achieving this objective have been below requirements in the past years. But this now has improved, and hence engaging this proposed development.

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### **1.3 Purpose of the EIA**

This EIA study serves to determine, analyse and present the environmental impacts (positive and negative) of the proposed developmental project and associated infrastructure. The EIA will also formulate remedial measures to minimise and mitigate the negative impacts and plan in such a way that enables a rational decision to be made regarding the implementation and management of the proposed project.

This EIA will further contribute to the reduction or mitigation of adverse impacts by generating a number of project alternatives for the proposed development. In general, the purpose of this EIA is to anticipate and prevent, minimise and/or manage, potentially significant negative impacts of development that may:

- Cost too much money to rectify in the future;
- Pose risk to lives, livelihood or health of current and future generations;
- Result in irreplaceable loss of resources and reduced options for future well-being; and,
- Help to seek opportunities to optimise potential benefits of development.

As a responsible Conservation organisation, the Proponent is committed to enhancing positive biophysical and social environmental impacts of the project while mitigating negative impacts of the project. During the scoping exercise, the Proponent has emphasized that it attach great importance to environmental sustainability and human well-being. The Proponent also recognizes the strong correlation between environmental sustainability and human well-being through good health that depends on healthy ecosystems, clean water and air. All of the above is further appreciated by the decades of direct experience in sustainable roads construction, upgrading and maintenance.

Therefore, this Environmental Impact Report has been prepared with a view to comply with RA's Environmental Manual, the Namibia's Environmental Assessment Policy of 1995, the Environmental Management Act No. 7 of 2007, Government Notice No. 29 of 2012 (Listed Activities) and the Government Notice No. 30 of 2012 (EIA Regulations).



## **1.4 Scope of the EIA Study**

Trinity Environmental Solutions (TES) undertook to carry out the EIA study by following a well defined framework. Owing to the importance of Interested and Affected Parties (I&APs) involvement in environmental studies. The EIA team ensured that I&APs consultations were central to every step of this EIA process.

The scope of the EIA study comprised of public meetings, I&APs consultations and detailed site specific investigations. Details of each process component are elaborated below.

### Scoping Exercise

The scoping exercise aimed at identifying and screening all relevant issues related to the development project as well as identifying at the earliest possible time whether any adverse effects existed that could render the proposed project environmentally unacceptable. Specifically, scoping assisted in:

- Focusing the impact assessment on a manageable number of important questions on which decision making is expected to focus;
- Ensuring that only key issues and reasonable alternatives are examined;
- Informing the interested and affected parties and other key stakeholders about the project and to obtain their inputs, issues and concerns; and,
- Identifying fatal flaws in the proposed project planning.

### Existing Environmental Conditions

To establish prevailing environmental conditions for the project area, environmental and socio-economic data including surrounding areas was collected, compiled and analysed. Findings of the analysis are presented in the following Sections. Biological, zoological, botanical and socio-economic studies carried out in the past for the area provided secondary data for the report.



### Descriptions of Project Activities

Project inputs, activities and outputs during project preparation, construction and operational life stages were reviewed and are described in this section. This section also includes description of project alternatives.

### Analysis of Potential Environmental Impacts

An assessment of environmental effects and benefits of the proposed project regarding biophysical and socio-economic environment has been undertaken as well as an analysis of the impacts' extent, duration, intensity and significance.

### Formulation of Possible Mitigating Measures

Based on the analysis of findings, a number of measures and plans for mitigating the identified possible adverse environmental impacts of the project are proposed. Further, the report proposes measures and plans for enhancing positive environmental impacts of the project. And wherever possible, the costs and benefits of these environmental measures are quantified.

### Elaboration of an Environmental Management Plan

An Environmental Management Plan (EMP) for implementing the proposed mitigating measures during the project preparation, construction and operation phases of the project was developed. The EMP further indicates management responsibilities and time frames. See **Appendix B**.

## **1.5 Stakeholder Consultations**

TES's approach to environmental assessment studies is aimed at ensuring that wide stakeholder participation and involvement is achieved. Recognising this, and as part of the transparent consultative process aimed at taking public views into account in determining the scope of the EIA, a public consultative process started in the area early as March 2021. Public meetings were held from 4-6 July 2021 at the Fumu Mbambo Palace, Divundu, Bagani, Kamutjonga and Mohembo Border Post. The meetings were announced locally by the Mukwe Constituency Councilor and local headmen, and were



also advertised in local newspapers. Due to the COVID-19 Regulations, only 10 participants were allowed to attend, hence limiting participation to local Traditional Authorities, Political Leaders, key GRN institutions representatives and Private Sector. Telephonic conversation took place and Background Information was sent to the Ministry of Environment, Forestry and Tourism (MEFT) and I&APs via email.



Figure 2: Public Meeting held Kamutjonga Village (06 July 2021)

Only one person T. Kanime ([kanime.tuli273@gmail.com](mailto:kanime.tuli273@gmail.com)) registered as an Interested and Affected Party.

Key Interested and Affected Parties consulted include:

- Fumu Erwin Mbambo - Hambukushu Traditional Authority
- Hon Councilor Damian Maghambayi - Mukwe Constituency



- Divundu Town Council - Management
- Mr. T. Nghitila - MEFT Executive Director
- Mr. C. Sikopo - MEFT Deputy ED
- Mr. B. Kahuure - MEFT Park Director
- Mr. K. Uiseb - MEFT Scientific Services Deputy Director
- Mr. B. Sinonge - MEFT Mahango Game Park
- All Headmen from Divundu, Bagani and Kamutjonga

### **1.5.1 Methodology**

The Interested and Affected Parties (I&APs) consultative process involved meetings, open discussions and interviews with relevant government institutions and representatives from the local community. Through this interaction the EIA team tried to establish how Interested and Affected Parties understood the dynamics of the environment in which the proposed project is located and any possible underlying causes that could lead to changes over time as a result of implementing the project.

Where the EIA team felt it necessary to go more in-depth on a particular matter, Interested and Affected Parties within the project area or surrounding area with either experience or expert knowledge of the study area were identified and interviewed to validate the data already obtained, as well as to get their advice on any additional sources of information that was not readily available. This was useful in interpreting any underlying factors of the trends already observed.

The outcome of these Interested and Affected Parties consultations and interviews further provided relevant background information to this report and helped identify potential environmental issues of concerns within the project area.

### **1.5.2 Stakeholder Consultation Outcome**

The meetings and informal interviews conducted did not raise any objections against the proposed development. Key component of the proposed development is that it is a



brown fields activity that will affect an already developed area with an identical use - which a road way.

Key issues raised and discussed during the public consultation include:

A. Divundu

- Compensation takes too long.
- Need to ensure speed is controlled along the Divundu and Bagani section.
- Monument places need to be protected.
- Ensure that dust is suppressed during construction.
- Road construction was proposed to start from Mohembo border post.
- Taxi ranks and bus stops: Council requested that taxi ranks and bus stops to be incorporated into the design of the road.
- Need for the sharp curves to be addressed between Divundu and Bagani.
- Need to advice Contractors to employ local people and sub-contractors.

B. Bagani

- Concerned about moving people and delaying to compensate people.
- Community wishes to engage the government for request the Airstrip to be rehabilitated and also to build a Dry Port.
- Ensure that dust is suppressed during construction.
- Need for the sharp curves to be addressed.
- Need to advice Contractors to employ local people and sub-contractors.
- Monument places need to be protected.
- Question was raised about the 120km/hour in such a densely populated and busy area.

C. Kamutjonga

- Strongly advised that Contractors need to employ local people and sub-contractors whenever possible. (A lot of discussions concerned employment)
- Requested for access roads to schools and clinic.
- Compensation need to be fair.





#### D. Mohembo Border Post

- There was a common expression that too many accidents occur in the park. With the road upgrading to bitumen standard, the officers expect more accidents and hence, asked if the RA will put up speed-humps.
- The officers welcomed the proposed development as it will reduce vehicles repairs.
- There was also a proposal to widen the roads in the "no-man's' land" since two truck are not able to pass at the same time.

During the various formal consultations from March 2021 to September 2021 with members of the local community, Political Leadership, Traditional Leadership, MEFT, Customs and Namibian Police, no objections were raised. The proposed project is seen as a positive development desperately needed to facilitate access to services and efficient transport, and creating much needed jobs.

A single building was identified that falls within the road reserve but will not need to be removed due to its historical importance and at least 15m from the road way. The building was a Church in the early 1900s, but use as a Pre-school. No further protection is required.



Figure 3: Old Church building in Bagani



### **1.5.3 EIA Study Team**

TES is a firm of environmental consultants that has been active in Namibia since its establishment in 2012. TES staff have extensive experience in a variety of projects related to EIAs, socio-economic, water resources management, sustainable land management and on climate change mitigation.

Previous and Current Projects inter alia include:

- EIA and EMP for a 2.5 MW Solar PV Plant in Okongo
- EIA and EMP for Ndiyona Irrigation and Mill Development.
- EIA and EMP for Osona Township development near Okahandja.
- EIA and EMP for the development of Ruacana Quarry.
- EIA and EMP the construction of an Industrial and Business Estate in Lubumbashi area, Democratic Republic of Congo.
- EIAs and EMPs for the upgrading of two gravel roads, DR3608 and MR67 to bitumen standards, approximately 185km in total length.
- EIA and EMP for new wastewater treatment ponds for Engela, Groot Aub, Andara, Onesi, Ogongo towns and villages.
- Supervision of the Environmental Monitoring and Auditing for the MR122 road upgrading from gravel road to bitumen standards.

Don Muroua, Environment Management Specialist: Mr. Muroua has compiled this Scoping Report and the EMP. He has also carried out the overall environmental assessment and public participation activities. Mr. Muroua is a qualified environmental manager and a founding member of the Environmental Assessment Practitioners of Namibia (EAPAN). He is familiar with conducting EIA studies, preparing EIA reports and EMPs, conducting specialist studies which include socio-economic assessments and ecological studies. Mr. Muroua is also a Professional Member of the Southern African Institute of Ecologists and Environmental Scientists (SAIEES).

Apart from Namibia, Mr. Muroua's experience extends across numerous countries including the Democratic Republic of Congo, South Africa, Malawi, Swaziland and Kenya.



## CHAPTER 2: DESCRIPTION OF PROPOSED PROJECT

### 2.1 Location

The Environmental Clearance Certificate is applied for the upgrading of 32.3km DR 3403 road. The proposed project is located in the Kavango East Region in Northern Namibia. It involves the upgrading to bitumen standard of the District Road 3403 stretching from Divundu via Bagani and ending at Mohembo Border Post in the Kavango East Region in Northern Namibia (Figure 4). The District road 3403 starts at the junction with TR8/4 in Divundu and follows a south easterly direction for 8km to Bagani. From Bagani the road follows a southerly direction towards the Mohembo border post between Namibia and Botswana. The road is approximately 32.3km long. The first 13.5km of the road is dust palliated, meaning that the gravel road was surfaced with a light seal of a 13mm slurry seal. The remaining 18.8km is a gravel portion and was re-graveled in 2013. Both sections will form part of the upgrade to bitumen standards.

Starting at Divundu (Lat -18.098952°, Long 21.548981°)

Ending at Mohembo Border Post (Lat -18.257093°, Long 21.760004°)



Figure 4: DR3403's PGS coordinates (Google Earth, 2020)



## **2.2 Project Rationale**

The Roads Authority aspires to manage a sustainable road sector which is ahead of national and regional socio-economic needs in pursuit of Namibia's Vision 2030." The proposed upgrading of the DR3403 to bitumen standards is just one of the many initiatives for 2021/2022.

Upgrading this road to bitumen standards will provide improved access to social services centres such as schools and clinics, some of which are used as pensioner pay points and water pay points in the region. Tourist attraction centres such as Mahango Game Park, Kamutjonga Inland Fishery Institute (KIFI) will also benefit greatly from this project.

However, apart from providing access to social services, tourist attraction centres, the upgrading of this District Road 3403 to bitumen standards will also reduce costs of maintenance, roads user costs, travelling time, transport costs and reduce accidents.

The objectives of upgrading the project, DR3403 to bituminous standards could be seen as follows:

1. To connect the Trans-Caprivi Highway to the Botswana road system via the Mohebo border post which serves the Kavango swamps.
2. To serve the local communities and tourists and to reduce road user costs.
3. To save on maintenance costs arising from rising traffic volumes. The road currently serves 430 vehicles daily and grading the gravel road three or four times a year is no longer sufficient.
4. This network connection will also provide access to schools, various lodges along the route, clinics and the 1.4km airstrip at Bagani.

Once completed, the road will be proclaimed as a Trunk Road and will form part of the SADC's regional trunk route, which aims to promote the development of the country through inter-regional trade. As a member of SADC, Namibia is committed to the development of regional transport infrastructure, which was identified by all member countries as a development priority.



The project will also support the development of the northern regions of the country, which is characterised by the ever-growing agricultural sector, a key component of the National Development Plan. The paving of the road aims to also improve market accessibility in terms of import/export of agricultural products.

## **2.3 Project Description and Alternatives**

### 2.3.1 Project Description

Application for the Environmental Clearance from the Directorate of Environmental Affairs and Forestry (DEAF) is being made for the upgrading of DR3403 to bitumen standards.

The constructions works envisaged will be as follows:

- The Rehabilitation of the existing 13.5km (from Divundu to Bagani area) of a 13mm slurry seal to full bitumen standards.
- The Upgrading of the gravel road to Bitumen standards from kilometre 13 to kilometre 32.3.
- Upgrading of existing drainage structures to increase their capacity, provide additional structures, widening and/or replacement.

Prospecting of suitable road materials will be sourced along the road, in existing borrow pits at 5.4km, 13.2km, 17.5km and 23km that will be evaluated.

Graders, roller compactors, front loaders, excavators, survey equipment, water dozers, tipper trucks, slurry trucks, chip spreaders & fog spray trucks, are some of the equipment to be used during the 16 months construction period starting next year.

It is anticipated that the existing alignment will be used as far as possible with minor adjustments to comply with the Roads Authority's standards. Properly constructed accesses will be provided to adjacent settlements, villages, schools, hospitals and clinics, police stations, government offices and at any other locations where it is evident that



traffic accesses or leaves the road to be constructed. The positions of the intersections and accesses have to be determined through stakeholder consultations and shown on the drawings.

### 2.3.2 Design and Layout

The design and construction will be performed in accordance with various RA's Manuals such Section 4 (Detailed Design Stage) of the RA Procedures Manual. Any proposed deviation from the requirements of the RA Manuals must be brought to the attention of the Roads Authority.

The appropriate manuals to be consulted i.e.

- TRH 4: Structural Design of Interurban and Rural Pavements published by the Committee of Roads Authorities of South Africa.
- Code of Practice for Pavement Design (Southern Africa Transport and Communications Commission (SATCC), 1998).

The road will have a 60m wide reserve that will include the following Figure 5 to Figure 7:

- Road reserve 60m total. No vegetation clearing required for total area and only fences will be moved. No building will be affected, especially since most building within the 60m zone are in an urban area, hence residential or settlement area. The maximum speed also in the heavily populated area need to be adjusted to 80km/h to 100km/h. Vegetation thinning might be required only at specific areas to improve wildlife visibility in the Mahango Core area.
- Road way, about 6.9m wide. Area to be used as carriage way for goods and public (no clearance needed since this road way already exist)
- Road shoulders and Sided Slope (no vegetation clearing required, since it already exist).





Figure 5: DR3403 Road reserve in already surfaced area, from Divundu to Bagani 13,5km in total of the 32.3km (Google earth, 2021)



Figure 6: DR3403 Road reserve in Mahango Core Area (Google earth, 2021)

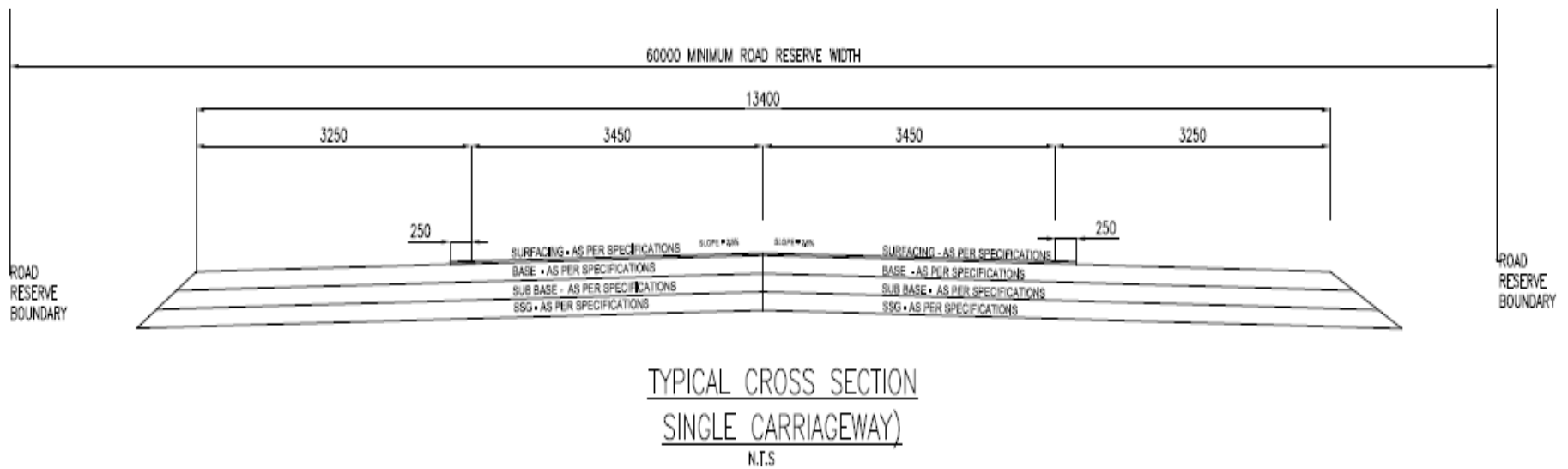


Figure 7: Typical cross section of a bitumen standard road

See also **Appendix A**.



### 2.3.3 Project Alignment Alternatives

Various alignment alternatives were proposed and discussed with I&APs. These are depicted in Figure 8, and as follows:

- Re-alignment 1: Between Divundu and Bagani. This was proposed by the community and the RA. It was later decided by the RA and the consulting team to not go ahead with the re-alignment because it would lead to loss of homesteads, crop field and relocation of residents. Hence, speed will be controlled by putting up appropriate road signs and rubber strips on the road way.
- Re-alignment 2: At Bagani. This was proposed by the community and the RA. It was later decided by the RA and the consulting team to not go ahead with the re-alignment because it would lead to loss of homesteads, crop field and relocation of residents. Hence, speed will be controlled by putting up appropriate road signs and rubber strips on the road way.
- New alignment: Mahango Core Area. This new alignment is necessitated by the RS' standards that do not allow for a sharp curve on a bitumen standard road. ***This proposed new alignment was withdrawn after recommendations from the EIA Process.*** See Figure 9.

### 2.4 No-Go Alternative

**No-Go Alternative:** If this option is selected, the development will not proceed. In essence, the no-go alternative would ultimately imply that the status quo would be retained as it is presently, with obvious advantages and disadvantages. The benefits of continuing with this proposed upgrading of the DR 3403 significantly outweigh the loss of 9ha of habitat in the park. The Department of Environmental Affairs and Forestry (DEAF) in the MEFT stresses that the no-go alternative should only be considered in cases where the proposed development will have a significant negative impact that cannot be effectively or satisfactorily mitigated against.





Figure 8: DR 3403 Alignment Alternatives



Figure 9: DR 3403 - New Alignment in Mahango Core Area (1,5km long)





### **CHAPTER 3: LEGAL, REGULATION AND POLICY FRAMEWORK**

The Table 1 below summarises the legislation and policy guidelines that are relevant to the proposed project and is not exhaustive.

Table 1: Relevant legislations and policy guidelines

<b>Title of legislation, policy or guideline</b>	<b>Implications for proposed project (Please read all Acts with their Regulations)</b>
The Namibian Constitution of 1990	The Constitution clearly indicates that the State shall actively promote and maintain the welfare of the people by adopting policies aimed at management of ecosystems, essential ecological processes and biological diversity of Namibia for the benefit of all Namibians, both present and future.
Water Resources Management Act No. 11 of 2013	This Act protects all water resources in Namibia. The Act also laid down conditions to ensure that proper wastewater treatment is provided, including requirement for wastewater discharge permit from the Directorate of Water Affairs.
Environmental Assessment Policy of Namibia (1995)	The Policy seeks to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.
Environmental Management Act No. 7 of 2007	The Act provides a list of projects requiring an Environmental Assessment. It aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities which may have significant effects on the environment.
Roads Authority Manuals	These are various manuals all contractors are or must be aware of when dealing with road construction works in Namibia. These manuals are on, but not limited to: <ul style="list-style-type: none"> <li>• Procedures Manual (1st Edition, October 2014)</li> <li>• Materials Manual (1st Edition, October 2014)</li> <li>• Structures Manual (1st Edition, October 2014)</li> <li>• Drainage Manual (1st Edition, October 2014)</li> <li>• Survey Manual (1st Edition, October 2014)</li> <li>• Geometrics Manual (1st Edition, October 2014)</li> <li>• Environmental Manual (1st Edition, October 2014)</li> <li>• Construction Manual (1st Edition, October 2014)</li> <li>• Economic Evaluation Manual (1st Edition, October 2014)</li> <li>• Standard Drawings Manual (1st Edition, October 2014)</li> </ul>
Park Regulations	Regulations, including rules prescribe how visitors to the park must behave which also include any other persons such as construction workers. This regulations determines visitors entry and exit, speed limits, when allowed to be in the park, who should be in the park, type of activities allowed in the park, etc.
Nature Conservation Ordinance Number 4	Guide the conservation of nature; the establishment of game parks and nature



*Environmental Impact Assessment, Final Scoping Report*  
*Upgrading to Bitumen Standards: DR 3403 in Mukwe Constituency, Kavango East Region (Namibia)*

of 1975 (as amended)	reserves; the control of problem animals; and to provide for matters incidental thereto.
Management Plan of Bwabwata National Park 2020/2021-2029/2030	This management plan sets out the objectives and guidelines for the management and development of the Bwabwata National Park. As such, it represents the policies and intentions of the Ministry of Environment, Forestry and Tourism (MEFT) on how the park should be managed.
MEFT Policy Document - Community-Based Tourism Development (June 1995)	<p>This document contains the approved Ministry policy for providing support to, and encouraging the development of, community-run tourism activities and enterprises on communal land.</p> <p>This policy document provides a framework for ensuring that local communities have access to opportunities in tourism development and are able to share in the benefits of tourism activities that take place on their land.</p> <p>Support for the involvement of rural communities in tourism enterprises is important:</p> <ul style="list-style-type: none"> <li>a) to implement the government policy of giving communities access to development opportunities and</li> <li>b) because where tourism is linked to wildlife and wild landscapes, the benefits to local communities can provide important incentives for conservation of these resources.</li> </ul>
Act No.5, 1996 Nature Conservation Amendment ACT, 1996	<p>This amend to the Nature Conservation Ordinance of 1975, provide for an economically based system of sustainable management and utilisation of game in communal areas.</p> <p>This amend allows for the formation of Conservancies in communal areas.</p>
Hazardous Substances Ordinance No. 14 of 1974	<p>The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.</p> <p>Hydrocarbons handled during the construction phase may be hazardous thus careful handling and management is vital to prevent spills, explosions, ill-health or death.</p>
Pollution Control and Waste Management Bill of 1999	The Bill promotes sustainable development and the establishment of the Pollution Control and Waste Management Unit; to prevent and regulate the discharge of pollutants to the air, water and land; to make provision for the establishment of an appropriate framework for integrated pollution prevention and control; to regulate noise, dust and odour pollution; to establish a system of waste planning and management; and to enable Namibia to comply with its obligations under international law in this regard.
Draft Wetlands Policy of 2004	This policy strives to complement existing policy instruments regarding sustainable development and sound natural resource management in Namibia. Its implementation provides a platform for the conservation and wise use of wetlands, thus promoting inter- generational equity regarding wetland resource utilisation. Furthermore, it facilitates the Nation's efforts to meet its commitments as a signatory to the International Convention on Wetlands (Ramsar) and other Multinational Environmental Agreements (MEA's).
National Waste Management Policy, 2010	This policy is focusing specifically on Waste Management and use of various technologies waste treatment and disposal to minimize health risks. It is also geared to have a unified waste management system country wide. This policy provides the necessary guidance on the processes related to waste management in the MOHSS, wider Namibia health and social welfare sectors, and other relevant stakeholders. It is taking into consideration the process of integrated waste management from generation to final disposal. This practice also focus on medical, household, mining, agricultural, and construction waste.



*Environmental Impact Assessment, Final Scoping Report*  
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Forest Act No. 12 of 2001 and its amendments	The purpose of this Act guides the use and management of forestry and related resources. The aims of the forest management as per the Act, is to achieve manage of forest "for which forest resources are managed and developed, including the planting of trees where necessary, 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."
National Heritage Act No. 27 of 2004	The Act provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.
Labour Act No. 11 of 2007)	Consolidate and amend the labour law; to establish a comprehensive labour law for all employers and employees; to entrench fundamental labour rights and protections; to regulate basic terms and conditions of employment; to ensure the health, safety and welfare of employees; to protect employees from unfair labour practices; to regulate the registration of trade unions and employers' organisations; to regulate collective labour relations; to provide for the systematic prevention and resolution of labour disputes; to establish the Labour Advisory Council, the Labour Court, the Wages Commission and the labour inspectorate; to provide for the appointment of the Labour Commissioner and the Deputy Labour Commissioner; and to provide for incidental matters.
Public Health Act, No. 36 of 1919 and Amendments and Regulations	This Act makes provision for the prevention and control of infectious diseases, venereal diseases and epidemics. It also regulates sanitation, food and public water supplies.



## **CHAPTER 4: DESCRIPTION OF EXISTING ENVIRONMENT**

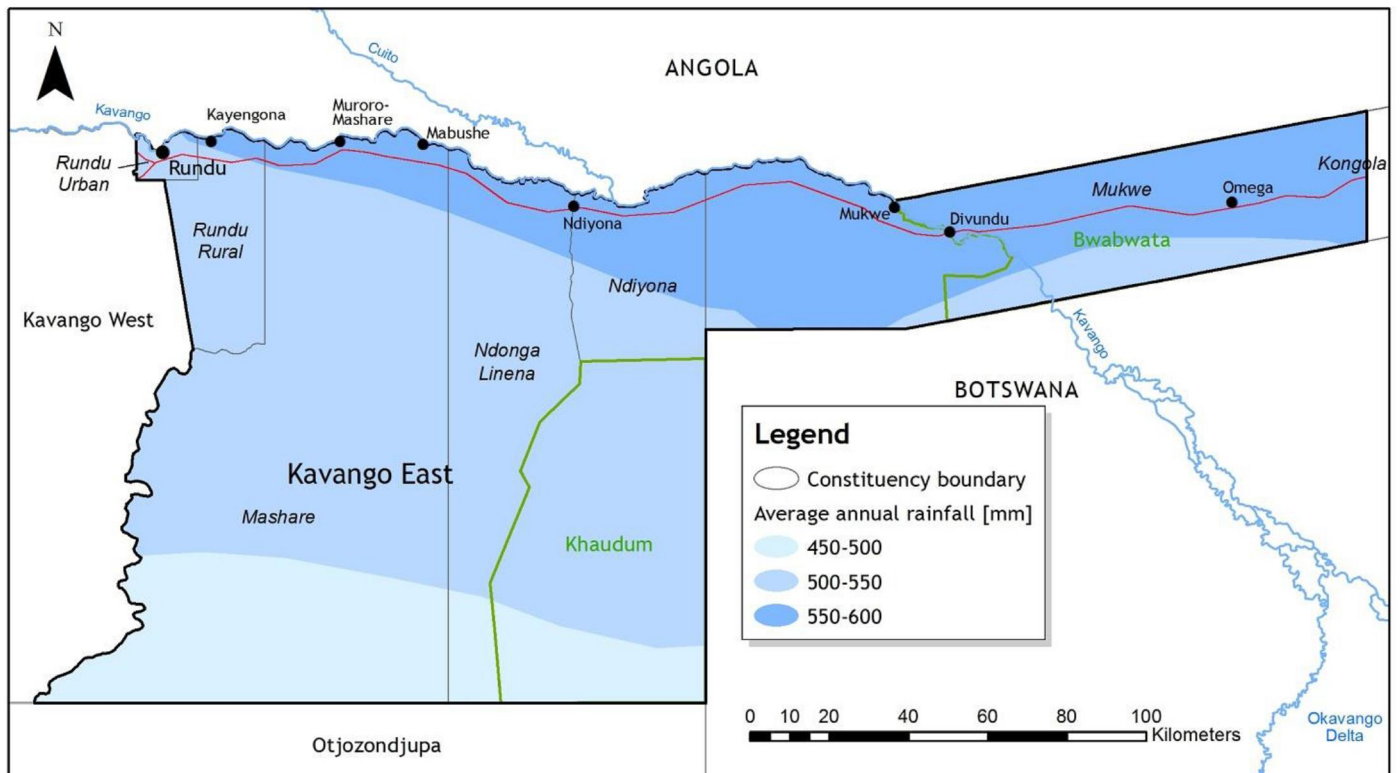
The project area is the same as the current DR3403 as shown in Figure 1, located in the Mukwe Constituency in the Kavango East Region. The Kavango East Region stretches from just west of Rundu up to the eastern boundary of the former Kavango Region. The Region covers an area of 23 983.2 km<sup>2</sup> and constitutes about 2.9% of Namibia's extent. The region is bordered by the Kavango River and Angola to the north, the Zambezi Region and Botswana to the east, the Kavango West Region to the west and the Otjozondjupa Region to the south. There are 6 Constituencies in the Kavango East Region: Rundu Urban, Rundu Rural, Mashare, Ndonga Linena, Ndiyona and Mukwe. Rundu is the capital of the Region. In extent, Mashare is the largest of the constituencies, while Rundu Urban is the smallest.

### **4.1 Physical Environment**

#### **4.1.1 Climate**

The former Kavango Region generally receives more rain than the rest of the country (except Zambezi) with an annual average rainfall that varies between about 450 and 600 mm with the highest rainfall in the most northern areas. See Figure 10.

As with most of Namibia, the Kavango East Region receives summer rainfall with the first early rains coming to the region in October and November. The highest rainfall usually occurs in January and February and the months from May to September tend to be dry. (Mendelsohn, Jarvis, Roberts, & Robertson, 2002)



**Figure 10: Mean Annual Rainfall**

While about 80% of all rain falls between December and April, the amount, timing and effectiveness of rainfall varies greatly from year to year and also from place to place, making rain-fed crop production very risky. For instance, a period of about four weeks with dry, hot weather can cause failure of mahangu fields, the staple and favourite crop for most smallholder farmers.

#### 4.1.2 Temperature

The Kavango East Region experiences average maximum temperatures of over 30°C for nine months of the year and average minimums of 4-6°C during the winter months of June, July and August. While temperatures below freezing point are only rarely recorded and mostly occur in the low-lying valleys, such as those of the Kavango River, they nonetheless rule out the option of growing any frost-sensitive tropical fruits (e.g. litchis, macadamia nuts) in the irrigable areas close to the river. On the other hand, in summer



the very hot and dry conditions can prevent fruit 'setting', which is why most citrus varieties do not do well in Kavango Region.

#### **4.1.3 Soils, Geology and hydrogeology**

In terms of soils, the Kavango Region is an undulating plain of unconsolidated sands that gradually slope down northwards to the Kavango River and eastwards to the lowest areas along the river before it enters Botswana. The plains undulate from sculpting of the sand into long, low east-west oriented dunes that are covered in vegetation and not generally visible. The plains are traversed by small ephemeral river channels, the most prominent one being the Omuramba Omatoko that meets the Kavango River east of Rundu.

The most conspicuous and important feature in the region is the perennial Kavango River, making up 350 km of Namibia's northern border before crossing the region and flowing into Botswana. Almost the entire runoff of the Okavango basin is generated in the Angolan highlands with the main Rio Cubango providing over half the total runoff. The Rio Cuito joins the Kavango River about 100 km downstream of Rundu, and has a more even flow rate and later flood peak.

The flat landscape and high permeability of the sandy soil produce very little surface runoff. Occasionally, water collects and flows in some of the shallow omurambas, or the pans in shallow depressions, but these events are short-lived.

Considering the physical characteristics of the region discussed above, one can surmise that due to the abundance of natural resources close to the Kavango River, life is comparatively easy and vegetation and animals can be easily supported. However, living conditions in small, remote villages away from the river and main roads are difficult with little access to services and limited economic opportunity. Furthermore, land available for settlement, grazing and crop cultivation is also increasingly limited close to the river.

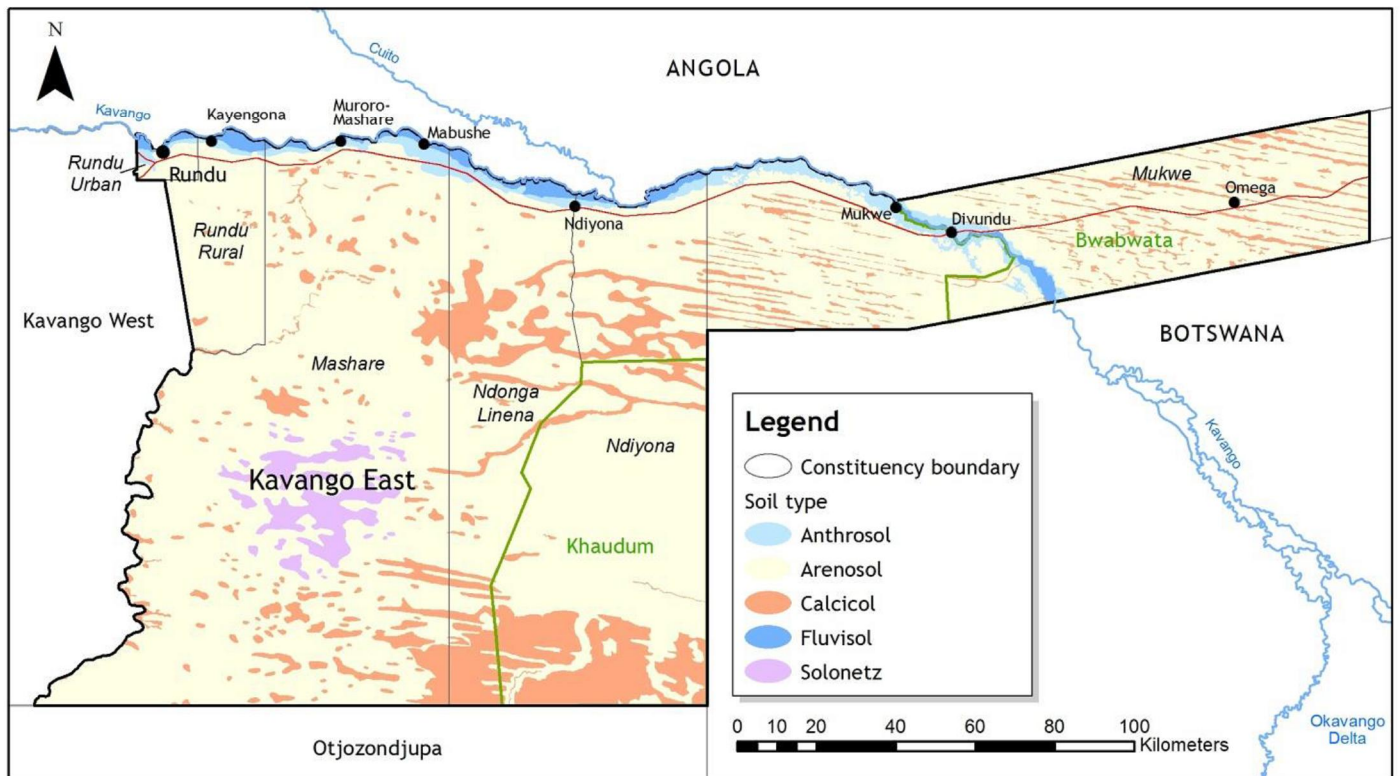


Figure 11: Soils, Geology and hydrogeology

#### 4.1.4 Air Quality

An assessment of the baseline air quality status in the project area and surroundings was carried out in order to assess the possible impacts on the air quality due to certain project activities with the potential of releasing pollutants to the ambient air. Field surveys showed that fugitive dust from vehicles using the gravel road is the main source of air pollution. Noise pollution is also emanating from vehicles using these roads and tracks.

The observed air pollution did not remain hanging over the area for prolonged periods and as such no haze was reported to be a distinctive result of vehicles use. Apart from pollution caused by vehicles, the air quality in the area was generally found to be very good.





## **4.2 Biological Environment**

### **4.2.1 Approach**

The methodology used to describe the site's biological environment took into consideration the purpose of the study, extent of development site, and the flora and fauna species composition.

It should be noted that the actual 70% of the proposed activity will be on an existing roadway, DR3403 and on existing borrow pits. See Figure 13 to Figure 15.

### **4.2.2 Flora**

Due to the limitations of the climate, the vegetation in the Kavango Region is fairly homogeneous Kalahari Woodland that is comprised of broad-leafed, deciduous woodlands that vary according to topography and the nature of the soils that support them. Broadly speaking, the relatively larger and deep-rooted trees, such as Teak and Mangetti, are more prevalent in deep sands, while various species of shrubs and grasses can be found in the shallower soils in valleys.

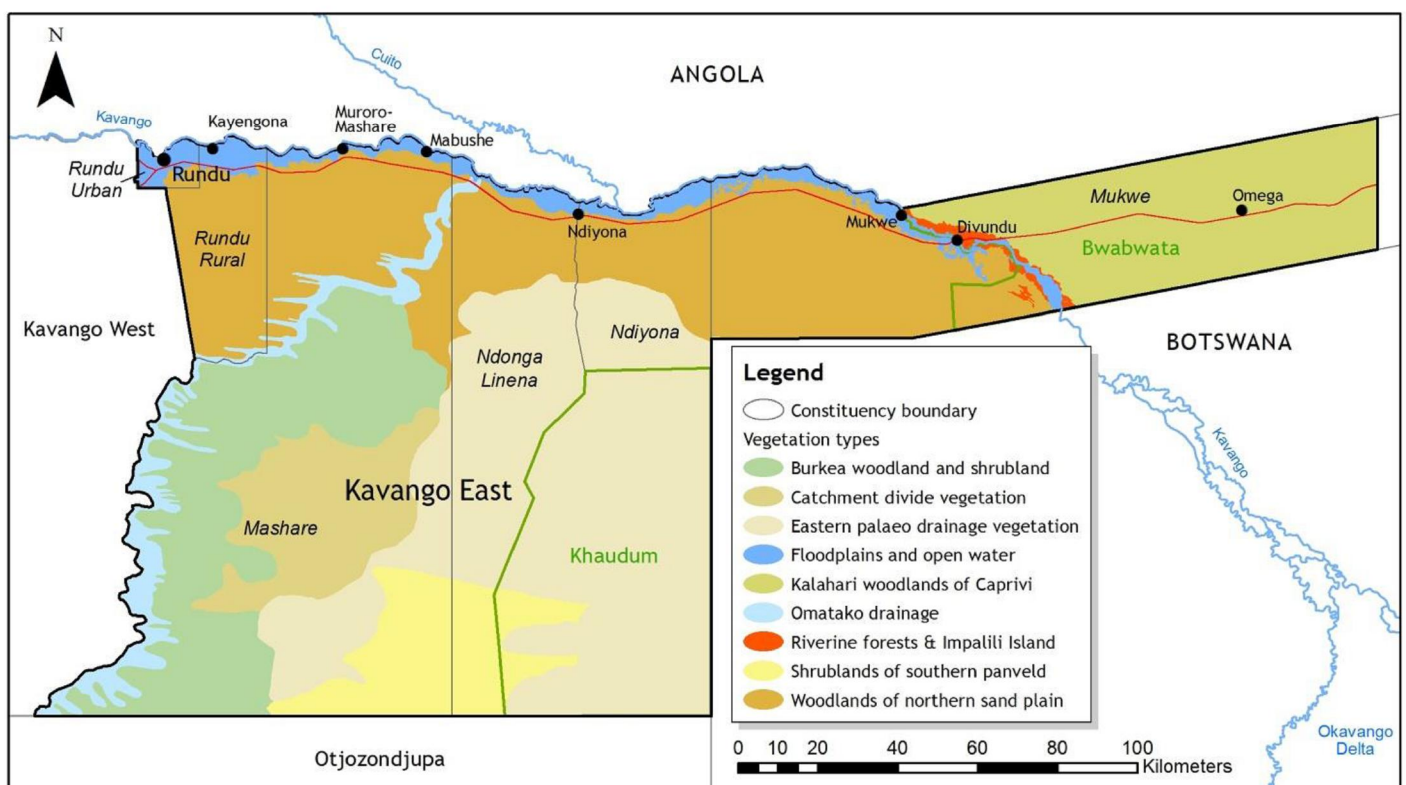
Initially, the banks of the Kavango River supported forests with distinctive trees, such as Knobthorn, Weeping Wattle and Jackalberry with dense shrubby undergrowth. However presently only a few, localised patches remain almost entirely within the protected area of Bwabwata National Park in the eastern part of the region. The river banks and terraces are open with few trees, although some Mangetti trees are still prevalent due to their value as fruit trees.

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terraces are open with few trees, although some Mangetti trees are still prevalent due to their value as fruit trees.

The Kavango woodlands are unique in Namibia, although they do not contain endemic species. Fires and timber collection operations that are currently banned in the Region pose threats to this resource. Tree diversity in the woodlands is high and there are several special interest species



**Figure 12: Kavango East Vegetation**



**Figure 13: Vegetation Cover on the Proposed Site - Kamutjonga Area**



**Figure 14: Vegetation Cover on the Proposed Site - Mahango Core Area**



Figure 15: Vegetation Cover on the Proposed Site - Divundu and Bagani for 13.5km

### **4.2.3 Fauna**

Due to the clearing of land and hunting, much of the wildlife that used to occur along the Kavango River has now disappeared and most of the remaining wildlife is now concentrated in the Bwabwata and Khaudum National Parks. The Mahango area of Bwabwata, specifically, has the highest concentration of large mammals as well as the greatest diversity of birds in Namibia. This led to it being registered as a Ramsar Wetland of International Importance. Other species of conservation priority in Bwabwata include pangolin, African Clawless Otter, Sitatunga, reedbuck and bushbuck. Large species, such as hippo and crocodile, also occasionally move from the park into upstream, inhabited parts of the river. Elephants move between Khaudum and Bwabwata, some taking a short cut through Botswana, and mainly breeding herds following routes north of Khaudum and west of Bwabwata in Namibian territory.

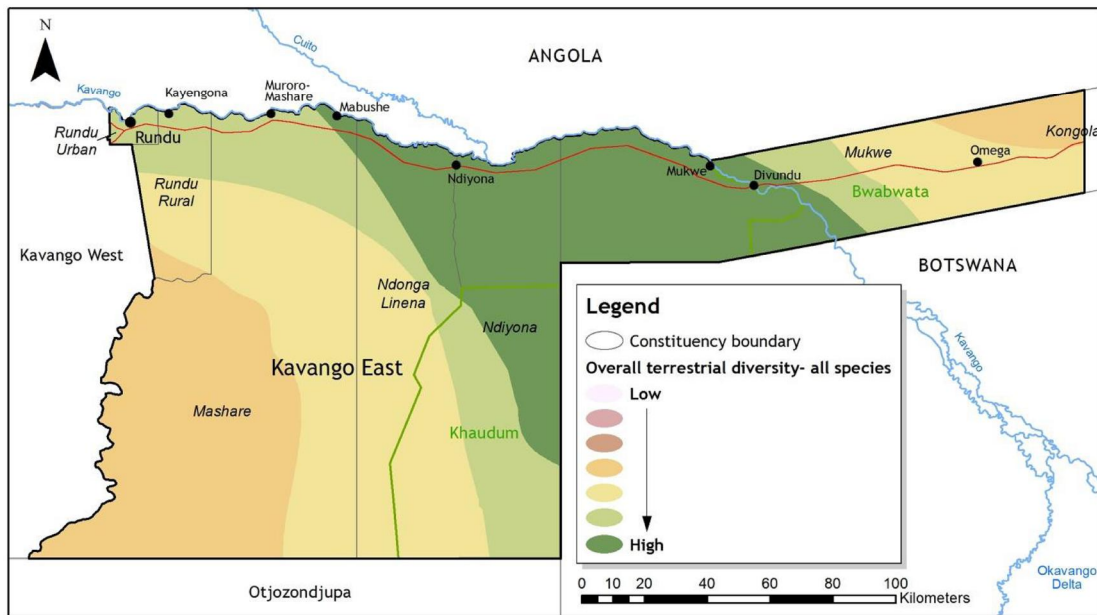


Figure 16: Kavango East Terrestrial Diversity

Again, it is very important to note that, at least 70% of the proposed activity will impact on an already existing road, as per Figure 13 to Figure 15.

### 4.3. Socio-economic Environment

#### 4.3.1 Introduction and Demography

The current population residing in the Kavango East Region was enumerated at 136 823 in 2011 (NSA, 2011 Population and Housing Census. Kavango East Regional Tables based on 4th Delimitation, 2014 (b)) at an approximate growth rate calculated at 0.7% by using the total population of the five constituencies (Mukwe, Ndiyona, Mashare, Rundu Rural East and Rundu Urban) that approximate the new region. The growth rates for these constituencies are illustrated in Figure 17. The Mashare Constituency experienced a negative growth rate of -0.2%, while the Mukwe and Ndiyona Constituencies also grew very slowly from 2001 to 2011. The growth rates in the Rundu Rural East and Rundu Urban Constituencies are the highest, so growth appears to be centred in and around the town of Rundu.

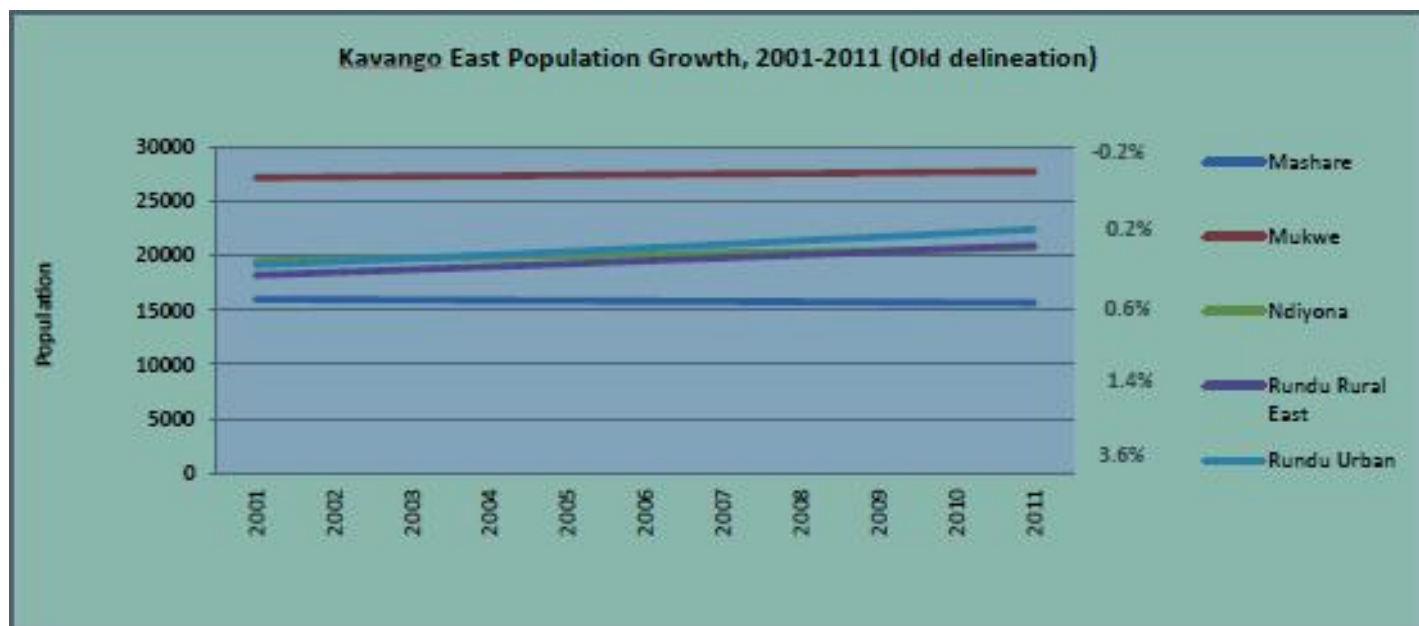


Figure 17: Kavango East Population Growth

With a population of 63 431, growing at a rate of 3.6% from 44 413 in 2001 and at 8.7% from 19 366 in 1991, the rapidly growing town of Rundu is now the main administrative and economic centre of the Kavango East Region. Due to its strategic location, Rundu has become the hub of trade and development in the north, especially with rebuilding efforts in Angola and the Trans Caprivi Highway that links the country and its main port in Walvis Bay to the rest of Africa.

As is also the norm in urban areas, the highest population density by far in the Kavango East Region is found in the Rundu Urban Constituency (407 people per km<sup>2</sup>) followed by the Rundu Rural Constituency. Outside of Rundu, the Mashare (15 688) and Mukwe (27 690) Constituencies have the most constituents.

The tendency to migrate to urban areas due to the (often incorrect) perception of more employment opportunities can also be seen in the Rundu Urban Constituency that has both the highest proportion of its men and women participating in the labour force, as well as the highest proportion of its men and women unable to find employment.





Overall, the unemployment rates for both men and women in all the Constituencies were above average. Except for the Ndonga Linena Constituency, unemployment levels were higher for women than for men across the region.

Private sector provide jobs for the largest proportion of employees (39.8%) in Namibia, followed by subsistence/communal farmers (without paid employees) (21.3%) and government (16.7%). In contrast, the vast majority of workers in the Kavango East Region and all its Constituencies, except Rundu Urban, are subsistence farmers without employees. These farmers mostly produce food for their own survival with little surplus left to sell and earn a significant income. In addition, as these farmers have no paid employees, there is no benefit of job-creation to address the high levels of unemployment in the region.

#### **4.3.2 Land Tenure**

The land where the project area is located is a proclaimed DR3403 gravel road and under the authority of the Roads Authority. No physical long-term construction will take outside the existing road-reserve. Should the road-reserve be extent to an extra 15m both side of the road, land to be affected is mainly homestead yards and crop field. Compensation will then be done according National Compensation Guidelines.

#### **4.3.3 Archaeological and Cultural Sites**

A single building (Figure 18) was identified that falls within the road reserve but will not need to be removed due to its historical importance and at least 15m from the road way. The building was a Church in the early 1900s, but use as a Pre-school. No further protection is required.



Figure 18: Old Church in Bagani

#### **4.3.4 Existing Infrastructure**

There are various infrastructures along the DR3403. These are mainly fences for residential yards, homesteads and crop fields. In Divundu, businesses are found within the first 200m from the T-junction of the B8 and DR3403.



## **CHAPTER 5: POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS**

### **5.1 General Considerations**

The objective of assessing the potential effects of the proposed project was essentially to permit planning of actions to avoid or reduce undesirable effects and/or to enhance secondary benefits of the project. Implementation of a project may exert a suite of effects during the construction and operation stages. It is therefore common practice to discuss the effects of the project construction and operations (including preparatory phase) before the project commences.

Therefore, this section of the report addresses the interactions of the project with the natural and socio-economic resources in and around the project site. These interactions are normally known as 'impacts'. It is worthwhile separating project effects into direct (or primary) effects resulting from direct interaction of some components of the project with one or more environmental resources, and indirect (or secondary) effects which arise from the primary effects. Note that a classification of negative effect does not necessarily imply a long-term adverse effect on the environment. It may as well indicate an irreversible change to the physical environment from original conditions. In some cases, these irreversible changes can result in favourable long-term effects.

### **5.2 Prediction of Impacts**

The Proponent is aware of the fact that the proposed project will have both negative and positive impacts. Importantly, the negative impacts are mainly related to the construction and operation activities, and limited to the site. In predicting possible impacts, the following impact zones were applied:

- a) Zones influenced by land use changes: area where the development will be carried out.
- b) Zones influenced by activities associated with the construction: road upgrading and construction impact zone, camp establishment area, access roads and local communities.





- c) Zones influenced by activities associated with the operations of the development: area that will be impacted on due to human activities arising from the upgraded road and support infrastructure.

Prediction of impacts of the proposed project was carried out with the aid of appropriate analytical techniques. However, certain ecological aspects do not lend themselves to straight forward quantification. In such instances, expert judgement by members of the multi-disciplinary EIA team was employed.

### **5.3 General Impacts**

A number of impacts (positive and negative) were identified with due consideration to issues discussed in the earlier Sections. These impacts are based on the design of the infrastructure development, project details, environmental and socio-economic baseline studies, stakeholder consultations as well as expert judgment.

### **5.4 Impact Criterion and Classification**

For purposes of this report, classification of possible impacts and criterion used are highlighted in the Table 2 below.

**Table 2: Criterion and classification of impacts**

<b>Assessment Evaluation Criteria</b>	<b>Rating (Severity)</b>	
<b>Impact Type</b>	<b>-</b>	Negative
	<b>=</b>	No Impact or Negligible Impact
	<b>+</b>	Positive
<b>Extent of impact</b>	<b>I</b>	Immediate (the site and immediate surroundings)
	<b>L</b>	Local
	<b>R</b>	Regional
	<b>N</b>	National
	<b>IT</b>	International
<b>Duration of impact</b>	<b>ST</b>	Short term (0-5 years)
	<b>MT</b>	Medium term (5-15 years)
	<b>LT</b>	Long term (lifetime of the development)
<b>Intensity of impact</b>	<b>L</b>	Low (where natural, cultural and social functions and processes are not affected)
	<b>M</b>	Medium (where the affected environment is altered but natural, cultural and social functions and processes can continue)
	<b>H</b>	High (where the affected environment is altered to the extent that natural, cultural and social functions and processes will temporarily or permanently cease)
<b>Probability of impact</b>	<b>LP</b>	Low probability (possibility of impact occurring is low)
	<b>P</b>	Probable (where there is a distinct possibility that it will occur)
	<b>HP</b>	Highly probable (where the impact is most likely to occur)
	<b>D</b>	Definite (where the impact will occur)
<b>Significance of impact</b>	<b>L</b>	Low (where natural, cultural and social and economic functions and processes are not affected). In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming
	<b>M</b>	Medium (where the affected environment is altered but natural, cultural, social and economic functions and processes can continue). An impact exists but is not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort.
	<b>H</b>	High (where the affected environment is altered to the extent that natural, cultural, social and economic functions and processes will temporarily or permanently cease). In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time consuming or a combination of these. In the case of beneficial impacts, the impact is of a Substantial order within the bounds of impacts that could occur.



## 5.5 Potential Impacts

### 5.5.1 Socio-Economic Impacts

#### Impact: Increased Employment Opportunities

The development will create job opportunities for the local community members of the Constituency, and Namibia in general. At preparatory, construction and operational stages, local community members will be employed and consequently livelihood support for family members will be improved (short-term and long-term) – in particular as on average support from one job benefit five family members. **Currently, there are very limited job opportunities in the Constituency. This development could potentially positively impacts at least 1000 members of the local community.**

#### Impact: Increase in Local Population

The development will not have a significant impact on the population size of the area. The proposed development will source a very small number of highly skilled personnel from outside the Constituency during the construction phases, and the rest from the local community. All semi-skilled and unskilled staff will be employed from the area and appropriate training provided. Hence, the possibility of the project to significantly increase the local population is very low. Human presence in the remote project site will though increase. It is not expected that this increase of human presence will significantly negatively impact the wildlife or diminish the eco-tourism experience in the area.

#### Impact: Increase in Local Economic Activities

Trading opportunities among the local people are expected to increase. Increased in people employed in the Constituency will also support local trade through increased income in the area. This will lead to a snow-ball positive growth for the area, for at least 2 years. Possibly, creating longer-term safety-nets for many families.

#### Impact: Water Supply Availability

The development is unlikely to put pressure on water demand in the area and will not overwhelm the water resources. Surface water from the Okavango River will be able to



support this proposed development without jeopardizing access to portable water for the local community and wildlife.

Impact: Loss on Cultural Sites

No significant impact determined. The Old Church is still being used and is located in an urban area where the road reserve will actually support its protection.

Impact: Increased Demand for Health Services

During construction, when most labour will be needed, all occupational health related injuries will be referred to the local health facilities for immediate attention. This will not have a significant impact on the capacity of the medical staff and facilities to meet the demand for health care, since most of the employed people will be from the area and already residing within the area. HIV and AIDS programs for the Contractors, Staff and local communities need to be developed and provided so to ensure that the participating people are not exposed to increased risk of contracting HIV and/or spreading it.

Impact: Worker Safety

During the construction phase, heavy machinery will be employed for the various works associated with the upgrade of DR3403. Absence of clear safety guidelines may lead to accidents affecting worker's safety and productivity, however, this will not be the case during the construction of this development and clear safety guidelines will be available and all workers will be briefed and trained accordingly as per industry and RAs standards and guidelines.

Impact: Increased Traffic

Increased traffic flow in and out of the area is expected during construction and operations. During operations, this increase is expected to be significant. An increase in local traffic can be expected during operational phase, however, negative impacts can be mitigated through the appropriated road signage and other speed control techniques.

***We recommend that the maximum speed between Divundu and the Bwabwata Park's entry be limited to 80-100km/h. This is mainly due to the very high human and livestock activities.***



Impact: Blasting noise and vibration

No blasting will take place, but limited vibrations from machinery and tools could be perceived as intrusion. This will only occur during limited construction time and at few points in time.

### **5.5.2 Environmental Impacts**

Impact: Displacement of people

No impact. There will be very limited request to move some fences and not loss of entire properties.

Impact: Machinery noise and vibration

During the construction and operational phases, noise and vibrations from the vehicles and machineries will result into noise and vibration. This impact will be insignificant. The construction workers are the most vulnerable and therefore they should wear protective gear.

Impact: Water quality

No impact.

Impact: Solid Waste Disposal

Waste will be produced at the site during the setting up of supporting infrastructure and construction phases. Piles of gravel cleared are not environmental pollutant hazard, but can reduce the area aesthetics value.

Impact: Air Pollution

The major source of the impact will be dust from vehicles ferrying materials. Due to distance from local communities, this impact can be significant. Care should be taken not to expose the local community and workers to excessive dust and exhaust fumes.

Impact: Loss of Historical and Cultural Sites:

No impact is expected.



**Impact: Loss of Productive Land**

At least 70% of the development will take place on an existing road, DR3403. Hence, very little area will be affected, requiring loss of significant land/property. As a fact, the whole road will occupy only about 200ha (32,300m X 60m = 1,938,000m<sup>2</sup> ). The 1,938,000m<sup>2</sup> is equal to 193.8ha. Take into account that most of the 193.8ha consist already of an at least 13.5km long and 30m wide dust palliated/low seal level tar-road and gravel standard DR3403 and other infrastructure. See Figure 13 to Figure 15.

**Impact: Loss of Wildlife Habitat, Indigenous Flora and Fauna**

The District road 3403 starts at the junction with TR8/4 in Divundu and follows a south easterly direction for 8km to Bagani. From Bagani the road follows a southerly direction via the Bwabwata National Parks' Mahango Core Area Woodlands, towards the Mohembo border post between Namibia and Botswana. The part of the road that transfers the Park is about 13km.

***The following is recommended:***

- All activities should conform to the Parks Regulations.
- All activities should conform to the Bwabwata National Park's Management Plan of 2020-2030).
- Road Construction Staff will not be allowed unsupervised in the Park.
- No fires in the Park for any purpose by road construction workers.
- Only existing borrow pits to be utilised, and should be rehabilitated after use.
- ***The proposed new alignment to be withdrawn.***

If the above recommendations are adhered to, the proposed upgrading will produce insignificant negative impacts on the Park.

**Impact: Erosion of the Top-Soil**

The nature of the project demands the use of machinery during construction. This may lead to instability of the soil in the area and as a result may cause soil erosion. This though will not lead to gully formation, unless site rehabilitation is not done properly



after construction and no regular maintenance is carried out during the operational phase of the project.

The following Tables below present the proposed impact analysis.

**Table 3: Evaluation of impacts during pre-construction phase**

<b>PRE-CONSTRUCTION PHASE</b>							
Identified Impact	Impact Type	Extent	Duration	Intensity	Probability	Significance	
						Unmitigated	Mitigated
Surface water pollution	=						
Ground water pollution	=						
Soil erosion	=						
Soil pollution	=						
Air pollution	=						
Land use potential	=						
Habitat transformation	=						
Fauna displacement	=						
Damage to Flora	=						
Traffic impacts	=						
Visual & aesthetic impacts	=						
Social	+	L	ST	M	D	L	M
Economic	+	L	ST	M	D	L	M



**Table 4: Evaluation of impacts during construction phase**

<b>CONSTRUCTION PHASE</b>							
Identified Impact	Impact Type	Extent	Duration	Intensity	Probability	Significance	
						Unmitigated	Mitigated
Surface water pollution	=						
Ground water pollution	=						
Soil erosion	-	I	ST	L	LP	L	=
Soil pollution	-	I	ST	L	LP	L	=
Air pollution	-	I	ST	L	P	L	=
Land use potential	-	I	ST	L	P	L	=
Habitat transformation	-	I	LT	L	D	L	=
Fauna displacement	-	I	ST	L	LP	L	=
Damage to Flora	-	I	LT	L	D	L	=
Traffic impacts	-	I	ST	L	P	L	=
Visual & aesthetic impacts	-	I	ST	L	P	L	=
Social	+	L	ST	M	D	M	H
Economic	+	L	ST	M	D	M	H

**Table 5: Evaluation of impacts during operational phase**

<b>OPERATIONS PHASE</b>							
Identified Impact	Impact Type	Extent	Duration	Intensity	Probability	Significance	
						Unmitigated	Mitigated
Surface water pollution	=						
Ground water pollution	=						
Soil erosion	-	I	ST	L	P	L	=
Soil pollution	-	I	ST	L	P	L	=
Air pollution	=						
Land use potential	+	IT	LT	M	D	M	H
Habitat transformation	=						
Fauna displacement	=						
Damage to Flora	=						
Traffic impacts	+	IT	LT	M	D	M	H
Visual & aesthetic impacts	+	L	LT	M	D	M	H
Social	+	L	LT	M	D	M	H
Economic	+	N	LT	M	D	M	H



## **CHAPTER 6: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMP)**

From the above identification of adverse and positive impacts measures have been proposed for mitigation. In order to achieve this, an Environmental Management Plan (EMP) has been developed. See Appendix B.

## **CHAPTER 7: RECOMMENDATION AND CONCLUSION**

A project of this magnitude will bring with it both positive and negative environmental and socio-economic impacts. These can be localized to the project site or can also affect areas beyond the project's vicinity. While positive impacts from this development are expected to affect the wider Region and the local community, the adverse affects can be considered very localized. For this development project, the positive impacts outweigh the negative impacts to which amelioration measures have been proposed to cushion their impacts.

Therefore, we recommend that the project be considered for approval for implementation, especially since the proposed development will be based on the upgrading of an existing DR3403, hence very little new area of the 193.8ha's project area is expected to be affected. Taking into account that at least 135ha are already developed as DR3403 and other infrastructure. Thus the proposed upgrading is unlikely to generate long-term significant negative impacts.

This Scoping Report has revealed that a full EIA will not be required in order to identify gaps in information or to accurately identify all project's aspects that could generate significant negative impacts.



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