

Environmental & Social Impact Assessment for The Upgrade to Low Volume Seal (LVS) Standard of The DR3633 Tsandi – (22KM), Omusati Region Namibia

Environmental Scoping Report (ESR)

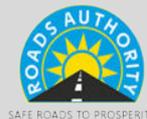
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Prepared for DAT JV



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Client	Roads Authority of Namibia Enquiries: Mr. Tuli Nashidengo Tel: +264 811 29 5501 E-Mail: tuli@archetype.com		
Lead Consultant	EnviroPlan Consulting Cc Enquiries: Mr. T E. Kasinganeti Tel: +264813634904 E-Mail: tendai@enviroplanconsult.com		
Date Of Release	June 2022		
	Name	Signature	Date
Author/S	Tendai E. Kasinganeti		13 June 2022
Reviewer			

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ACRONYMS

TERMS	DEFINITION
BID	Background Information Document
DR	District Road
EAP	Environmental Assessment Practitioners
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA (R)	Environmental Impact Assessment (Report)
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GHGs	Greenhouse Gasses
ISO	International Organization for Standardization
I&Aps	Interested and Affected Parties
MAWF	Ministry of Agriculture Water and Forestry
MEFT: DEA	Ministry of Environment, Forestry and Tourism's Directorate of Environmental Affairs
NHC	National Heritage Council
NEMA	Namibia Environmental Management Act
RA	Roads Authority
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 ESIA and the preparation of the EMP for the development

The '**Proponent**' – this refers to the institutions/departments that are directly involved in the implementation of the project, i.e. MAWF.

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

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

ENVIRONMENTAL IMPACT ASSESSMENT

This Environmental Scoping Report (ESR) follows the Scope of Work delineated by the Roads Authority (RA) and DAT JV for the proposed upgrade to Low Volume Seal (LVS) standard of the District Road (DR) 3633. The road upgrade project will also include other activities such as the abstraction of water and construction materials for construction activities. Existing information and input from commenting authorities, Interested and Affected Parties (I&APs) were used to identify and evaluate potential environmental impacts (both social and biophysical) associated with the proposed project.

Environmental flaws associated with the proposed project were identified through an Environmental Scoping Assessment. A conscious decision was made based on the recommendations and guidelines by the Directorate of Environmental Affairs (DEA) Environmental Impact Assessment (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 the proposed listed activities will have to be effectively implemented by the client, to ensure that adverse environmental impacts are considered.

The detailed assessment of the anticipated impacts was undertaken with the purpose of highlighting any sensitivities regarding the proposed project during its construction, and operation. In addition, an independent sensitivity mapping analysis was undertaken. This analysis characterised the development site on the significant environmental aspects in order to reflect the site's suitable and unsuitable (no-go) development footprint areas. This action guided the final footprint of the proposed Upgrade to LVS standard road.

This ESR has been compiled in accordance with the regulatory requirements stipulated in the Environmental Assessment Regulations (2012), promulgated in terms of the Namibian environmental legislation Environmental Management Act (No. 7 of 2007).

The ESIA aims to:

- Provide an overall assessment of the social, physical and biophysical environments of the area affected by the proposed road upgrade project;
- Undertake a detailed environmental assessment, in terms of environmental criteria and impacts (direct, indirect and cumulative), and recommend a preferred location for the sand abstraction sites, water abstraction and road right of way based on environmental and social sensitivity);
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts; and
- Undertake a fully inclusive Public Participation Process (PPP)

- GIS sensitivity mapping was conducted to identify potential impacts, propose mitigation and inform the sensitivity analysis.

A systematic approach was adopted to successfully complete the ESIA in line with the regulated process.

ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations underpin the approach to this EIA study:

- The information received from the stakeholders, desktop surveys and baseline assessments are current and valid at the time of the study;
- A precautionary approach was adopted in instances where baseline information was insufficient or unavailable;
- Mandatory timeframes will apply to the review and adjudication of the reports by the competent authority and other government departments; and
- No land claims have been registered for the proposed site at the onset and registration of the study.

NB: *The EAP does not accept any responsibility in the event that additional information comes to light at a later stage of the process. All data from unpublished research utilised for the purposes of this project is valid and accurate. The scope of this investigation is limited to assessing the potential biophysical, social and cultural impacts associated with the proposed project.*

EXECUTIVE SUMMARY

The Roads Authority of Namibia (the Proponent) appointed DAT JV to undertake the preliminary and detailed design, tender documentation, contract administration and full-time site supervision for the upgrading to Low Volume Seal (LVS) standards of District Road 3633 (DR3633) between Tsandi and Ongulumbashe in the Omusati Region.

The need for the upgrade of the LVS road has been determined by the deteriorating condition of the road and the current increase in economic activities within irrigated farms being serviced by this road. As such, the Proponent identified the need to upgrade the road to fulfil its mission of achieving a safe and efficient national road network in Namibia. The design further aims to determine possible sources for material (borrow pits) that will be needed for the road upgrade activities.

EnviroPlan consulting cc was appointed by DAT JV to conduct a detailed assessment in terms of environmental and social implications associated with the proposed road upgrade project. A holistic approach was adopted to assess biophysical, water resources, culture & heritage, socio-economic and ecological impacts of the road upgrade project and its associated activities such as materials abstraction. This report documents the assessment of potential environmental and social impacts of the proposed activity. The preliminary findings within this Scoping Report indicate that potential impacts will be of low significance. These potential impacts can be further mitigated by the implementation of an effective Environmental Management Plan.

Based on the information provided in this report, EnviroPlan is confident the identified risks associated with the proposed development can be reduced to acceptable levels, should the measures recommended in the EMP be implemented and monitored effectively. Should the recommendations included in this report and the EMP be implemented, the significance of the impacts can be reduced to reasonably acceptable standards and durations. All developments could proceed provided that general mitigation measures as set out are implemented as a minimum.

It is therefore recommended that the proposed upgrade to LVS of the DR3633 and its associated activities receive Environmental Clearance, provided that the recommendations described above and the developed ESMP are implemented

1. CHAPTER ONE: BACKGROUND

1.1. Overview

Roads Authority (RA) of Namibia (the Proponent) intends to upgrade the DR 3633 road to Low Volume Seal Standard (LVS). As such RA appointed DAT JV to undertake the preliminary and detailed design, tender documentation, contract administration and full-time site supervision for the upgrading to Low Volume Seal (LVS) standards of District Road 3633 (DR3633) between Tsandi and Ongulumbashe in the Omusati Region.

The road currently has an Average Annual Daily Traffic volume of 39 vehicles per day according traffic counts carried out by The Consultant.

The objective of the road is to upgrade the existing link to an all-weather two-lane single carriageway low volume seal which will serve the purpose of:

- Improving local rural and regional accessibility,
- Reduction of road user costs,
- Reduction of travel times,
- Reduction of maintenance costs and frequency.

In order for the road upgrade and its associated activities to commence, in terms of the Namibian environmental legislation (Environmental Management Act (No. 7 of 2007 and the Environmental Impact Assessment Regulations of 2012), an EIA is required to obtain an Environmental Clearance Certificate from the Ministry of Environment and Tourism (MET) before the project can proceed. This is because under the 2012 Environmental Impact Assessment (EIA) Regulations of the Environmental Management Act (EMA) No. 7 of 2007, the proposed development is a listed activity that may not be undertaken without an Environmental Clearance Certificate (ECC). This activity is listed under the following relevant sections:

Table 1: Listed Activities -Environmental Management Act No. of 2007

<p>3: Mining and Quarrying Activities 3.3 Resource extraction, manipulation, conservation and related activities</p>	<p>10: Infrastructure 10.1 The construction of- (b) public roads</p>
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Furthermore, as per the requirements of the Environmental Management Act No. 7 of 2007, Roads Authority has appointed EnviroPlan Consulting cc to conduct an Environmental and Social Impact Assessment (ESIA) and develop an Environmental & Social Management Plan (ESMP) for the proposed project.

This has been followed by an application for an Environmental Clearance Certificate (ECC) to the Ministry of Environment and Tourism (MET): Directorate of Environmental Affairs (DEA).

In this respect, this document forms part of the application to be made to the DEA's office for an Environmental Clearance Certificate (ECC) for the proposed upgrade to LVS Standard of the DR3633 road and abstraction of construction materials. The document is compiled in accordance with the guidelines and statutes of the Environmental Management Act No.7 of 2007 and the environmental impacts assessment regulations (GN 30 in GG 4878 of 6 February 2012).

1.2. The Environmental Consultant

The Roads Authority has appointed DAT JV as the engineer to design and supervise the proposed road upgrade project. DAT JV subsequently appointed EnviroPlan Consulting CC (EnviroPlan hereafter), on behalf of the Roads Authority, as the independent environmental consultant conducting the EA for the proposed activity.

Tendai E. Kasinganeti, a qualified Environmental Assessment Practitioner (EAP) conducted this EA process. The CVs of the consultants are attached as Appendix A at the end of this report.

1.3. Project Location

District Road 3633 starting from Tsandi to Ongulumbashe settlement, in the Omusati Region. The road is about 22km in length and currently used to provide access to Clinics and Schools within Ongulumbashe Constituencies, as well as serving numerous public services along the route.

Please refer to the map below (Fig 1) giving a locality layout of the site:

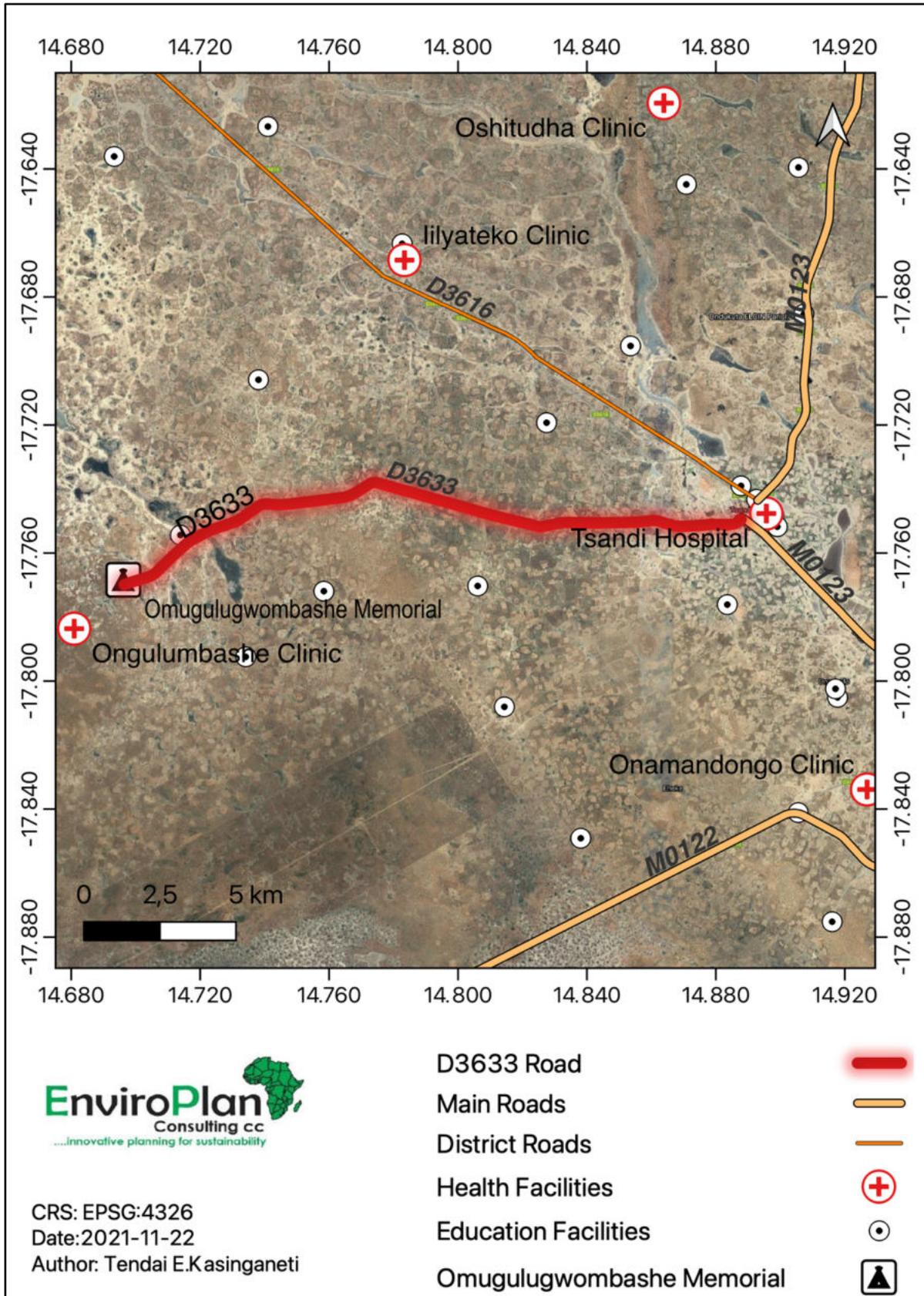


Figure 1: DR 3633 Route Locality.

1.4. Need and Desirability of the Project

The Roads Authority has identified the need for this road upgrade project as the project road has surpassed its intended design life. The project road has not been rehabilitated since its construction and has thus been identified for upgrading from gravel to LVS standard. The proponent, therefore, aims to extend the life of the road by significantly improving the road pavement type and riding quality to ensure that the road is safer and more comfortable for the road user (DAT JV, 2022).

During the initial site visit, issues were brought to the attention of the project team which require further investigation during the design stage. These issues will be developed and investigated as the design and planning progress. Should possible solutions be found these will be required to be executed during the upgrading activities and works.

By investigating the issues on the subject road, the proposed project aims to benefit Namibian road users and assist the Roads Authority in meeting its objective of ensuring safe roads to prosperity. The need for the project is further motivated by:

- The need for road safety and traffic management improvements;
- The need to identify and address drainage problems;
- The need to investigate the condition of existing structures and identify associated upgrade requirements.

The project road is of local and regional importance within Omusati Region and additionally provides road connections to neighbouring Angola. The road further provides agriculture, social services, and tourism access. It is for these reasons that the upgrade of the road to LVS standard is needed.

1.5. Scope of Work

This scoping study was carried out in accordance with the Environmental Management Act (EMA) (7 of 2007) and its 2012 EIA Regulations (GG No. 4878 GN No. 30).

After submitting an application for ECC to the DEA, the first stage in the EA process is to submit a scoping report. This report provides the following:

Table 2: Sections Within Scoping Report

Description	Section of the Report
The need and desirability of the proposed project	Sub-Chapter 1.4
Project description and the need for it	Chapter 2
Alternatives considered for the proposed project in terms of no- go option, design, and natural resources	Chapter 3
The relevant laws and guidelines pertaining to the proposed project	Chapter 4

Baseline environment in which the proposed activity will be undertaken	Chapter 5
The public consultation process followed (as described in Regulation 7 of the EMA Act) whereby interested and affected parties (I&APs) and relevant authorities are identified, informed of the proposed activity and provided with a reasonable opportunity to give their concerns and opinions on the project	Chapter 6
The identification of potential impacts, impacts description, assessment, mitigation measures and recommendations	Chapter 7
Recommendations and conclusions to the report	Chapter 8

2. CHAPTER TWO: PROJECT DESCRIPTION

A Joint Venture formed between D&P Engineers and Environmental Consultants, Archetype Project Consultants and Tweya Consulting Engineers was appointed by the Roads Authority to perform consulting services for the detailed design, tender documentation, contract administration and site supervision for the upgrading to LVS standards of DR3633.

The objective of this project is to:

- Improve local rural and regional accessibility;
- Reduction of road user costs;
- Reduction of travel times;
- Reduction of maintenance costs and frequency.

The upgrading to entail the following:

- Upgrading to LVS standards of the roadway;
- Horizontal and geometric alignment improvements;
- Improvement of drainage facilities and features;
- Upgrading of intersections;
- Installation of road furniture;
- Establishment of road reserve.

2.1. Road characteristics

The subject road is a gravel road and it will be upgraded to LVS standard road. The project road is approximately 22 km in length. The road is generally flat, with occasional dips where there are Oshanas. The subject road details are stipulated in below:

Table 3: Project Details

Length of Road	22 km
Road reserve	15 m from the Centre Line
Regional Administration	Omusati
Towns and settlements serviced by the road	Tsandi, Ongulumbashe

2.2. Description of Activity

2.2.1. Road design

The components of the project to be carried out by DAT Joint Venture as predetermined in the Terms of Reference may be summarised as follows:

- The detailed engineering design, including consultation, data collection, survey, geotechnical and materials investigation and testing, pavement design, geometric design, structural and drainage design, tender documentation;
- Administration of the tender process;
- Contract administration and site supervision of the construction phase.

The existing DR3633 has been constructed according to geometric standards for its present status (i.e. 100km/h gravel road). The upgrade from gravel to LVS standard however warrants a reconsideration of the geometric standards to accommodate and comply to the upgraded operating speeds of up to 100km/h and all associated implications.

The study aims to also assess the existing condition of the road in order to determine which areas are a matter of concern and to generate alternative solutions accordingly. As such the engineering, social, economic and environmental aspects that relate to the proposed upgrade will be investigated in order to provide sufficient and accurate information regarding the proposed upgrade.

2.2.2. Road furniture

Fencing: New fences will be installed where impacted due to construction and relocated to establish the boundaries of the road reserve. Borrow areas will also need to be fenced for the protection of the public and livestock as a once-off and provision for this will be made in the bill of quantities.

Road signs: New road signs will be installed where necessary and existing road signs will be replaced with new ones. The bulk of these signs will be required at major community centres and at intersections. The positioning and the design of all road signs specified will comply with the stipulations contained in the Roads Authority Road Traffic Signs Policy.

Rest areas and Pedestrian Facilities: Rest areas will be constructed at intervals of at least 10 km along the road. It is generally not required in rural areas it is not a requirement that provision be made for pedestrians. In areas where heavy pedestrian traffic is experienced however, such as Tsandi, painted pedestrian crossings will be installed. Bus stops will also be provided.

Intersections and Accesses: Standard Roads Authority access types are anticipated on this project.

2.2.3. Services and facilities

Electricity: Several overhead electricity lines cross the road and pass within the project and road reserve areas. The positions of the visible power lines have been surveyed and indicated on the Route Layout Drawing to be included in the Detail Design submissions. The lines will be verified by NORED in terms of the minimum permissible clearance required. Interested and Affected parties have not indicated concerns regarding potential disturbances to electrical lines.

Water Pipelines, Canals and Water Points: The positions and sizes of the existing bulk pipelines except for the formal Namwater feeder lines have not been well documented. A number of Namwater and Rural Water Supply pipeline markers have been noted. The individual pipelines supplying households will be noted with the aid of the residents at the construction stage. These will need to be protected and rerouted/ relocated where required. Additionally, sleeves will be provided along the route for existing and future communal pipelines to provide points to cross the road without cutting into the pavement

2.3. Pavement and Materials: Aggregates for Concrete and Surfacing

There are no known concrete aggregate sources in the immediate project area. All crushed aggregate is therefore anticipated to be imported from commercial sources outside the project area. The closest known sources of crushed aggregate are below. Only those sites with valid approved Environmental Clearance Certificates will be used for supply by the contractor.

Table 4: Sources of crushed aggregates

Supplier	Location	Distance (km)
Henning Crusher	Tsumeb	134
SLS Crusher	Ruacana	53
KBS	Omakange	48

2.4. Pavement and Materials: Borrow pits

The exploration for borrow pits was carried out at the positions determined during the desktop study phase. To minimize haul costs, borrow pits should ideally be spaced approximately 5 km apart for selected sub-grade materials and 10 km apart for sub-base and base materials as far as practicable. Four potential borrow areas were identified and explored.

2.4.1. Borrow Pit 1

This borrow pit is located on the left-hand side of existing gravel road at an approximate Stake Value of 8.500km and has a haul road distance of approximately 3.5km from the road centreline.

Site coordinates: S 17° 46' 42.7" / E 014°47'56.1"

This is a new proposed borrow pit, located at Ombugu village at the outskirts of fenced mahangu fields, occupying an area of about 4 hectares and mostly covered by sparse vegetation. There is an existing track/path to the site



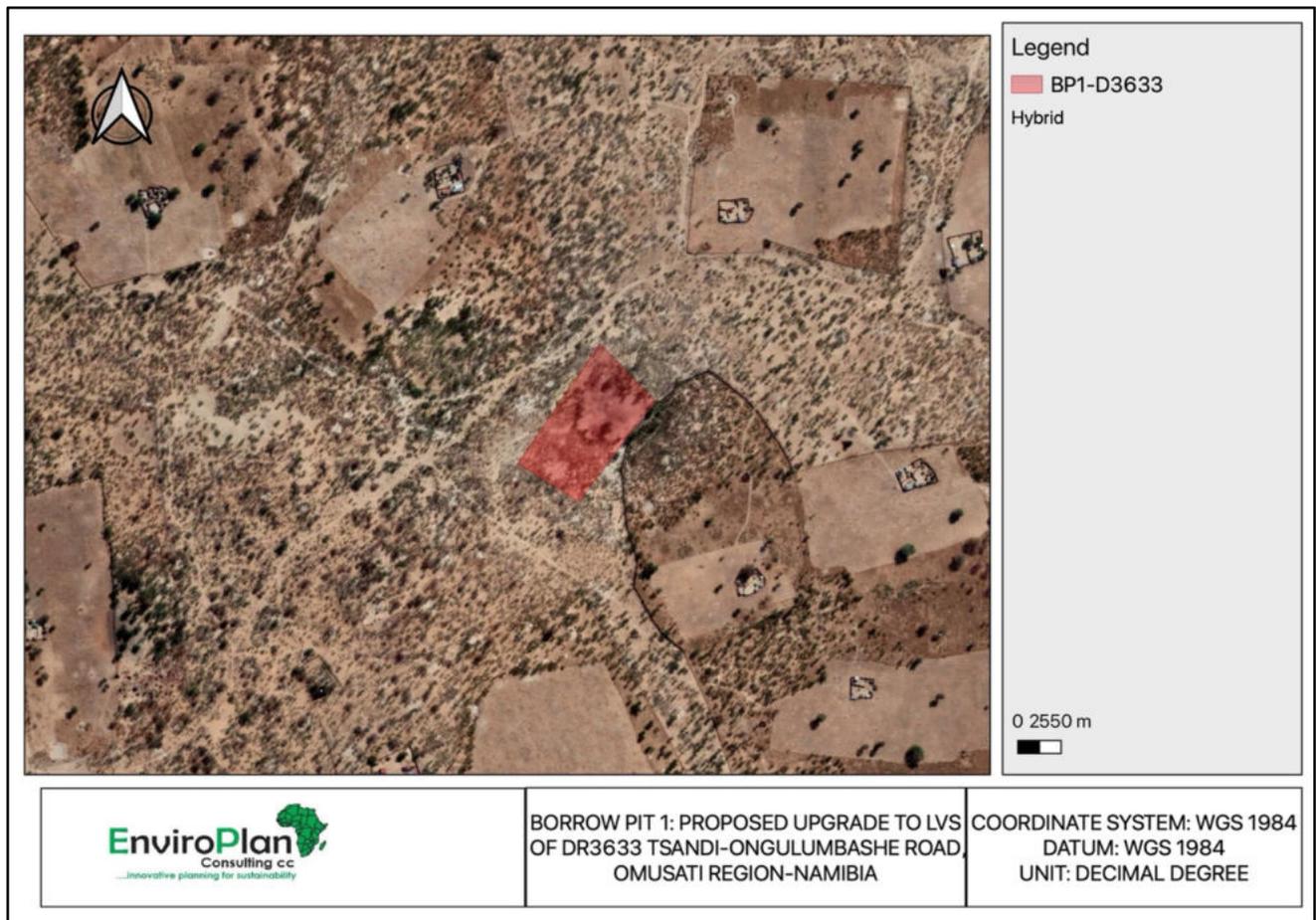


Figure 2: Borrow Pit 1 Locality

2.4.2. Borrow Pit 2

This borrow pit is located on the left-hand side of DR3633, when driving from Tsandi Village Council in the direction of Ongulumbashe Settlement, at approximately Stake Value of 11.0km and has a haul road distance of approximately 4.0km from the road centreline.

Site Coordinates: S17°46'31.1"/ E 014°46'28.6"



BP2 will be within an existing mahangu field and the area is already cleared of vegetation. An existing access path to the homestead was observed, and it will be upgraded to allow trucks to pass through during haulage. The BP is expected to have minimal environmental impacts because there are no major sensitivities observed around the project area.

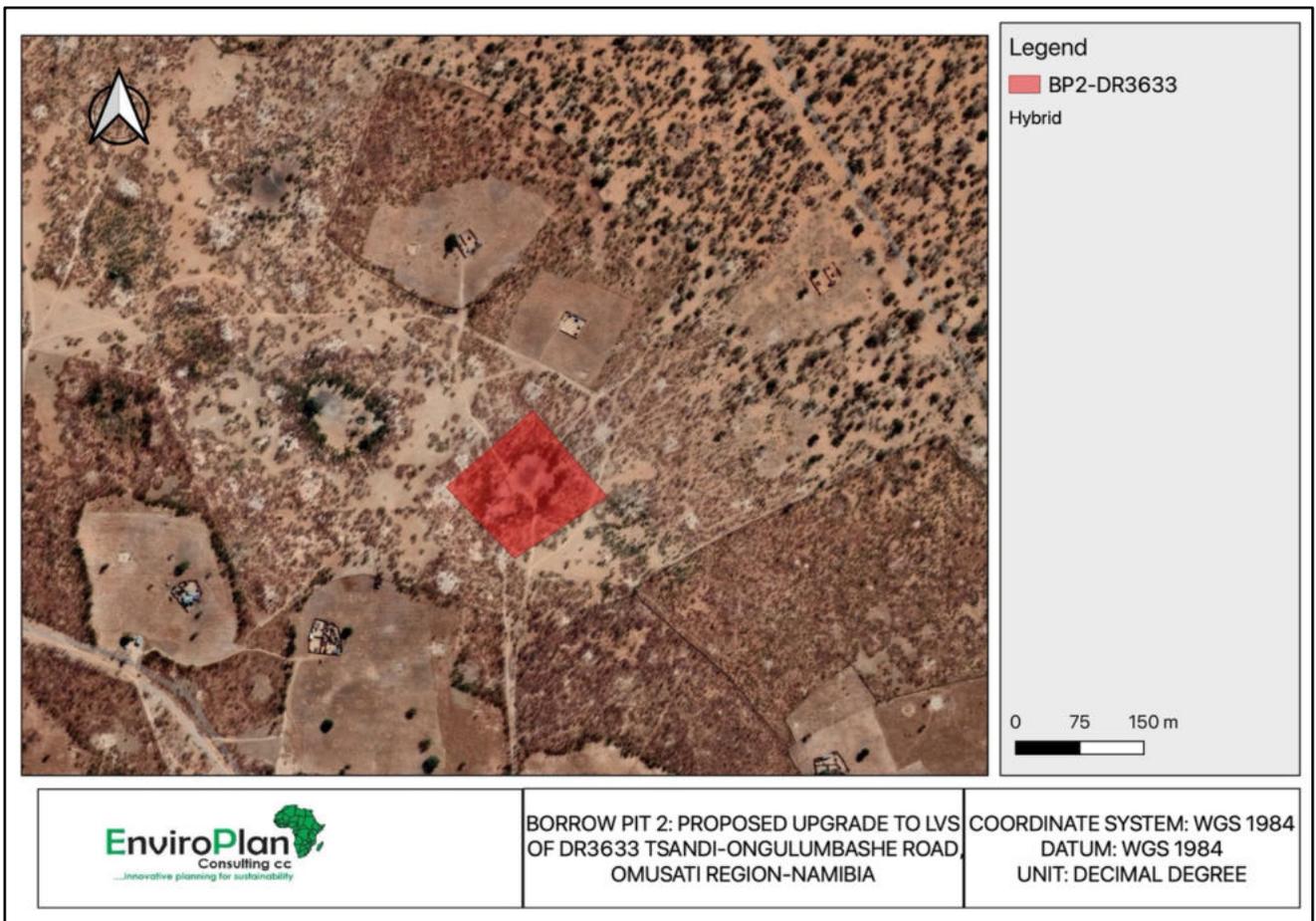


Figure 3: Borrow Pit 2 Locality

2.4.3. Borrow pit 3

This borrow pit is located on the left-hand side of DR3633, when driving from Tsandi to Ongulumbashe at approximately Stake Value of 17.300km and has a haul road distance of approximately 300m from the road centreline

Site Coordinates: S 17° 45' 14.30" / E 014°43'47.20".



This is a new proposed borrow pit, located near old borrow pit (300m away from old borrow pit) at Ontanda B Village. The general area is already disturbed by activities at the nearby borrow pit, however RA will not use the existing borrow pit, rather it will be rehabilitated.

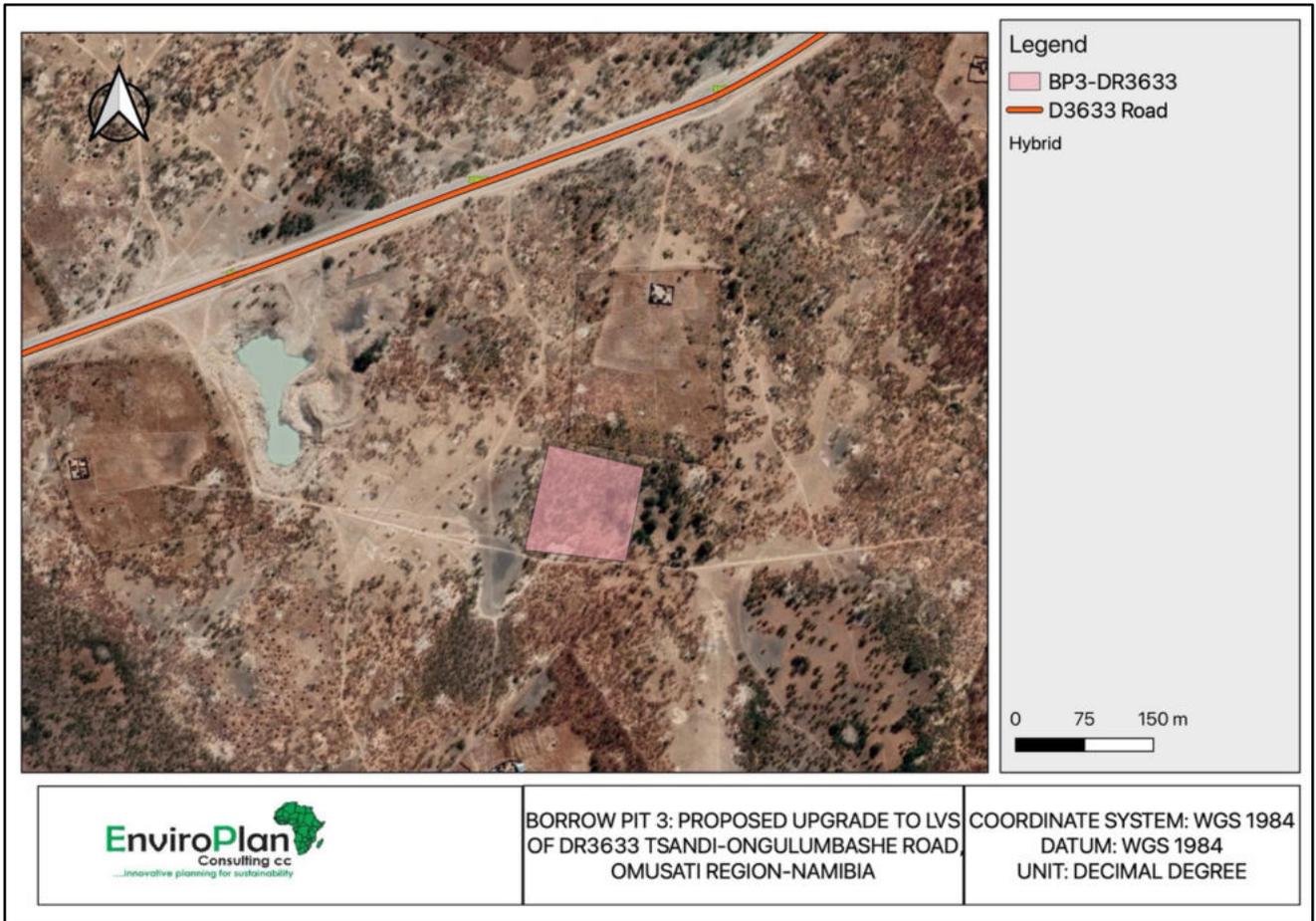


Figure 4: Borrow Pit 3 locality

2.4.4. Borrow Pit 4

The proposed borrow pit is located in Ongulumbashe Settlement at stake value of 20.0km, on the right-hand side when approaching Ongulumbashe from Tsandi Village Council. The Borrow Pit has an approximately haulage distance of 200.0m from DR3633 centreline.

Site Coordinates: S17°45'46.80"/ E 014°42'24.50".



The site area is covered by patches of grassland and sparse mopane bushes. There will be localised impacts on the natural environment.

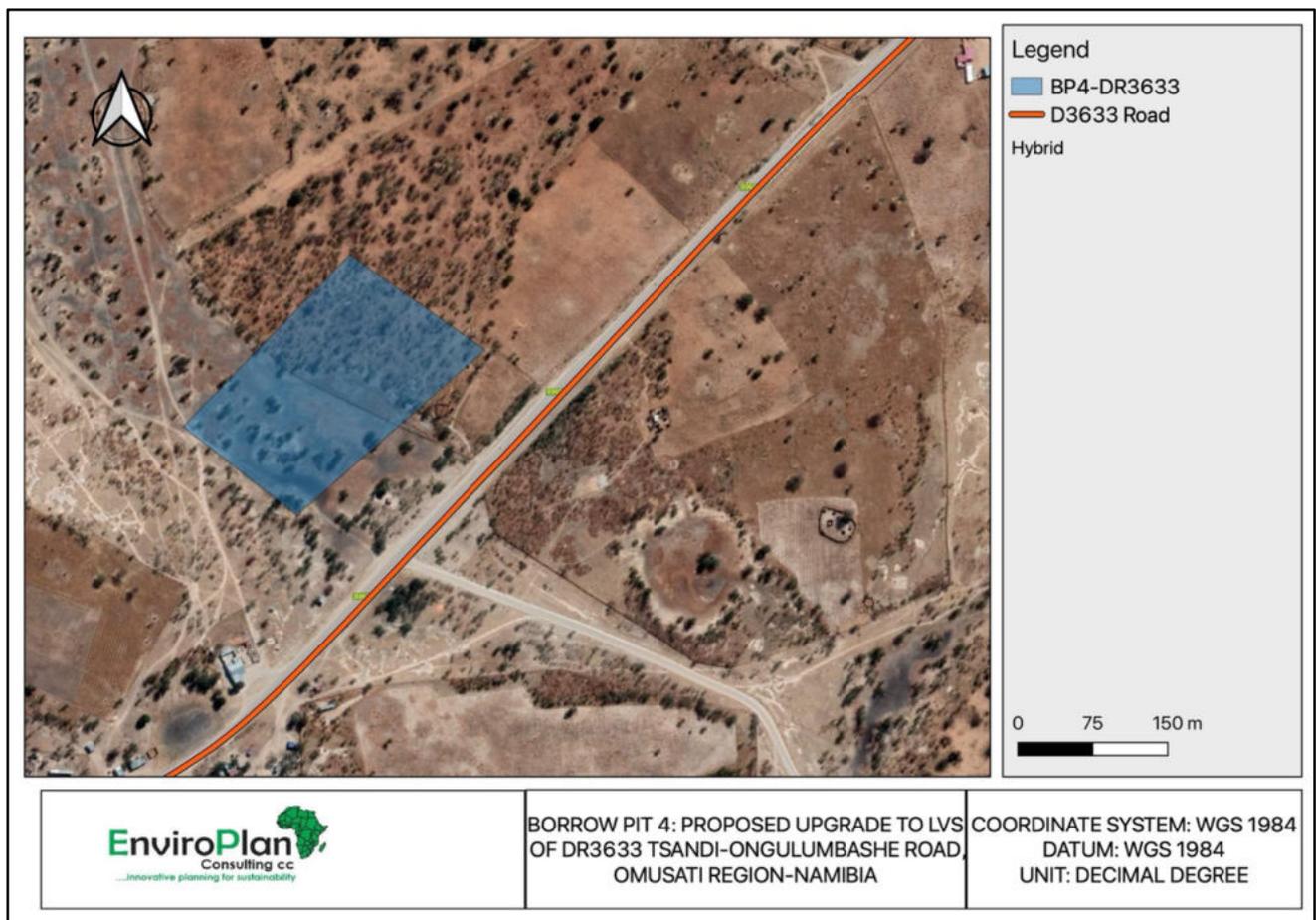


Figure 5: Borrow Pit 4 Locality

2.4.5. Environmentally sensitive areas identified

The proposed road and borrow pits are not in any sensitive protected area such as community forests, conservancies, and areas with memorial sites.

2.4.6. Resources and Working Team

Upgrade activities will be undertaken by a contractor appointed by the Roads Authority. It is anticipated that the workforce will be housed in temporary site camps throughout the road upgrade period.

2.4.7. Infrastructure and Services

Water will be required for the proposed development. The water sources to be utilized are detailed in the hydrogeological report appended with this document. The water source chosen would depend on the amount of water required during construction. The alternatives considered in terms of infrastructure and services during the assessment are discussed further in Section 3.

3. CHAPTER THREE: PROJECT ALTERNATIVES CONSIDERED

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 chapter 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.

3.1. No-Go Alternative

The “No-Go” alternative is the 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 commence. Should the proposed project be discontinued, none of the potential impacts (positive and negative) identified would occur. Therefore, the road condition will remain unchanged and would not be improved.

In considering the proposed project, the ‘no-go’ option cannot be the preferred alternative.

3.2. Design alternatives

The detailed design for the proposed road upgrade to LVS standard will take into consideration all raised environmental, social and technical options in designing the proposed road. However, due to this project being upgrading an existing road, with activities taking place within an existing road reserve, it is unlikely that design alternatives will significantly change potential impact significance.

3.3. Resources alternatives

In terms of the resources that may be required for the proposed upgrade works, their alternatives are presented in Table 5 below.

Table 5: Alternatives considered in terms of services infrastructure

Services	Proposed source	Alternative source
Water	Water to be sourced from the water supply canal, Namwater rural water supply pipeline and Olushandja dam.	Piping water from other sources out of the project area. This would be done to augment local water supplies
Power	Electric drives and generators	Solar
Power for cooking	Gas stoves	Firewood
Worker’s accommodation	Campsite at the project site	Accommodation in the nearest town, which is Tsandi (depending on where along the

		road the upgrade is taking place)
Materials	Borrow pits	Hauling from outside the project site
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	Driving waste daily to the nearest town landfill
Hazardous waste (chemicals)	Waste generated is to be transported to and disposed of at an appropriate facility in the nearest town equipped for the disposal of hazardous waste	None

3.4. Conclusions on the Considered Alternatives

The alternatives considered for the project are summarized as follow:

- No-go vs. continuation of the proposed project: The no-go alternative is not considered to be the preferred option. Should the proposed project be discontinued, none of the potential impacts (positive and negative) identified would occur. Therefore, the road condition will remain unchanged and would not be improved.
- Project design: The detailed design for the proposed road upgrade is currently being undertaken. This ESIA study will inform the design report as far as environmental and social compliance is concerned. It is unlikely that design alternatives will significantly change potential impact significance.
- Resources:
 - **Water**-Water for the proposed activity is to be sourced from the NamWater rural water supply pipeline, from the water supply canal in Epalela and the Olushandja Dam. However, should this not be a suitable option, water would have to be trucked to the site from elsewhere.

- Energy- Increased use of solar technologies is promoted within the development. Where it cannot be successfully employed the use of generators would be required.
- Materials- It is proposed that approved borrow pits be utilized to source material for the proposed upgrade of the road. The borrow pits which are located in close proximity to the subject road are preferred to reduce hauling costs. Tests are ongoing to determine what material will be needed and is available. The materials to be used and where they will be sourced from will only be defined during the detailed design phase.
- Waste - Domestic and hazardous waste is to be disposed of appropriately. Portable toilets are to be made available at the construction site and the contractor's camp and these are easily transportable and have no direct impact on the environment or area ecology (if waste is properly disposed of).

4. CHAPTER FOUR: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1. Introduction

A review of Namibian legislation, policies and guidelines applicable and relevant to the proposed development is given in this chapter. This review serves to inform the Proponent (Roads Authority), Interested and Affected Parties (I&APs) and the decision-makers at the DEA of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled in order to undertake the road upgrade activities

- The Constitution of the Republic of Namibia (1990)
- Environmental Assessment Policy of Namibia 1994
- Environmental Management Act No. 07 of 2007
- EIA Regulations GN 57/2007 (GG 3812)
- Communal Land Reform Act 5 of 2002
- Roads Authority Environmental Manual (October 2014)
- The Regional Councils Act No. 22 of 1992
- Local Authorities Act No. 23 of 1992
- Roads Ordinance No 17 of 1972
- Road Traffic Ordinance 30 of 1967
- Roads Authority Act No 17 of 1999
- National Road Safety Act No 9 of 1972
- The Water Act 54 of 1956
- The Water Resources Management Act No. 11 of 2013
- Atmospheric Pollution Prevention Ordinance 11 of 1976
- National Solid Waste Management Strategy
- Soil Conservation Act 76 of 1969
- Forest Act 12 of 2001
- Nature Conservation Ordinance (1996)
- Labour Act 11 of 2007.
- Health and Safety Regulations GN 156/1997 (GG 1617)
- Public Health Act 36 of 1919
- Public and Environmental Health Act 1 of 2015.
- National Heritage Act 27 of 2004 The Constitution of the Republic of Namibia (1990);

These above-listed legislations and policies and their inclusion in the proposed project assessment are further presented in Table 6 below.

Table 6: Policies, legal and administrative regulations

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
The Constitution of the Republic of Namibia (1990)	<p>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:</p> <ul style="list-style-type: none"> • Guarding against overutilization of biological natural resources, • Limiting over-exploitation of non-renewable resources, • Ensuring ecosystem functionality, • Maintain biological diversity. 	The Proponent should ensure compliance with the conditions set in the Act.
Environmental Assessment Policy of Namibia 1994	<p>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 Proposed Feedlot Development activities" are on that list.</p>	This EIA outlines the environmental consequences of this project and considers this definition of Environment.
	<p>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.</p>	This EIA outlines the environmental consequences of this project and considers this definition of Environment.
Environmental Management Act No. 07 of 2007	<p>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</p>	The EMA and its regulations should inform and guide this EA process.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	<p>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 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”.</p>	
<p>EIA Regulations GN 57/2007 (GG 3812)</p>	<p>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).</p>	
<p>Communal Land Reform Act 5 of 2002</p>	<p>To provide for the allocation of rights in respect of communal land; to establish Communal Land Boards; to provide for the powers of Chiefs and Traditional Authorities and boards in relation to communal land; and to make provision for incidental matters</p>	<p>The Proponent should ensure that the proposed development complies with the regulations provided in the for-road reserve, furniture and borrow pits.</p>
<p>Roads Authority Environmental Manual (October 2014)</p>	<p>The manual seeks to inform practitioners regarding the legal and contractual framework within which roads must be designed and built. It also seeks to provide guidance regarding the requirements of the Roads Authority in respect of environmental issues.</p>	<p>The EIA and resultant road upgrade design and activities should be conducted in line with the guidelines within the document.</p>

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
The Regional Councils Act No. 22 of 1992	This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning point of view, their duties include, as described in section 28 “to undertake the planning of the development of the region for which it has been established with a view to physical, social and economic characteristics, urbanisation patterns, natural resources, economic development potential, infrastructure, land utilisation pattern and sensitivity of the natural environment.”	Omusati Regional Councils were considered to be IAPs and were consulted during the Environmental Assessment (EA) process.
Local Authorities Act No. 23 of 1992		Tsandi Village Council is affected and it was consulted.
Roads Ordinance No 17 of 1972	The Ordinance consolidates the laws relating to roads. <ul style="list-style-type: none"> ▪ Section 3.1 deals with width of proclaimed roads and road reserve boundaries. ▪ Section 27.1 is concerned with the control of traffic on urban trunk and main roads. ▪ Section 36.1 regulates rails, tracks, bridges, wires, cables, subways or culverts across or under proclaimed roads. ▪ Section 37.1 deals with infringements and obstructions on and interference with proclaimed roads. 	The proposed road upgrade must adhere to all applicable provisions in the Roads Ordinance.
Road Traffic Ordinance 30 of 1967	The Ordinance governs road traffic comprehensively.	The project should consider the impact it will have on road traffic in the subject area.
Roads Authority Act No 17 of 1999	The Act establishes a Roads Authority to manage the national road network of Namibia.	The Roads Authority is the proponent for the development.
National Road Safety Act No 9 of 1972	The Act establishes the National Road Safety Council and includes provisions intended to promote road safety.	The project should consider the impact it will have on road safety in the subject area.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
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 for certain purposes; for the control of certain activities on or in water in certain areas.	The pollution of water resources must be avoided during construction and operation of the development.
The Water Resources Management Act No. 11 of 2013	Equitable improvement of water and sanitation services should be achieved by the combined efforts of the government and the beneficiaries, based on community involvement and participation, the acceptance of a mutual responsibility and by outsourcing services where necessary and appropriate, under the control and supervision of government.	Should water need to be abstracted, a water abstraction permit will be required from the Ministry of Water, Agriculture and Forestry.
Atmospheric Pollution Prevention Ordinance 11 of 1976	The law act to provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto. The law regulates and prohibit pollution from industries particularly smoke and dust from various activities.	The development should consider the provisions outlined in the act. The proponent should apply for an Air Emissions permit from the Ministry of Health and Social Services (if needed).
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 The Strategy listed priorities for the strategy to address for effective solid waste management, the priorities given below are the most relevant to the WSSP:	The road upgrade can potentially generate significant amount of solid waste (stockpiles, soil remains, cattle manure) that might need proper management by contractors to avoid pollution. Waste management plans should be generated and implemented prior the commencement of civil works and during operation of the feedlot.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	<ul style="list-style-type: none"> Waste disposal is the main problem with the current 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. 	<p>Contractors for the construction of the road should reduce the risk of solid waste to the environment and surroundings of the project area.</p>
<p>Soil Conservation Act 76 of 1969</p>	<p>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.</p>	<p>The proposed activity should ensure that soil erosion and soil pollution is avoided during construction and operation.</p>
<p>Forest Act 12 of 2001</p>	<p>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.</p> <p>(a) vegetation which is on a sand dune or drifting sand or on a gully unless the cutting, destruction or removal is done for the purpose of stabilising the sand or gully; or (b) any living tree, bush or shrub growing within 100 metres of a river, stream or watercourse.</p>	<p>Protected tree and plant species as per the Forest Act No 12 of 2001 and Forest Regulations of 2015 may not be removed without a permit from the Ministry of Agriculture, Water and Forestry.</p> <p>The construction will not result in the removal of living trees, bushes and shrubs growing within 100m of a river, stream or watercourse. If need arise, necessary measures should be implemented.</p>

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	<p>(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 designated or appointed for the area where the protected area is situated.</p> <p>The Strategy proposed strategies that aim to:</p> <ul style="list-style-type: none"> - Strategic Aim 1: Further improve the overall climate change understanding and related policy responses in water resources sector. - Strategic Aim 2: Monitoring and data collecting technologies of surface and underground water are developed and implemented at basin/watershed level. 	<p>The removal of trees in the above instances would require the contractors or sub-contractors to acquire necessary permits first.</p> <p>DAPEES should invest capital on strengthening the understanding of climate change and its related policies through various training of the officers responsible for management of the various feedlot establishment projects in the Northern region of Namibia.</p>
<p>Nature Conservation Ordinance (1996)</p>	<p>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.</p>	<p>The activities of the project are highly localized therefore, there is no potential to interfere with parks, games, and nature reserves. However, there is need for proper designing and planning of the drainage and water network of the project to make sure that the infrastructure will not interfere with facilities listed in the Nature Conservation Ordinance.</p>
<p>Labour Act 11 of 2007.</p>	<p>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).</p>	<p>The construction and operation activities will invite significant amount of laborious work. Therefore, there is need to make sure that the workers participate are protected and that they are from the local's especially unskilled labour.</p>

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety of labourers to be involved in the construction and operation of the feedlot.	Contractors involved in the construction of various units and facilities of the feedlot should complying with this Act and its regulations
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.”	The Proponent should ensure that relevant regulations set out under this Act are adhered to.
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.	
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 constructions are localized, however, if heritage resources (e.g. human remains, artefacts, etc.) discovered during constructions, it would require RA to have a permit from the National Heritage Council of Namibia for removal and relocation.

5. CHAPTER FIVE: ENVIRONMENTAL AND SOCIAL BASELINE

5.1. Introduction

The proposed project will be undertaken in a specific biophysical and social environment. The baseline conditions of these environmental features are described in the following subchapters. The baseline conditions are described for the subject area, which is the area/regions through which the project road traverses. The subject road is located within the Omusati Region.

5.2. Socio-economic profile

5.2.1. Population

According to NSA Census 2011, Omusati's population of 240 900 is the third-largest regional population in Namibia, preceded by those of Khomas and Ohangwena (341 000 and 242 700 respectively). Almost the entire region (94%) comprises rural communal areas, complemented by four towns, four main settlements and several conservancies. The population density is very high: 9.1 persons per km² compared with the national population density of 2.6 persons per km². Many Omusati households can have as many as 10 or more members, based on the extended family structure culturally practised in the region. Most households (55% compared to 62% in 2001) are headed by females (Namibia Statistics Agency (NSA) 2013: 8-18).

Omusati is one of the five poorest regions in Namibia. According to the United Nations Development Programme (UNDP) Human Development Index (HDI) statistics for 2001, of Namibia's 13 regions, Omusati had the fourth worst life expectancy at birth, the sixth worst literacy rate and the third lowest annual average per capita income (Levine 2007: 10). Omusati, along with Kavango and Oshikoto Regions, had the highest Human Poverty Index (HPI) (45) of the 13 regions (Levine 2007: 11).

Almost all Omusati residents (96.1%) speak Oshiwambo, followed by those who speak Otjiherero (2.8%), English (0.5%), Lozi (0.1%), Rukwangali (0.1%), other European languages (0.1%), other African languages (0.1%), Tswana (0.1%) and German (0.1%). The NSA Population and Housing Census Basic Report further noted that 0% of the region's households spoke a San language (NSA 2013: 171). All San at the four sites visited for this study were fully conversant in Oshiwambo dialects, depending on where they lived.

5.2.2. Education

The literacy rate is 88% in the Omusati Region. In the Omusati Region 23% of the population older than 15 years is currently attending school, whereas 13% never attended school and 60% left school without completing it. Similarly, in the Oshana Region 21% of the population aged over 15 years are attending school whereas 7% never attended school and 68% left school prior to completion.

5.2.3. Land Use

The Omusati region is predominantly agriculture based in which mahangu (also known as pearl millet) is successfully cultivated as a staple food. Subsistence farming is extensively practiced within

the area. Livestock farming is dominated by cattle, goats, donkeys and poultry. The main land uses are for conservation, agriculture and mining.

5.2.4. Agricultural Sector

Agriculture is the most important sector of the economy in the Omusati Region. It provides for the livelihood of more than 80% of the population. Nationally, the agriculture sector contributes about 8% of the overall economic activity.

The D3633 road is bordered by numerous agricultural fields and homesteads. The project area is used for small-scale farming on a communal basis. The land is essentially owned by the government, controlled by traditional authorities and regional government, and used by individual farmers. The region's agricultural sector is traditionally based on two main activities: agriculture and livestock farming supported by migratory seasonal grazing. The development of the agricultural sector in these regions is however limited by the following:

- the limited size of the average holding,
- the lack of alternative income-generating activities,
- the lack of commercial markets.

The development of an extensive rural road network is a prerequisite for growth in the agricultural sector. Roads reduce input costs, enhance productivity and promote commercialization by providing access to commercial markets.

5.2.5. Mining

There are no commercial mining activities known in the project area, however there are active mineral prospecting licenses in the project area.

5.3. Infrastructure Development

5.3.1. Air Transport

A landing strip for light aircraft is known to exist at Outapi which is the regional capital of the Omusati Region. Other notable airports closest to the project area are in Ondangwa, Otjiwarongo and Rundu. In general, road access to the two airports is in an acceptable condition from major urban centres. The improved road will provide improved accessibility to the residents in the project area to these infrastructure for general air travel and possible emergencies.

5.3.2. Rail Transport

Rail transport is a general indicator of national economic development and has some relevant reference even on this project. A substantial amount of bulk goods and products (such as cement, road building materials (crushed basecourse)) are transported this way between regions that are indirect and direct inputs into initiatives that further drive national, regional and local development. Goods such as construction materials are transported via rail.

The northern railway extension from Tsumeb to Ondangwa has been in operation since 2006 and is the closest to the project area and operates scheduled trips between Windhoek and Ondangwa on

a weekly basis. Goods to be used in the project may be delivered directly or indirectly via rail to the closest appropriate offload points and thereafter via road to the project.

5.3.3. Water Supply

The Olushandja water purification plant and dam located in Epalela takes water from the main northern Namwater supply canal from Angola and processes it for potable consumption distributing it from Epalela past Onesi to Tsandi, until Ongulumbashe.

More than 80% of the rural population within the project area have access to proper water supply. The supply of water is generally related to the development of other infrastructure such as schools and clinics and areas supplied with water are potential growth centres. Areas supplied with water should therefore be considered as areas where access by road should be considered, if not available. Future road development should therefore follow future extensions to the water supply network. Initial consultations with Namwater indicate that there is sufficient (quantity and pressure) and suitable (quality) water available for the construction of the road within proximity of the alignment and without having to shift the alignment of the existing pipelines.

5.3.4. Power Supply

The supply of electricity is generally related to the development of other infrastructure and areas supplied with electricity are potential growth centres. The electrical infrastructure follows along the road with power lines crossing the alignment at multiple locations along its length.

The development and extension of power lines and networks are ongoing in the Region. The existing powerlines are directly applicable in that the provision of power and electricity along the road will be for the provision to the construction and engineer's camps.

5.3.5. Telecommunications

There are eight post offices in the Omusati Region and the delivery of mail between Windhoek and the Region takes approximately one week. Several courier services also operate efficiently between Windhoek and the Region. Landlines, as well as mobile telephone facilities, are available in these areas and these services are constantly being improved and extended. 4G LTE connectivity is available throughout most of the route. Improved telecommunication services stimulate growth, which in return necessitates the upgrading and extension of the road network.

Good telecommunication services will facilitate communication during the construction and supervision phase.

5.3.6. Road Construction and Maintenance

The road is currently routinely maintained by blading activities since it was constructed to restore better riding quality under the gravel road maintenance programme. The quality of gravel however and the blading has reduced the gravel thickness has resulted in poor riding conditions on the road

having motorists utilise the road reserve instead of the main carriageway. Road construction and maintenance is ongoing in the region. The maintenance of DR3633 is managed under the Opuwo District/ Area under the Oshakati Maintenance Region.

5.3.7. Future developments along the road

There are no major future developments envisaged along the project corridor that would adversely affect the current proposed development according to consultation with the Omusati Regional Council and by extension the constituencies and traditional authorities.

5.4. Climate & Topography

5.4.1. Climatic Conditions

The climatic conditions of the project area presented herein have been sourced from a recent EIA Study done in Tsandi, which forms part of the proposed road route (centre point of the project). Therefore, these conditions would apply to the entire area through which the DR3633 passes through. The climatic condition is presented in **Table 7** below:

Table 7: Climatic conditions around the entire project site area

Climatic feature	Description
Climate classification	Semi-arid area
Average rainfall	Average to be between 350 and 400mm annually
Variation in rainfall	Averaged to be ranging between 40 and 50% annually
Average evaporation	Average between 2,800 and 3,000mm annually
Precipitation	The highest summer rains are experienced in February. Irregular and unpredictable, high intensity, highly localised storm events between October and April does occur
Water deficit	Water deficit in the area is averaged to be between 1,501 and 1,700mm annually
Temperatures	Temperatures in the area are averaged to be more than 22°C annually
Wind direction	The wind direction in the project area is predominantly north-easterly and easterly

5.4.2. Topography

With regards to topography, the Omusati Region is generally flat with an altitude ranging from 800 to 1,200m above sea level (Mendelson *et al.*, 2009). The landscape of the project area is classified as Kalahari Sandveld, which is characterized by palaeo dunes and pans (Matrix Consulting Services, 2019).

5.5. The General Geology, Surface and Ground Water

5.5.1. Soils

In terms of soils, the dominant soil types in the Omusati Region are Cambic Arenosols and some areas Eutric Cambisols as per Dominant Soil Map by Mendelson et al., (2009). The soil types in the Omusati region vary considerably. For the most part the soil consists of volatile sand mixed with a small percentage of silt and clay (Arenosols), in the north-east there are also soils deriving from oshana deposits and in the south the soils are mainly clayey (Luvisols), deposits (Cambisols) or rocky outcrops.

The soils in this area are categorized as sands and loams, where wind and water has repeatedly reworked the soil to create a mixture of deposits, they are generally saline, hence the dominance of mopane vegetation which can grow on these soils. However, some areas of sands and loams that are not as saline and provide good soils for crop growth in the area (Environam Consultants, 2019).

Arenosols are formed from wind-blown sand and usually extend to a depth of at least 1m, with sand generally making up more than 70% of the soils and the rest of the soil particles consisting of clay and silt. The Cambic soils are these that are characterized by changes in colour, structure, and consistency, whereas Eutric soils are fertile with high base saturation. Cambisols are soils that were formed quite recently in geological time, mainly from medium-and fine-textured parent material deposited during sporadic flooding (Mendelson et al., 2009).

The site route area and surroundings are covered by the Kalahari sands comprising sand, clayey and loamy soils. At some sections in proximity of the road, the soils are highly influenced by the land use including the secondary sediments such as gravel that were brought to the area for the construction of the existing gravel road (DR3633).

5.5.2. Geology

The geology of the project area is characterized by the unconsolidated to semi-consolidated sands, calcrete and gravel sediments of the Quaternary and Tertiary age of the Kalahari Group. According to Mendelsohn et al., (2000) as cited by Environam Consultants (2019), the site area falls within the Cuvelai landscape, the Cuvelai lies on silt, clay, limestone and sandstone sediments. The area is distinguished by a myriad of drainage channels known as oshanas, these oshanas direct water to the Etosha Pan. They often fill with water during the wet season and cut into the underlying sediments. The oshanas closest to the road will be analysed as far as potential impacts on the road are concerned during the detail design.

5.5.3. Hydrology (Surface Water)

There is generally not much water on the surface in Namibia, as the little rain that falls either evaporates, seeps into the ground or is rapidly drained by ephemeral rivers that dominate natural surface water systems inside the country. The only perennial water systems (rivers) that can hold surface water are extremely varied, ranging from great rivers that define the country's borders, to a host of smaller rivers and channels that flow at varying frequencies (Mendelson et al., 2009). The nearest perennial river to the project area in the Omusati Region is the Kunene River at the borders

of Namibia and Angola. This River is 344km long with a catchment of 107,000 km² and annual average water volume of 5,100 million m³.

According to Matrix Consulting Services (2019), the site is located along the western limits of the Cuvelai catchment of the Etosha (Etosha-N River) Pan, an ephemeral river draining in a southern direction into the Etosha Pan. The local drainage in the area is poorly developed and runoff usually collects in shallow drainage channels and depressions (oshanas, pans and omurambas).

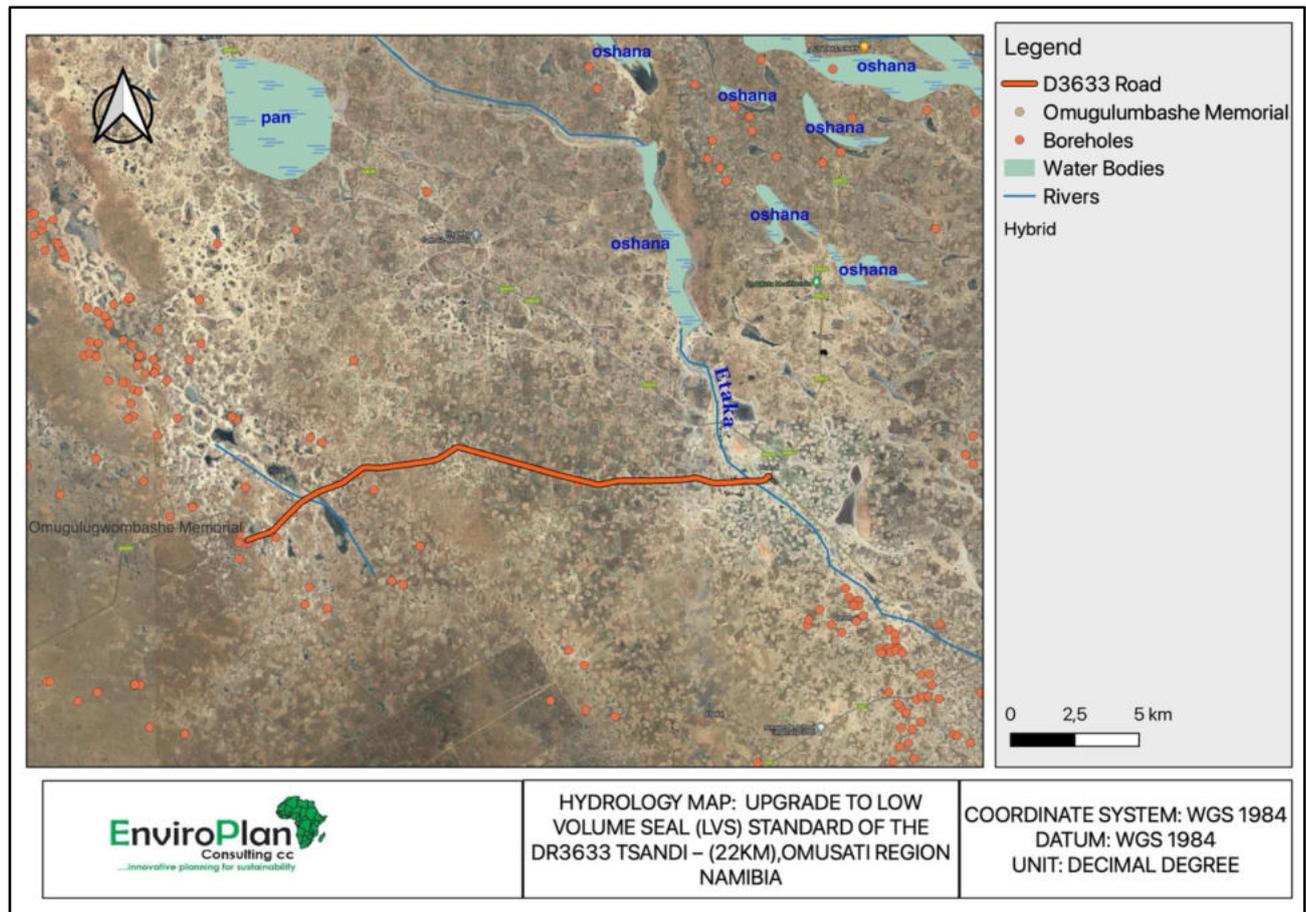


Figure 6: Hydrological Map for the project area

5.5.4. Piped Treated Water Supply

Majority of treated water supply in the Omusati Region and Oshana Region is sourced from The Calueque Dam along the Kunene River. Raw water from the Calueque Dam is pumped into the Calueque – Oshakati open channel to canal in Calueque and then the raw water gravitates through the canal downwards towards The Oshakati water treatment plant. Raw water is treated at Oshakati treatment plant, and from the plant, treated water and then transferred through sub-surface piped network to the greater Oshana Region populous.

For the case of treated water piped water supply to the project route, A Olushandja NamWater water treatment plant located in Eepalela, along the Caleque – Oshakati open canal. The plant draws raw water from the canal, treats the water and then distributes water to the through a feeder

160mm dia sub-surface pipe from Eepalela to Onesi and then further to Tsandi. A 110mm dia branches from the Tsandi – Eepalela line and travels alongside the project route to Ongulumbashe. The line from Tsandi to Ongulumbashe supplies fresh water to both livestock and inhabitants along the line.

5.6. Ecological Environment

The area forms part of the Cuvelai Drainage vegetation type within the Acacia Tree-and- shrub Savanna biome which is dominated by floodplain grasslands and woodlands (Mendelsohn et al., 2002).

The subject area can be grouped as plains in which woodlands are known to occur. Within north-central Namibia, Mopane, makalani and baobab trees are very common, which is also a characteristic of the Cuvelai Drainage where grassy channels of oshana carry floodwater during heavy rains from the higher areas in the north of Angola (Mendelsohn & el Obeid, 2005).

5.6.1. Flora

The project route lies within the Cuvelai Drainage System and runs right along the prominent Etaka Canal which is fed by many local oshanas, therefore highly influencing the vegetation in the project area. Most of the high grounds along the proposed route is characterised by short-growth (shrubs) interspersed with taller-growth trees. Most of these trees have been reduced to dense Mopane shrub lands with very few trees of a height of more than 5m occurring in the area.

Much of the area is extensively cultivated on the higher ground where fruit trees including *Sclerocarya birrea* and *Berchemia discolor* also grow. Dominant grasses are *Odysea*). *paucinervis*, *Sporobolus tenellus* and *Willkommia sarmentosa*.

Local indigenous trees were identified along the subject road, the Makalani Palm Trees (*Hyphaene petersiana*), Mopane Trees (*Colophospermum mopane*) and the baobab trees are predominant and protected. Several tree species also occur along D3633 of which the Bird plum, Jackal-berry, and Weeping wattle and these are also protected. If removal is required a permit needs to be obtained from the Ministry of Agriculture Water and Forestry. Figure 12-15 depicts some of the large trees observed along the subject road during the site visit.

Of the trees that occur along D3633 four species stand out as being particularly valuable to the local communities: Marula (*Sclerocaryabirrea*), Makalani palms (*Hyphaenepetersiana*), Sickle bush (*Dichrostachyscineria*) and Leadwood (*Combretumimberbe*).

Table 8:Common Plant Species occurring in project area

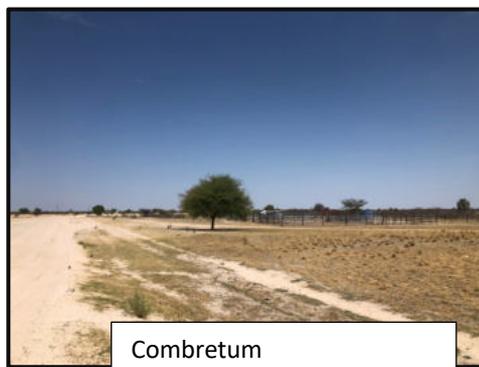
SPECIE	STATUS
<i>Anthephora pubescens,</i>	
<i>Schinziophytonrautanenii</i>	Protected
<i>Brachiaria nigropedata,</i>	

<i>Digitaria eriantha</i>	Protected
<i>Acacia Erioloba</i>	Protected
<i>Hyphaene petersiana</i>	
<i>Colophospermum mopane</i>	Protected
<i>Terminalia prunioides</i>	
<i>Peltophorum africanum</i>	Protected
<i>Combretum imberbe</i>	Protected
<i>Terminalia sericea</i>	Protected
<i>Bauhinia petersiana</i>	Protected
<i>Hyphaenepetersiana</i>	Protected
<i>Albiziaanthelmentica</i>	Protected
<i>Diospyrosmespiliformis</i>	Protected
<i>BurkeaAfricana</i>	Protected
<i>Combretumimberbe</i>	Protected
<i>Ficussycomorus</i>	Protected
<i>Adansoniadigitata</i>	Protected
<i>Salvadorapersica</i>	
<i>Terminaliaprunoides</i>	
<i>Acacia nilotica</i>	
<i>Acacia hebeclada</i>	
<i>Dichrostachyscineria</i>	

Some of the vegetation in the project area is of high value to the population and as part of the ecology and must be conserved at all costs. Sustainable compensation and replacement options for lost fruit trees and other vegetation must be considered.



Baobab and



Combretum



Mopane

Figure 7: Tree species identified to occur along the subject road

5.6.2. Fauna

Not much wildlife occurs within the area as most wildlife is located within the Etosha National Park. Donkeys, cattle, pigs and goats are the dominant animals found to roam the subject road. The surrounding conservancies and community forests are barely inhabited by wildlife.

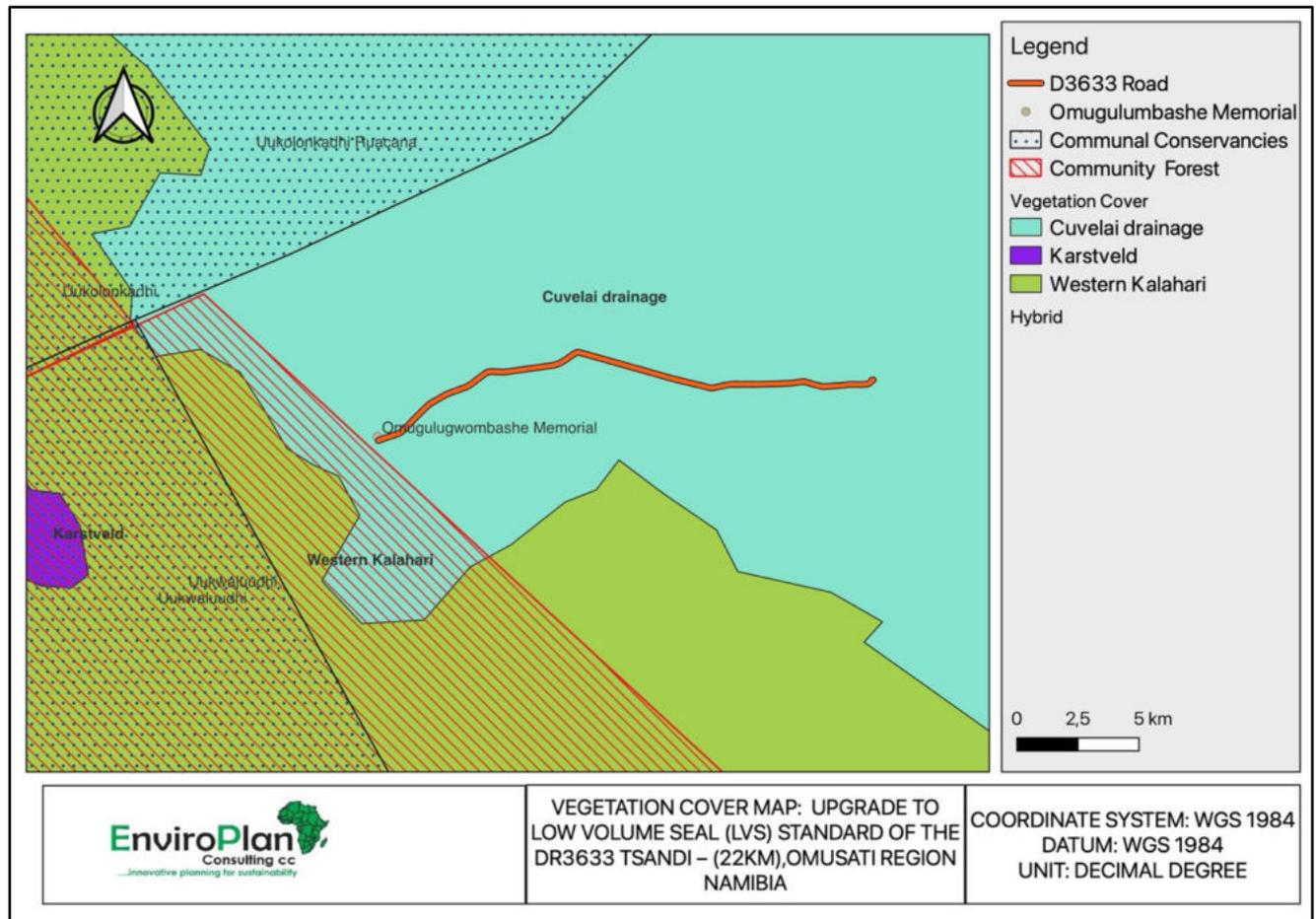


Figure 8: Vegetation Cover Map

5.7. Culture and Heritage

During the site visit and public consultation process, the project area did not have any identified cultural heritage sites, graves, places of worship or traditional meeting places that will be affected. The nearest protected site is the Ongulumbashe memorial which the road intends to connect to Tsandi. This is because there is a clinic near the memorial, as well as the continuous use of the memorial site for burial of war veterans.

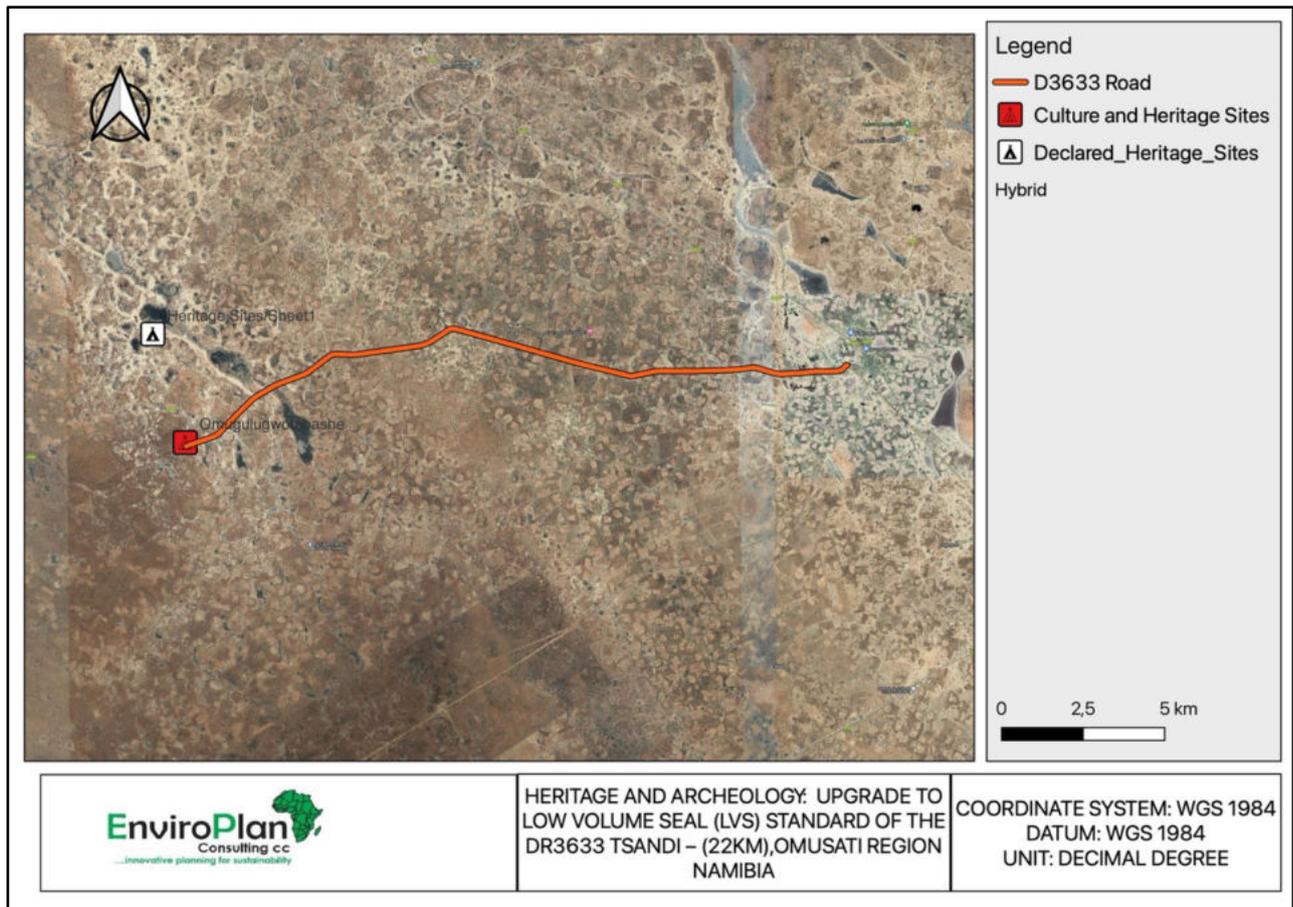


Figure 9: Culture and Heritage Sensitivity

6. CHAPTER SIX: PUBLIC CONSULTATION

6.1. Overview

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 are documented below.

Public consultation forms an important component of an Environmental Assessment (EA) process. Public consultation provides potential Interested and Affected Parties (I&APs) with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process. Public consultation has been done in accordance with both the EMA and its EIA Regulations.

The public consultation process assists the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and the extent to which further investigations are required. Public consultation can also aid in the process of identifying possible mitigation measures.

6.2. Approach

6.2.1. *Interested and Affected Parties (I&APs)*

An I&P is defined under the Environmental Management Act (2007) as:

- “Any person, group of persons or organization interested in or affected by an activity; and
- (b) Any organ of state that may have jurisdiction over any aspect of the activity”.

EnviroPlan identified specific I&APs, whom were considered interested in and/or affected by the proposed activities through the following means:

- Information for the applicable local authorities was obtained from the existing GCS stakeholder database;
- Notification letters and/or emails were sent to those possibly interested and affected by the proposed project; and
- Notices were placed in the local newspapers requesting any potentially affected or interested members of the public to register as I&APs.

A summary of the I&APs identified is presented in Table 10. The complete list of I&APs is provided in Appendix B.

Table 9: Summary of Identified IAPs

List of IAPs	Description
	Ministry of Environment and Tourism
	Omusati Regional Council
	Tsandi and Constituency
	Tsandi Village Council
	Ongulumbashe Settlement
	Local community members

6.2.2. Communication with I&APs

Regulation 21 of the EIA Regulations details steps to be taken during a given public consultation process and these have been used in guiding this process. Communication with I&APs regarding the proposed development was facilitated through the following means and in this order:

Meetings were held with the relevant authorities as follows (see Appendix B):

Table 10: Consultative engagement conducted

Date and Time	Activity	Venue/Place
09.12.21, 09:30 AM	Consultative Meeting	Tsandi Traditional Authority Hall
09.12.21, 14:00 PM	Consultative Meeting	Ongulumbashe Settlement- Otunana Meeting Tree

- A Background Information Document (BID) containing descriptive information about the proposed activities was compiled (Appendix D) and sent out to all identified and registered I&APs;
- Site notices were fixed at conspicuous locations in Tsandi, Ongulumbashe and along the road (see Appendix B); and
- Radio announcements were made in Otjiherero and Oshiwambo on Otjiherero (Omurari) and Oshiwambo NBC Radio by the Onesi and Tsandi constituency councilors.

Public consultation was carried out according to the Environmental Management Act’s EIA Regulations. After the initial notification, the I&APs were given three weeks to submit their comments on the project until January 28 2022. The comment period will remain open until the final scoping report is submitted to MET.

6.3. Printed Media

6.3.1. 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 road upgrade project. In addition, the BID provided details on the public consultation process with contact details for further information. This document was advertised for availability through various means of newspaper articles, public meeting and electronic mail; see Appendix B of this document.

6.3.2. Newspaper Advertisements & Articles

Newspaper notices about the proposed project and related EA processes was circulated in two newspapers for two weeks. Notices were placed in The Windhoek Observer and The New Era newspapers, briefly explaining the activity and its locality, and inviting members of the public to register as I&APs (Appendix B).

Table 11: Newspaper & Site Notices (Appendix B)

Newspaper	Area of Distribution	Language	Date placed
The New Era (Refer to Appendix B)	Country Wide	English	25 November, 02 December 2022
Windhoek Observer (Refer to Appendix B)	Country Wide	English	25 November, 02 December 2022
Site notice	Tsandi, Onesi, Onhoko, Epalela, Road reserve	English, Oshiwambo	15 September 2022
Public Meeting Meeting minutes attached in Appendix B	Epalela-Onhoko Tree Onesi Constituency Office Tsandi Constituency Office	English	09/02/ 2022

6.3.3. Building a Stakeholder Database

A stakeholder database for the project collected through a variety of means. During the advertisement of the project (through 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 B and C.



Figure 10: Public Consultation Notification Poster

6.3.4. Stakeholder Meetings & Key Conversations

Public consultation meetings were conducted, and these were represented with traditional authority, council representatives, regional council, residents, government and quasi-government departments and ministries. Meeting minutes were taken attached in Appendix B and pertinent issues relating to the projects were discussed and recorded. Below are meeting proceedings pictures taken.

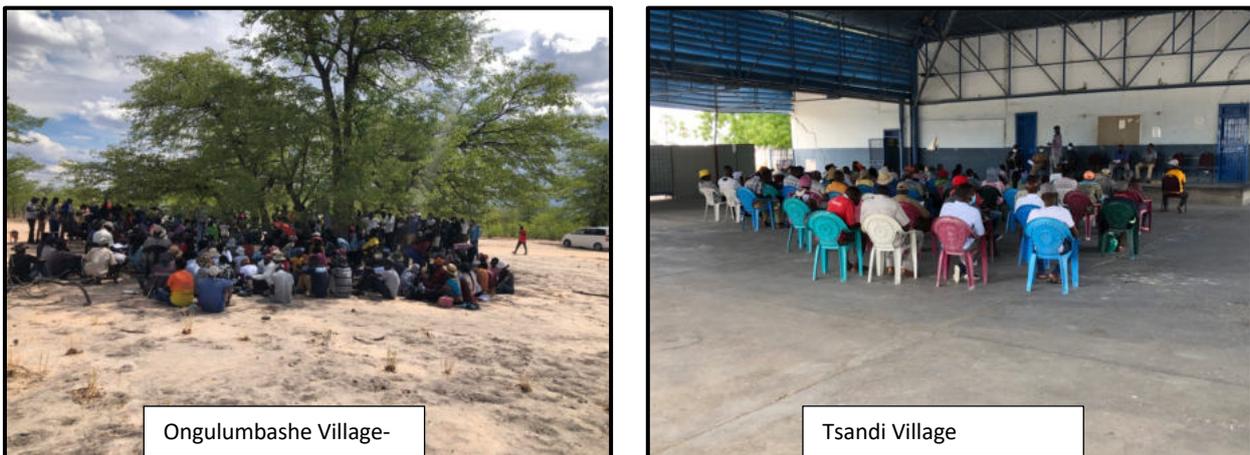


Figure 11: Public Meeting Proceedings at Ongulumbashe and Tsandi

6.3.5. Comments and review period

Various stakeholders have registered and provided comments from the onset of the public consultation process and the initial information sharing through the BID, newspaper and site notices.

The public commenting period from the First Newspaper advert spanned for 30 Man days and the Scoping Report and Environmental Management Plan was made available to the public and stakeholders for comment and review.

Attendance registers, comments and proof of stakeholder’s engagement are attached in appendix B of this ESR. Key Issues raised during the consultative meeting are presented below:

Table 12: Commenting themes raised during the consultative meetings

THEME	COMMENT
Land Use	<ul style="list-style-type: none"> ▪ Compensation of properties affected by the road reserve. ▪ Borrow pit areas and access roads were raised as a major concern and the community members emphasized on consultative engagements.
Economic	<ul style="list-style-type: none"> ▪ Emphasis was given to local employment. ▪ Residents acknowledged that borrow pits can be rehabilitated to allow for the pits to be used as rainwater harvesting infrastructure.
Traffic-Safety and Existing Infrastructure	<ul style="list-style-type: none"> ▪ Important crossings along the road are required and should be co0-identified in consultation with local residents, i.e., rest places, schools, clinics, and churches. ▪ Existing private water supply pipelines crossing the road will be identified and sleeves will be provided for. ▪ Road signage will be installed as per road safety requirements.
Environmental	<ul style="list-style-type: none"> ▪ Protected tree species were mention to be important and compensation should be ensured. ▪ Implementation of the EMP was emphasized by the local residents to ensure that compliance monitoring is conducted. ▪ Employee safety and waste management was also raised as a major issue to be addressed.
Others	<ul style="list-style-type: none"> ▪ Access roads to schools and clinics were requested for upgrade. ▪ The community members also indicated the need to extend the upgrade to Ongulumbashe memorial since it is an important culture and heritage area.

6.4. Conclusion

EnviroPlan concludes that the public participation was extensive and transparent enough to ensure any comments or issues regarding the proposed development were addressed and to suggest possible mitigation measures.

7. CHAPTER SEVEN: ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

7.1. Overview

The proposed activities have impacts on certain biophysical and social features. The identified impacts were assessed in terms of probability (likelihood of occurring), scale/extent (spatial scale), magnitude (severity) and duration (temporal scale) as presented in Table 14, 15, 16 and 17 8. To enable a scientific approach to the determination of the environmental significance, a numerical value is linked to each rating scale. This methodology ensures uniformity and that potential impacts can be addressed in a standard manner so that a wide range of impacts are comparable.

It is assumed that an assessment of the significance of a potential impact is a good indicator of the risk associated with such an impact. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact;
- Assessment of the pre- and post-mitigation significance of the impact; and
- Description of recommended mitigation measures.

The recommended mitigation measures prescribed for each of the potential impacts contribute towards the attainment of environmentally sustainable operational conditions of the project for various features of the biophysical and social environment.

The following criteria were applied in this impact assessment:

7.1.1. Extent (spatial scale)

Extent is an indication of the physical and spatial scale of the impact. Table 14 shows rating of impact in terms of the extent of spatial scale.

Table 13: Extent or spatial impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Impact is localised within the site boundary: Site only	Impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond site boundary: Regional	Impact extend National or over international boundaries

7.1.2. Duration

Duration refers to the timeframe over which the impact is expected to occur, measured in relation to the lifetime of the project. Table 15 shows the rating of impact in terms of duration.

Table 14:Duration of Impact

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long-term	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

7.1.3. Intensity, magnitude / severity

Intensity refers to the degree or magnitude to which the impact alters the functioning of an element of the environment. The magnitude of alteration can either be positive or negative. These were also taken into consideration during the assessment of severity. **Table 15** shows the rating of impact in terms of intensity, magnitude or severity.

Table 15: Intensity, magnitude and severity of impact

Type of Criteria	Negative				
	H-(10)	M/H (8)	M-(6)	M/L (4)	L-(2)
Qualitative	Very high deterioration, high quantity of deaths, injury of illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat / diversity or resource, severe alteration or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat / biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Minor deterioration, nuisance or irritation, minor change in species / habitat / diversity or resource, no or very little quality deterioration.

7.1.4. Probability of occurrence

Probability describes the likelihood of the impacts actually occurring. This determination is based on previous experience with similar projects and/or professional judgment. See Table 8-4 for impact rating in terms of probability of occurrence.

Table 16: Probability of occurrence impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.

7.1.5. Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact “without mitigation” is the main determinant of the nature and degree of mitigation required. As stated in the introduction to this chapter, for this assessment, the significance of the impact pre-and post-mitigation actions was measured.

Once the above factors (Table 14, Table 15, Table 16 and Table 17) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

$$SP = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$$

The maximum value per potential impact is 100 significance points (SP). Potential impacts were rated as high, moderate or low significance, based on the following significance rating scale (Table 18).

Table 17: Significance rating scale

SIGNIFICANCE	ENVIRONMENTAL SIGNIFICANCE POINTS	COLOUR CODE
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L

Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	>-60	H

For an impact with a significance rating of high (negative), mitigation measures are recommended to reduce the impact to a low or medium significance rating, provided that the impact with a medium significance rating can be sufficiently controlled with the recommended mitigation measures. To maintain a low or medium significance rating, monitoring is recommended for a period of time to enable the confirmation of the significance of the impact as low or medium and under control.

The impact assessment for the proposed activities is given below.

7.2. Planning and Design Phase Impact Assessment

The planning and design phase is mostly concerned with the preparation of the site for the road upgrade activities. The potential impacts during this phase include loss of biodiversity, dust and noise during site clearing and preparation.

7.3. Impact Assessment of Biodiversity Loss

A number of large indigenous trees are located along the side of the road that is to be rehabilitated. Some are located within the road reserve in which the proposed road upgrade activities will take place. Some vegetation may need to be removed should the rehabilitated road deviate from its current alignment. This may also lead to habitat destruction for some fauna. As such, care should be taken during the removal of vegetation for site preparation to ensure minimal disturbance in the area. The envisaged impact at the project site is thus not of such magnitude and/ or significance that it will have irreversible impacts on the biodiversity and endemism of the area and Namibia at large. The pre-mitigation impact is assessed to be “medium” in significance and after mitigation the impact is assessed to have a “low” significance. The assessment of this impact is presented in Table 19.

Table 18: Assessment of the impacts on biodiversity loss

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 3	L/M - 5	M - 6	M - 3	M - 42
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L-4

7.3.1. Mitigations and recommendations to biodiversity loss

- Large indigenous trees on site need to be identified, marked, surveyed and are not to be removed or damaged.
- Trees with a trunk size of 150 mm and bigger should be surveyed, marked with paint (readily visible) and protected.
- Protected tree species as per the Forest Act No 12 of 2001 and Forest Regulations of 2015 may not be removed without a permit from the Ministry of Agriculture, Water and Forestry.
- Workers should be trained on the importance of conserving trees during construction activities and should be sensitised to be vigilant against any practice that will have a harmful effect on vegetation.

7.4. Impact Assessment of Dust Generation

During preparation of the site for the proposed upgrade, the presence of machinery such as graders for clearing vegetation and preparing the site may lead to the generation of dust which could impact the local communities and businesses negatively, if not properly handled. This may pose a negative health impact on the surrounding communities. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented in Table 8-7.

Table 19: Assessment of the impacts of dust generation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 3	L/M - 5	M - 6	M - 3	M - 27
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L-4

7.4.1. Mitigations and recommendations to dust generation

- Dust abatement techniques should be implemented e.g. spraying of water on site to reduce dust levels to an acceptable standard.
- The local community and surrounding businesses should be continuously consulted to ensure that the dust levels are acceptable.
- Community members and businesses should be informed prior to any clearing of vegetation commencing so that they are aware of the planned work.
- During high wind conditions, the contractor must make the decision to cease works until the wind has settled.
- Stockpiles should be covered with plastic to reduce windblown dust.

- Workers should be provided with dust masks.

7.4.2. Mitigations and recommendations to noise generation

Site preparation activities should be limited to daytime hours (between 08h00 and 17h00) unless otherwise arranged with community members and businesses in the area.

7.5. Construction Phase Impact Assessment

The potential impacts associated with the construction phase of the upgrade of the subject road have been identified and assessed in this subchapter. The main potential impacts identified are: environmental degradation, waste generation, soil and groundwater contamination, dust and noise generation, archaeological and heritage resources impacts, disturbance to local community members and businesses, temporary employment creation and health and safety impacts.

7.6. Impact Assessment on Environmental Degradation

During construction different types of waste may be generated on-site. This may include general waste as well as hazardous bitumen and hydrocarbons which may cause degradation of the subject environment if not correctly managed and contained. Furthermore, the presence of the workforce and machinery may enhance environmental destruction within the subject site. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented in Table 22.

Table 20: Assessment of impacts on environmental degradation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 1	L/M - 3	M - 4	M - 4	M - 32
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L-4

7.6.1. Mitigations and recommendations to environmental degradation

- All types of waste should be effectively managed on site.
- Hazardous substances and hazardous waste materials should be carefully and correctly handled and stored on site according to guidelines in the EMP.
- Contractors should be trained on the importance of protecting the environment.
- Contractors should be trained on EMP compliance and sensitized to ensure that they respect and protect the environment during the work.

7.7. Impact Assessment of Waste Generation

Construction activities usually generate waste which may lead to environmental pollution, if not properly handled. This may result in blocked waterways should waste be blown into water pipelines; animals may choke on waste when ingested and additionally it may pose a negative visual impact

on the surrounding environment. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to a “low” rating. The assessment of this impact is presented in Table 23.

Table 21: Assessment of Impacts on Waste generation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 1	L/M - 3	M - 4	M - 4	M - 32
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L-4

7.7.1. Mitigations and recommendation to waste generation

- The construction site should be kept tidy at all times.
- All domestic and general construction waste produced on a daily basis should be cleaned and contained.
- No waste may be buried or burned on site or anywhere else.
- Waste containers (bins) should be emptied during and after the construction and the waste removed from site to the municipal waste disposal site on a covered vehicle (to prevent waste blowing off the vehicle into the environment).
- Separate waste containers (bins) for hazardous and domestic / general waste must be provided on site.
- Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter.
- No waste may remain on site after the completion of the project.
- The recycling of waste should be considered and implemented as far as possible.

7.8. Impact Assessment of Soil, Surface and Groundwater

Improper handling, storage and disposal of hydrocarbon products and hazardous materials at the site may lead to soil, surface and groundwater contamination, in case of spills and leakages. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented in Table 24.

Table 22: Assessment of the impacts on soil, surface and groundwater

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 3	L/M - 4	M - 6	M - 4	M - 52
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L-4

7.8.1. Mitigations and recommendation to soil, surface and groundwater

- Careful storage and handling of hydrocarbons on site is essential.
- Workers responsible for the storage and handling of hydrocarbons should be suitably trained to do so and trained on spill prevention (e.g. the use of drip trays) and the handling of potential spills should they occur, to be able to ensure implementation on site.
- Potential contaminants such as hydrocarbons and wastewater should be contained on site and disposed of in accordance with municipal wastewater discharge standards so that they do not contaminate surrounding soils, surface water and eventually groundwater.
- An emergency plan should be available for major / minor spills at the site during operation activities (with consideration of air, groundwater, soil and surface water) and during the transportation of the product(s) to the site.

7.8.2. Mitigations and recommendations to dust generation

- Dust abatement techniques should be implemented e.g. spraying of water on site to reduce dust levels to an acceptable standard.
- The local community and surrounding businesses should be continuously consulted to ensure that the dust levels are acceptable.
- Community members and businesses should be informed prior to construction commencing so that they are aware of the planned construction.
- During high wind conditions the contractor must make the decision to cease works until the wind has settled.
- Stockpiles and sand being transported should be covered with plastic to reduce windblown dust.
- Workers should be provided with dust masks.

7.9. Impact Assessment of Noise Generation

Construction activities and the presence of construction vehicles may lead to the generation of noise which could impact the local communities negatively, if not properly handled. This may pose a disturbance on the surrounding communities. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented in Table 26.

Table 23: Assessment of the impacts of noise generation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M - 6	M - 3	M - 27
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L-4

7.9.1. Mitigations and recommendation to noise generation

- Construction activities should be limited to daytime hours (between 08h00 and 17h00) unless otherwise arranged with community members and businesses in the area.
- No amplified music should be allowed on site.
- Technology such as silencers should be installed on construction machinery.
- The use of horns as a general communication tool should not be allowed, they should only be used when necessary, as a safety measure.

7.10. Impact Assessment of Archaeological and Heritage Resources

The proposed construction activities is not taking place in an area that has significant archaeological or heritage resources. However, should these be encountered during the upgrade activities, mitigation measures need to be in place to ensure that these resources are not harmed. Memorial sites were identified along the road which are to be preserved during the proposed upgrade. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented in Table 27.

Table 24: Assessment of the impacts on archaeological and heritage resources

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 1	L/M - 4	M - 6	M – 1	M - 11
Post-mitigation	L - 1	L- 1	L- 2	L - 1	L-4

7.10.1. Mitigations and recommendation to archaeological and heritage resources

- All works are to be immediately ceased in an affected area should an archaeological or heritage resource be discovered.
- The National Heritage Council of Namibia (NHCN) should advise with regards to the removal, packaging and transfer of the potential resource.

7.11. Impact Assessment of disturbance to local community members and businesses

The proposed construction activities could potentially impact those who have settled or set up businesses close to the road or within the road reserve. Additionally, some community members sell fruits and crafts along the side of the road and this business activity could be disturbed during upgrade activities. Should these community members or businesses be impacted upon during upgrade activities, mitigation measures need to be in place to ensure that the impacts are minimised. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented in Table 28.

Table 25: Assessment of the impacts on disturbance to local community members and businesses

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 1	L/M - 4	M - 6	M - 1	M - 11
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L-4

7.11.1. Mitigations and recommendations to disturbance to local community members and businesses

- Community members and business owners should be informed of construction and materials abstraction activities prior to construction commencing.
- Should community members have to relocate their business activities e.g. selling of fruit, the contractor should communicate with the community members prior to commencing work to ensure that a suitable alternative location to which to relocate the activities is agreed upon.

7.12. Impact Assessment of Temporary Employment Creation

The proposed activity may provide employment opportunities for the local people. Additional benefits may arise depending on the agreements reached between the community and the Proponent. The impact can be rated as of a “low-positive” significance. The assessment of this impact is presented in Table 28.

Table 26: Assessment of impacts on temporary employment creation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M + 2	L/M + 2	M + 2	M + 3	L+ 18
Post-mitigation	L + 4	L+ 3	L+ 2	L + 3	L + 27

7.12.1. Recommendations for temporary employment creation

- Should any job opportunities result, they should be made available to the local people in the area as far as reasonably possible.
- Should materials or resources be sourced from communities, they should be sufficiently compensated in a manner agreed between the community and the proponent/contractor.

7.13. Impact Assessment of Health, Safety and Welfare

Construction activities may cause health and safety risks to people operating on the site. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After

the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented in Table 30.

Table 27: Assessment of impacts on health, safety and welfare

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M - 6	M – 3	M - 27
Post-mitigation	L - 1	L- 1	L- 2	L - 1	L-4

7.13.1. Mitigations and recommendations to health and safety

- Construction workers should be provided with awareness training about the risks associated with the proposed upgrade work such as hydrocarbon handling and storage, the handling of heavy machinery etc.
- During the works conducted, workers should be properly equipped with personal protective equipment (PPE) such as coveralls, gloves, safety boots, safety glasses etc.
- The contractors should comply with the provisions with regards to health and safety as outlined in the Labour Act (No. 6 of 1992).
- The contractor should ensure that road safety is prioritised during the road upgrade phase. Detours and temporary access should have adequate signage and safety considerations.

8. CHAPTER EIGHT: RECOMMENDATIONS AND CONCLUSION

8.1. Conclusion

The key potential biophysical impacts related to the construction, operational and maintenance and decommissioning phases of the proposed project were identified and assessed. Suitable mitigation measures (where required and possible) were recommended, and the impacts can be summarised as follows:

8.1.1. Impacts on biodiversity (during planning and design and construction phases):

There are some large indigenous trees located along the side of the road. Some are located within the road reserve in which the proposed road upgrade activities will take place. Some vegetation may need to be removed should the rehabilitated road deviate from its current alignment. This may also lead to habitat destruction for some fauna. As such, care should be taken during the removal of vegetation for site preparation to ensure minimal disturbance in the area. The likelihood of this impact is low. However, the impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.1.2. Impacts on environmental degradation (during construction phase):

During construction different types of waste may be generated on site. This may include general waste as well as hazardous bitumen and hydrocarbons which may cause degradation of the subject environment. Furthermore, the presence of the workforce and machinery may aid in environmental destruction within the subject site. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to low rating. The impact can be adequately addressed by the recommendations management actions given in the EMP.

8.1.3. Impacts on waste generation (during construction phase):

Construction activities usually generate waste, which leads to environmental pollution, if not properly handled. This may result in blocked waterways should waste be blown into water pipelines, animals may choke on waste when ingested and it may pose a negative visual impact on the surrounding environment. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to low rating. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.1.4. Impacts on soil, surface and groundwater contamination (during construction phase):

Improper handling, storage and disposal of hydrocarbon products and hazardous materials at the site may lead to spills and leakages which could cause soil, surface and groundwater contamination. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.1.5. Impacts on dust generation (during construction phase):

Site clearing, construction activities and the presence of construction vehicles may lead to the generation of dust which could impact the local communities negatively, if not properly handled. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigation measures, the impact will be significantly reduced to low rating. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.1.6. Impact on noise generation (during construction phase):

Site clearing, construction activities and the presence of construction vehicles may lead to the generation of noise which could impact the local communities negatively, if not properly handled. This may pose a disturbance on the surrounding communities. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to low rating. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.1.7. Impact on archaeological and heritage resources (during construction phase):

The proposed construction is not taking place in an area that has significant archaeological or heritage resources. However, should these be encountered during the construction activities, mitigation measures need to be in place to ensure that these resources are not harmed. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.1.8. Impact on disturbance to local community members and businesses (during construction phase):

The proposed upgrade could potentially impact those who have settled close to the road or within the road reserve. Additionally, some community members sell fruits and crafts along the side of the road and this business activity could be disturbed during upgrade. However, should community members or businesses be encountered during the upgrade activities, mitigation measures need to be in place to ensure that these impacts to the community members are minimised. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.1.9. Impact on temporary employment creation (during construction phase):

The proposed activity may provide employment opportunities for the local people. Additional benefits may arise depending on the agreements reached between the community and the Proponent. The impact can be suitably enhanced by the recommendations and management actions given in the EMP.

8.1.10. Impact on health and safety (during construction phase):

Construction activities may cause health and safety risks to people operating on the site. The impact can be adequately addressed by the recommendations given under subchapter 8.3.9 and management actions given in the EMP.

8.2. Recommendation

Based on the information provided in this report, EnviroPlan is confident the identified risks associated with the proposed road upgrade project can be reduced to acceptable levels, should the measures recommended in the EMP be implemented and monitored. It is therefore recommended that the project receive Environmental Clearance, provided that the EMP be implemented.

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APPENDICES

Appendix A: Environmental and Social Management Plan

Appendix B: Public Consultation Documents

- 1. Newspaper adverts**
- 2. Attendance Register**
- 3. I&APs Communiques**
- 4. Meeting Minutes**

Appendix C:

Maps and Layouts

1. Locality Map

Appendix D:

Specialist inputs

1. Geohydrological Study

Appendix E: Lead EAP Resume

1. Tendai E. Kasinganeti