Tortoise Environmental Consultants(TEC)
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VAT Number: 5728293015
Company Reg: cc/2012/2523

ENVIRONMENTAL SCOPING REPORT (ESR)

PROPOSED CONSTRUCTION OF THE GRAVEL ROAD DR3654 OMUTHIYA TO ELAMBO OSHIKOTO REGION

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+264 61 225 776 / +264 811 220 114
info@tec.com.na / www.tec.com.na
P.O.Box 35473, Kleine Kuppe, Windhoek
Unit 17, No. 40, Berg Street, Klein Windhoek, Windhoek, Namibia

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Location	DR3654 Omuthiya-Elambo, Oshikoto Region	
Proponent	Telephone: +264 61 284 7000 Fax: +264 61 284 7158 Email: pr@ra.org.na Website: www.ra.org.na	
Author:	**Signature**	**Date**
Ms. Grace Shihepo (EAP)[1]		26 May 2023
Reviewer: Mr. Jonas Heita (EAP)		26 May 2023
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1 EAP – Environmental Assessment Practitioner

Executive Summary

This Environmental Scoping Report (ESR) and Accompanying Environmental Management Plan (EMP) are compiled to guide construction works of the proposed gravel road DR3654 Omuthiya – Elambo, in Oshikoto Region. The road has a total length of approximately 49 km and will form a vital link to the national road network, through provision of access to communities living along the route. Roads are the veins of economic development and facilitate the movement of goods and services (logistics). The Ministry of Works and Transport is mandated to extend service provision to all Namibians, including road upgrades in rural areas. Meaning, a comprehensive Road network is one of the key building blocks for socio-economic development in the country. However, road construction requires significant quantities of gravel material and Water. Henceforth, mining for gravel material and water abstraction are inevitable (cannot be avoided).

Tortoise Environmental Consultants were appointed to undertake the environmental assessment and compile the requisite ESR and EMP for submission to the Department of Environmental Affairs. The SR states the potential impacts that the proposed project may have on the socio-economic and bio-physical environment. The assessments are useful in executing project planning and route designs from the start of the project right through to the finish. During the Environmental Assessment process the concerns of the local communities as well as other stakeholders were considered when the feasibility of the road upgrade is to be determined. All relevant natural environmental and cultural considerations were also considered while compiling this Scoping Report.

The current road track that is used between Omuthiya and Elambo is often only accessible with the use of 4x4 vehicles, and some sections get inundated with water during the rainy season. The use of heavy vehicles may cause nuisance and health hazards (such as noise and dust and potential environmental pollution from the storage and use of fuels and oils. Socially, road construction attracts people for employment opportunities, which are often recipe for various social ills such as pollution, substance abuse, spread of diseases and theft.

Potential impacts linked to the proposed road upgrade have been assessed, and mitigation measures were identified and have been recommended for adoption by the project proponent to manage the road upgrade activities. It is imperative that all activities during the duration of the road upgrade should conform to the Environmental Management Act of 2007 and EIA regulations of 2012. Upon approval of the Environmental Clearance Certificate, the proponent (Roads Authority) should commit and abide to the recommended mitigation and rehabilitation measures as prescribed herein.

ACRONYMS

BID	Background Information Document
DEA	Department of Environmental Affairs
DSR	Draft Scoping Report
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
ECC	Environmental Clearance Certificate
ECO	Environmental Compliance Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No. 7 of 2007)
EMP	Environmental Management Plan
ESR	Environmental Scoping Report
I&APs	Interested and Affected Parties
MEFT	Ministry of Environment, Forestry and Tourism
PPE	Personal Protective Equipment
RA	Roads Authority
SM	Site Manager
TEC	Tortoise Environmental Consultancy

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1. INTRODUCTION

1.1. Background

The Roads Authority recognizes the importance of maintaining a good road network across rural areas throughout the country. Road construction projects are generally intended to improve the economic and social welfare of people. Travelling times can then be reduced with increased road capacity which also lowers the costs of vehicle use, while further increasing access to markets, jobs, education, and health services.

The project entails the proposed construction of the road DR3654 Omuthiya - Elambo, to gravel standards. The total length of the road is approximately 49 km long and will form a vital link to the national road network, through provision of access to communities living along the route.

Site Location: GPS coordinates:
Latitude 18°13'36.11"S and Longitude 16°44'14.49"E

The proposed road construction would require authorization in terms of the Namibian environmental legislation (Environmental Management Act (No. 7 of 2007)) (EMA) and the Environmental Impact Assessment (EIA) Regulations (Government Notice 30 of 6 February 2012). For this, an environmental assessment must be conducted followed by the compilation of a Scoping Report (SR) that is submitted to the Ministry of Environment and Tourism: Department of Environmental Affairs (MET: DEA) for a decision on issuing an Environmental Clearance Certificate (ECC).

1.2. Terms of Reference

This document is prepared as part of the Environmental Impact Assessment (EIA) and scoping exercise, aimed at obtaining an Environmental Clearance Certificate (ECC) for the proposed construction of the grave road DR3654 Omuthiya – Elambo.

Tortoise Environmental Consultants (TEC) is appointed to carry out the requisite scoping assessment and develop an Environmental Management Plan (EMP). The scoping process investigated the potential significant positive and negative biophysical and socio-economic impacts associated with construction activities for the proposed road upgrade. In addition to reporting on the potential impacts,

the scoping process also serves to provide an opportunity for Interested and Affected Parties (I&APs) to provide comments and participate in the process.

1.3. What is an Environmental Impact Assessment (EIA)?

An Environmental Impact Assessment (EIA) is a tool to manage negative environmental impacts that may arise from the proposed development and is aimed at guiding the proposed activities to be more environmentally friendly and to comply with the provisions of the Environmental Management Act (Act No.7 of 2007).

An EIA is a systematic process of identifying, predicting, evaluating and mitigating the potential environmental and social effects that may arise from the activities of a proposed project. The aim of the EIA is to reduce negative impacts (effects) and maximize positive impacts, through the adoption of best environmental practices and application of the precautionary principle.

1.4.1 Identification and Mitigation of Impacts

The backbone of the EIA report entails identification of impacts (whether real or perceived) and recommendations on suitable mitigation measures to ensure compliance with the principles of environmental management and highlight risks and measures to ensure an environmentally friendly development.

1.4.2 Purpose of the EIA Scoping Exercise

The purpose of this EIA scoping exercise is to:

a) Provide description of the proposed activity;
b) Describe the affected environment (proposed area),
a) Identify potential environmental impacts / aspects of concern;
b) Describe the methodology followed to assess the potential impacts;
c) Mitigate negative impacts that may arise from the proposed project.

1.4.3 Rehabilitation

The EIA should not only focus on mitigating the impacts of the activity during the active operations but also should go further and recommend rehabilitation measures at project closure (when activities cease). Rehabilitation measures should not be parked waiting for project closure but should be implemented from the beginning and incrementally throughout the project lifespan.

1.4. Project Alternatives

As stipulated in the Environmental Management Act (EMA) and EIA regulations, alternatives should be considered during the project design, to determine if an alternative route (different locality) or alternative project (different activity) would yield better environmental and socio-economic benefits.

Construction of the gravel road is the only alternative considered for this project.

1.5. No-Go Alternative

If this option is considered, it would mean that the current status quo will prevail. The community members will continue using the track route that is accessible with the use of 4x4 vehicles.

Should the no-go alternative be considered, it would also mean that the opportunity costs stemming from socio-economic boost during construction as well as operational uses of the gravel road by the local community will not be realised. These include job opportunities for the local community members as well as provision of a good road network.

1.6. Environment vs Economic Development

A comprehensive Road network is one of the key building blocks for socio-economic development in the country. However, road construction requires significant quantities of Gravel and Water that are often sourced from the surrounding areas.

Namibia's economy is highly dependent on a healthy environment and striking a balance in meeting demands for economic development (e.g. road construction) and maintaining biological diversity can be a challenge. Therefore, the environment and development sectors should work together and devise synergies to ensure that natural resources are utilized in a sustainable manner. Development takes place on land (in the environment) and hence the quest for economic development requires a trade-off with certain parts of the environment in-order for the development to be realized. Meaning, for development to take place, some part of the environment will be affected. However, such impacts should be mitigated through the EMP. The aim of environmental assessments is to guide the sustainable utilization of natural resources and to mitigate negative impacts that would otherwise compromise the environmental integrity and future ecosystem benefits.

2. PROJECT INFORMATION

2.1 Project Location and Route Description

The Oshikoto Region is one of Namibia's fourteen regions located in the northern part of the country. The region covers a total land area of 38 653 km^2 which occupies 4.69% of the country's total land surface. The region is strategically located to attract economic activities and opportunities as it stretches north wards, connecting the communal land and southern commercial areas.

The area where the proposed gravel road is to be constructed is in an underdeveloped rural area that extends from Omuthiya Town to Elambo. The total length of the road is approximately 49 km and will form a vital link to the national road network, through provision of access for the communities living along the route to their regional town of Oshikoto Region, Omuthiya. The community members currently travel on a loose earth track that passes through sections of loose thick sand and water ponds during the rainy season. This existing earth track is often only accessible with the use of 4x4 vehicles (Please refer to *Figure 1* below).

Figure 1: The current condition of the earth track sections is either thick loose sand or pools of water when it rains.

2.2 The Physical Environment

The Study area lies within Oshikoto Region that has a landscape of Kalahari Sand plateau, characterised by deep sand. There are two major drainage systems in the Region are Cuvelai at the northwest that stretches from Angola to Etosha Pan; and the Omulamba which stretches from Otavi highlands and drains to Etosha Pan.

North-central Namibia lies in the Owambo Basin, comprising a topographic depression that is filled with sediments. Other rock formations are found along the rim of the basin, manifesting as hills and low ridges of rock outcrops.

2.3 Bio-physical Environment

The project area is underlain by thick sandy soils, silty sands and pedogenic material of Kalahari Group. The geological stratigraphy of the basin in the project area comprises of the following strata:

- Recent deposits that fall within the area of the Cuvelai-delta comprises of clayey sand and clay alluvial deposits (transported by water), which are present intermittently within large areas of eolian sand. The sandy and clayey deposits were reworked over time, forming a mosaic of soil types that consist mainly of clayey sodic sand (in the oshanas and depression areas) and sodic sand (in the surrounding higher ground). In principle, the sand remained at the original deposition site, while the silt and clay migrate and concentrates in the depression areas (processes of sheet wash and leaching).
- Kalahari Group: As is typical over vast areas of northern Namibia, Tertiary to Quaternary period unconsolidated deposits of windblown (eolian) origin are present in the whole region. These deposits (sand, calcrete and gravel) are generally thick, varying from 225m to 500m in areas, but may be as thin as 10m in areas where sub-outcrops of the Omingonde Formation, Karoo Sequence occurs (comprising red mudstone, siltstone, sandstone, grit and conglomerate).

2.3.1 Flora and Fauna

Conservation of biological resources both flora and fauna should be an investment that will yield benefits locally and nationally for present and future generations. The policy on biological diversity is to conserve the nation's biological diversity while ensuring that they provide lasting social, economic and environmental benefits to the population through their efficient and equitable use.

Figure 2: Dominant tree in the study area are Acacia, Terminalia and Combretum species

The vegetation in the area varies from open savanna and deep sand around the project area. The area has a high diversity and abundance of plant resources utilized by inhabitants, such as wild fruit and construction material. The dominant biome is North-eastern Kalahari. Due to the dominant focus on livestock farming, the area has limited grass cover and evidence of bush thickening were observed along the track route.

The project area borders Etosha National Park and wild animals do frequent the area from the park. Agricultural activities are mainly subsistence crop farming and livestock rearing. Both livestock and crop farming form the base for most of the people in the region.

2.4 Climatic Conditions and Rainfall

Oshikoto Region like other regions in Namibia is hot, semi-arid with average annual rainfall ranging from 400mm to 550mm. The rainfall decreases from northeast to southwest with Tsumeb area receiving the highest rainfall. Average annual temperature is ranging from 22.6 to 30^{o}C during winter and 30 to 37^{o}C during the hot months. Tsumeb has the lowest average annual temperature of 22.0^{o}C. Although there is a high degree of variability and the area is subject to periodic droughts, making the area marginal for rain-fed crop production. Heavy rainfalls are most common between January and March.

2.5 Socio-economic Profile of the Project Area

The project area falls within Omuthiya and Eengodi Constituencies that have a combined population of 41 673 inhabitants. Eengodi constituency is regarded as one of the underserved constituencies in the country with no formal access roads (see Table 2).

The area is predominantly communal and rural in character. As such construction of the gravel road would form a vital link to amenities such as schools and clinics. The positive impact that a road of this nature would have on the quality of life is high and irreversible. The impacts would be experienced over a long-term, beyond construction of the road. Although the road is to be physically situated in the two Constituencies, positive impacts would be extended to the entire Region of Oshikoto and Namibia as a whole. The probability of such positive impacts on quality of life are expected to be high.

According to labour force survey report (NSA, 2018), unemployment rate for both sexes in Oshikoto Region was recorded at 36.2%. Access to education and health facilities form part of the vital aspects that contribute to development of the region. At constituency level, Eengodi has the highest proportion of households with no toilet facilities at 92%. There are mini shops and primary schools located along the track route as depicted in figure 2 below.

Table 1: Villages through which the gravel road will cut across.

• Ontonke	• Okashana kelao	• Akoonde A & B
• Okashana koomanya	• Eyakulo	• Onambiya
• Nuunkulu yaKamati	• Onamishu yaAmukoto	• Ashipepe
• Onambinga	• Elambo	• Okondjatu

Figure 3: Some of the social amenities in the project site (left, local shops and right one of the schools)

2.6 Oshikoto Regional Profile

Oshikoto region covers an area of 38 673.1 km2 and has a total population of 181 973[2], which makes up 8.6% of Namibia's population. The region has a relatively young population composition, with 40% of the population being less than 15 years; while the elderly population aged 60 years and above is recorded at 8.5%.

2 Namibia Statistics Agency, 2011

Age Composition	Total	Females	Males
0 - 4 years	25 691	12 909	12 782
5 -9 years	22 841	11 347	11 494
10-14 years	24 184	11 974	12 210
15-19 years	23 121	11 200	11 921
20-24 years	16 367	7 923	8 444
25-29 years	12 052	6 205	5 847
30-34 years	10 111	5 339	4 772
35-39 years	9 017	5 035	3 982
40-44 years	7 380	4 310	3 070
45-49 years	6 672	3 980	2 692
50-54 years	4 876	3 019	1 857
55-59 years	4 216	2 549	1 667
60 + years	15 446	9 117	6 328
	181 973	**94 907**	**87 066**

Figure 4: Population composition of Oshikoto Region by age groups

Unemployment rate is widely regarded as one of the key labour market indicators and a good measure of current economic activity. The rate of unemployment for both sexes in Oshikoto region is recorded at 36.2%. Statistics further shows that the overall unemployment rate is higher for males 37.1% than females at 35%.

Trade in Oshikoto Region involves formal and informal traders ranging from multinational retail businesses to vendors selling home-made food and many others. Besides informal traders, most of the businesses are wholesalers and outlets as well as small shops, selling basic amenities and foodstuff. Most of the industrial activities are taking place in Tsumeb town and surroundings because that's where mineral deposits (copper) are occurring.

2.7 Technical Approach to Road Construction

The proposal is to construct a gravel road from Omuthiya onto a north-easterly direction to reach Elambo within Eengodi Constituency. The road will cover a total distance of 49km and will traverse through several villages, with layoff roads to schools and health amenities.

An investigative study entailing surveying and analysis of material quality was undertaken to assess the factors such as terrain, soil stability, drainage and water supply. A detailed design plan was thereafter developed, which outlines road alignment, cross sections, amongst others.

The materials investigation was conducted in accordance with the Roads Authority's Manual. The investigations for construction material sources (subgrade, general, selected, wearing course, building sand and concentrate aggregates) were carried out in the phases described below;

2.6.1. Phase 1: Initial Desk-Study and Field Investigations

The desk study identified potential areas where suitable construction material could be found. Aerial photo of the area were used to identify potential borrow pit sites to be explored.

2.6.2. Field Exploration

During the site visits, areas along the Route were investigated for signs that show the presence of road-building materials. These signs include the type of vegetation, topography, land-use and geographical characteristics.

Community members were also consulted for guidance on areas that are traditionally used for earth dams and wells as they predominantly contain gravel material.

2.8 Supporting Infrastructure

Road construction involves a range of activities that require a host of supporting infrastructure to ensure that the project is completed efficiently and effectively. Effective planning, design, and management are essential to ensure the construction of safe, reliable, and long-lasting roads. The items described below are some examples of supporting infrastructure that is required for upgrading the road section.

i) Borrow pit investigations for Road Construction Material

Suitable gravel material is required for construction of the respective road layers, subbase, shoulder, gravel wearing course and base course. Fill material is also required to ensure a vertical alignment appropriate for the chosen design speed. To achieve the afore stated, suitable material is therefore required from borrow pits. These pits are opened using various heavy-duty machines and the material is hauled from the pit to the required sections of the road where the material is needed. It is imperative that the material excavated complies with the engineering standards required for the construction of the road and is therefore tested on a regular basis.

Hauling distance is another important issue that needs to be considered. The borrow pits cannot be located too far from the section of the road

where the material is needed. Therefore, borrow pits should be situated within reasonable distance to reduce hauling and travel costs.

The initial exploration for borrow pits was carried out at pre-determined locations informed by the aerial investigations. Soil samples were logged, and representative samples were collected for further testing and quality analysis. Only areas that showed promising gravel material were considered for further detailed investigations. A total of forty-three (43) Road Indicator Tests (grading analysis, Atterberg limits, linear shrinkage), CBR and Mod AASHTO density tests were carried out.

From a total number of seven (7) borrow pit sites investigated, only five (5) sites indicated to have quality material from laboratory tests. Material results from the successful borrow pits allows a basic confidence factor in the material quality available for road construction. The information gathered during the borrow pits prospecting allowed for a basic approach to proportioning the test results to the estimated quantity of road building materials. Based on the laboratory test results and spacing of trial pits on-site, indicated on the borrow-pit sheets and the minimum anticipated depth of the suitable material, the estimated total quantities available in the borrow-pits are summarized in Table 2.

Table 2: Estimations of available wearing course quantities

BP No.	Position	Material		Dist. from CL *	Section Start	Section End	Section Length	Haul Dist. Back	Haul Dist. Forward	Quantity Required	Quantity Available	Excess Quantity
	(km)	Category (TRH20)	Category (COLTO)	(m)	(km)	(km)	(km)	(km)	(km)	(m^3)	(m^3)	(m^3)
BP1	0.0	B/E-Class	**G6**	230	0	9.0	9.0	0.0	9.0	10,800	18,750	7,950
BP2	15.5	B/E-Class	**G4/G5/G6**	120	9.0	20.5	11.5	-6.5	5.0	13,800	19,200	5,400
BP3	26.5	B-Class	**G5/G6**	300	20.5	31.5	11.0	-6.0	5.0	13,200	26,760	13,560
BP4	33.0	E-Class	**G6**	50	31.5	38.0	6.5	-1.5	5.0	7,800	12,600	4,800
BP5	45.0	B/E-Class	**G6**	1200	38.0	49.0	11.0	-7.0	4.0	13,200	16,150	2,950
TOTALS							**49.00**			**58,800**	**93,460**	**34,660**

The quantity required was calculated based on assumed wearing course layer thickness of 150mm, which will be changed once pavement design is completed and road width of 8.0m. Two very important criteria to evaluate the suitability of the material for wearing course are the Plasticity Index (PI) and the California Bearing Ration (CBR) at 95% mod AASHTO compaction.

The PI is very important, because low plasticity materials (PI<6) cause significant corrugations. Low-cohesion materials (i.e. low PI) also cause excessive ravelling (generation of loose gravel under traffic). On the other

hand, highly cohesive wearing course materials (i.e. PI > 20) are usually slippery in wet conditions and prone to excessive deformation in rutting under traffic. All five borrow pits were found to have sufficient type G8/G7/G6 quality material, classified as B-Class as per TRH20. Such material can also be used to improve roadbed bearing capacity, fill and selected layer.

ii) Sand for construction

In general, the residual and alluvial sands that occur along the route are unsuitable for use in concrete due to the high content of organic and other impurities. Table 3 below shows the grading results obtained from a sand sample taken along DR3654.

Table 3: Summary of test results for selected sand samples along the study route

Screen Size	Percentage Passing Screens		
	Test Results		Specified Limits (SANS 1083)
	BP @ km15+500 (TP1: 0.0 – 1.4m)	km32+000 (0.0-0.6)	Natural Sand
4.75	100	100	90-100
2.36	100	100	90-100
1.18	100	100	70-100
0.6	97	99	40-90
0.3	63	70	5-65
0.15	13	14	5-25
0.075	8.3	0	0-5
F.M	**1.3**	**1.2**	**1.2-3.5**

The material investigated for use as building sand do not conform to the stipulated limits as per SANS 1083. More sources will be investigated by the contactor prior to construction.

iii) Water Source/s for Road Construction

A reliable water supply is necessary to mix concrete, prepare the road surface during compaction amongst others. Sources of water in the construction area are limited because there are no old borrow pits available as this is a new road to be constructed. The amount of water that can be potentially stored in the borrow pits that will be excavated will also not be sufficient as large quantities of water will be required.

Potential sources of constructions are therefore considered to be groundwater in the project area, which occurs as follows:

- **Discontinuous perched water table that is seasonal** – This is rainfall water that is temporarily trapped above the calcrete layer at shallow depths.
- **Permanent water table known as the Main Shallow Aquifer** – this layer is approximately 20-40 m deep, and the water is saline over most of the project area.

Drilling of construction boreholes should be considered or else use of water from existing wells will need to be agreed with the local people. Should the Client decide to use water from existing wells, will require the necessary consideration given its high saline content.

In view of the above, the Consultant also considers potential sources of construction water from NamWater lines in the vicinity of the project.

It will be necessary to include an item for construction of boreholes by the Contractor during the construction phase. It remains the responsibility of the Contractor to obtain water for layer works and concrete as well as for human consumption. However, under no circumstances must the water supply of the normal users, i.e. settlements, schools and clinics, be compromised.

iv) Accommodation facilities for construction workers

Accommodation facilities for road construction workers can vary depending on the location, duration of the project and the number of workers involved. The construction period of the road is expected to last for a period of approximately 18 months, and this would require establishment of a camp-site that is equipped with tents, bunkhouses, trailers, ablution facilities and other amenities.

In addition to accommodation facilities, there will be a need to designate areas that will be used to store construction material as well as parking bays for construction vehicles. Heavy equipment such as bulldozers, excavators, graders, and rollers will be required; and these need a big turning area. Therefore, due diligence would be required when selecting an accommodation area to reduce disturbances to community members.

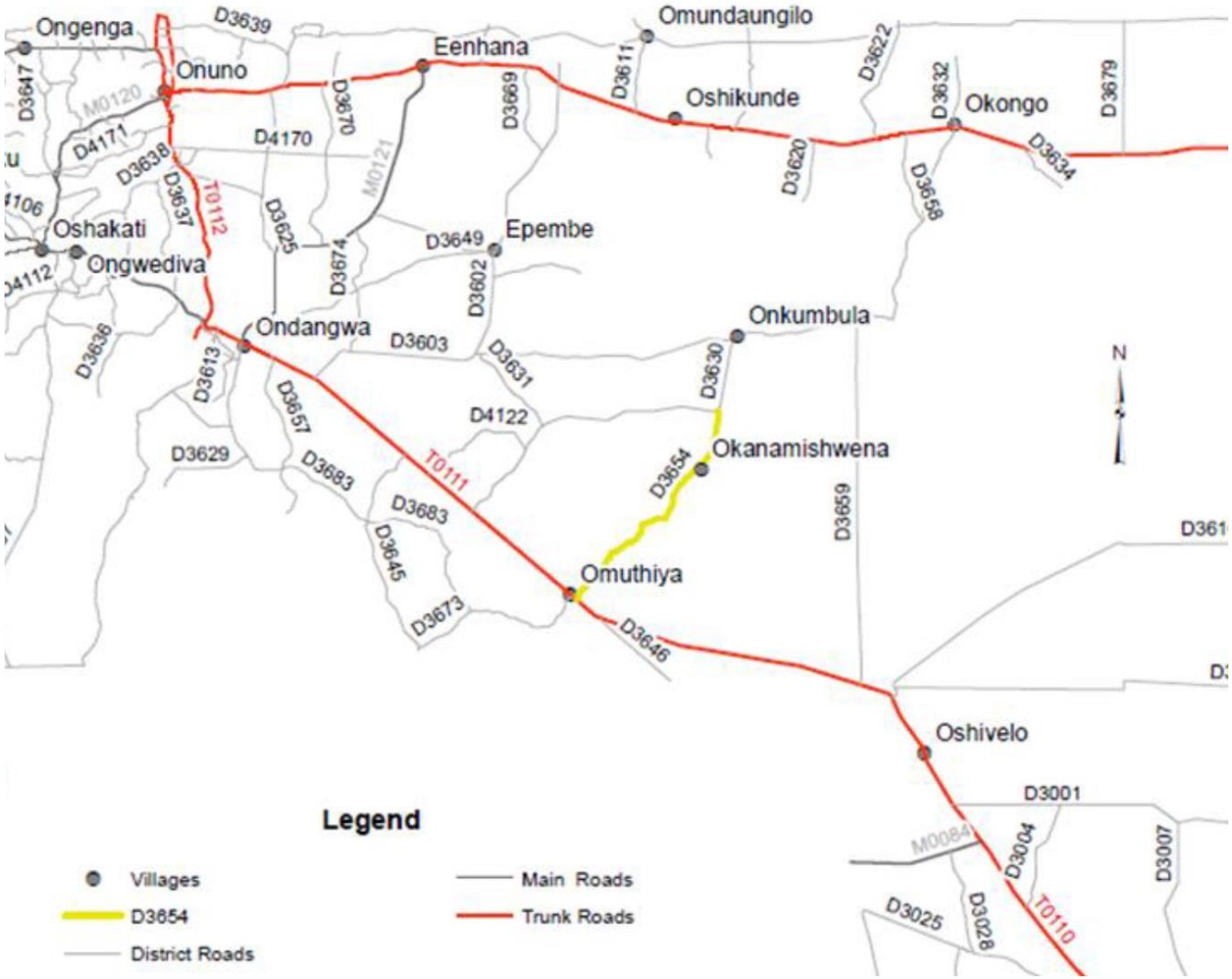

Figure 5: DR3654 as demarcated by the yellow line

Figure 6: DR3654 showing the villages through which it will run

3. LEGAL AND DEVELOPMENTAL FRAMEWORK

This chapter outlines the regulatory framework applicable to the proposed project. Table 6 provides an overview of applicable policies, plans and strategies and Table 5 provides a list of applicable national legislation.

3.1. Compliance to the EMP to the Environmental Management Act

Section 27 of the Environmental Management Act 2007 (Act No. 7 of 2007) (EMA) provides a list of activities that may not be undertaken without an Environmental Clearance Certificate (ECC) (herein referred to as: listed activities). The proposed expansion of the hospital triggers the following listed activities.

The EMP should conform to the provisions of the Environmental Management Act (EMA), Act No. 7 of 2007 and EIA regulations of 2012 (Government Notice: 30).

The EIA Regulations defines a '*Management Plan*' as:

"…a plan that describes how activities that may have significant impacts on the environment are to be mitigated controlled and monitored."

3.2. Listed Activities

Listed Activities may not be undertaken without an Environmental Clearance Certificate (ECC), and hence an Environmental Impact Assessment (EIA) is required.

As the organ of state responsible for management and protection of its natural resources, the MET: DEA is committed to pursuing the principles of environmental management. The EMA provides a list of activities that require an EIA and the proposed road upgrade is among the listed activities or activities that may not be conducted without at ECC. The purpose of listed activities for projects is to ensure that the associated impacts on the environment are carefully considered.

The proposed road upgrade to bitumen standards triggers a number of Listed Activities as set out in the Environmental Management Act, 2007 (Act No. 7 of 2007) (herein referred to as the EMA) and the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2011) (herein referred to as the EIA Regulations).

Table 4: Listed activities triggered by the proposed road construction.

Activity	Applicability
Activity 10: Infrastructure: 10.1 The Construction of (b) Public roads	Road Construction: Construction of the gravel road DR3654 Omuthiya - Elambo
Activity 3: Mining and Quarrying Activities 3.2 The Other forms of mining or extraction of any natural resources whether regulated by law or not. 3.3 Resource extraction, manipulation, conservation and related activities	The project entails establishment of borrow pits to source gravel and other material for road construction
Activity 8: Water Resource Development 8.1 The abstraction of ground or surface water for industrial or commercial purposes	The project will include water abstraction activities for road construction

3.3. Additional Permits

There might be a need to drill boreholes as the study has scarce open water sources that could be used for construction purposes.

3.4. Extended developmental and Legal Framework

In addition to the EMA and the Environmental Assessment Policy, there exists a host of legal and policy documents and guidelines that must be considered when undertaking an EIA as indicated in table 6, below. The proponent has the responsibility to ensure that the sand mining operations conforms to all other National developmental plans and legal framework.

Table 5: Legal frameworks and policies concerned with the project

National Statutes	Relevance	Applicability to the Proposed Project
5th National Development Plan (NDP) and Vision 2030	Outlines the country's National Development Plans (NDPs), in line with the Harambee Prosperity Plan (HPP) and vision 2030	The proposed project is a development that forms part of the bigger picture of achieving economic progression, social transformation and environmental sustainability
Environmental Assessment Policy (1995)	Promotes Sustainable development and Environmental Conservation emphasize the importance of environmental assessments as a key tool towards environmental sustainability	Environmental Protection
Soil Conservation, 1969 (Act 76 of 1969) and the Soil Conservation	Makes provision for the prevention and control of soil erosion	Monitor and apply the soil conservation mechanisms

National Statutes	Relevance	Applicability to the Proposed Project
Amendment Act (Act 38 of 1971)		
Forest Act 12 of 2001 Forest Act Regulations 2015	To provide for the protection of the environment and the control and management of forest. Relevant sections: - Approval required for the clearance of vegetation on more than 15 hectares (Section 23, subsection 1 (b)).	Forestry permits maybe required for vegetation clearing
Public Health Act (Act No. 36 of 1919)	Advocates for Public Health and safety	Personal Protective Equipment (PPE)
The Occupational Safety and Health Act No. 11 of 2007	Advocates for employee and public safety, health	In the working context "SAFETY" implies "free from danger"
Local Authority Act No. 23 of 1992 Government Notice of No.116 of 1992.	Advocates for inclusive socio-economic development	Ensure communication with community members about the proposed developmental activities
National Heritage Act, No. 27 of 2004.	The Act provides provision of the protection and conservation of places and objects with heritage significance.	No heritage features were observed within or around the site. Procedures and mitigation measures presented in the EMP should be applied.

4. IMPACT ASSESSMENT METHODOLOGY

4.1 Assessment of Impact Significance

The significance of an impact is determined by considering and measuring the temporal and spatial scales and magnitude of the project and the specific activities associated with the project.

The assessment of the environmental impacts of development activities should strive to be always objective and impartial. However, environmental assessment processes can be exposed to subjectivity inherent in attempting to measure significance.

The determination of the significance of an impact depends on both the context (spatial and temporal scale) and intensity of that impact.

4.2 Impact Assessment Criteria

For each impact, the **EXTENT** (spatial scale), **MAGNITUDE** and **DURATION** will be described. These criteria would be used to ascertain the **SIGNIFICANCE** of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure/s in place. The mitigation described in the Scoping Report would represent the full range of plausible and pragmatic measures.

Table 4-1: Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	**National**	Beyond a 20km radius of the site
	Regional	Within a 20 km radius of the site
	Local	Within a 2 km radius of the centre of the site
	Site specific	On site or within the boundaries of the property
	Zero	
Magnitude of impact (at the indicated spatial scale)	**High**	Natural and/ or social functions and/ or processes are *severely* altered
	Medium	Natural and/ or social functions and/ or processes are *notably* altered
	Low	Natural and/ or social functions and/ or processes are *slightly* altered
	Very Low	Natural and/ or social functions and/ or processes are *negligibly* altered
	Zero	Natural and/ or social functions and/ or processes remain *unaltered*
Duration of impact	**Zero**	Zero time
	Short Term	Up to 18 months

	Medium Term	0-5 years (after operation)
	Long Term	5- 10 years (after operation)
	Permanent	More than 10 years (after operation)
Probability	**Definite**	Estimated greater than 95 % chance of the impact occurring.
	Very likely	Estimated 50 to 95% chance of the impact occurring
	Fairly likely	Estimated 5 to 50 % chance of the impact occurring.
	Unlikely	Estimated less than 5 % chance of the impact occurring.
	Zero	Definitely no chance of occurrence
Confidence	**Certain**	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
	Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
	Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact.
Reversibility	**Irreversible**	The activity will lead to an impact that is permanent.
	Reversible	The impact is reversible, within a period of 10 years.

4.3 Mitigation Measures

For each impact assessed, mitigation measures should be identified to reduce and/ or avoid negative impacts. These mitigation measures are also incorporated in the Environmental Management Plan (EMP) to ensure that they are implemented throughout the lifespan of the proposed activity. The EMP forms part of the Scoping Report, and upon project approval, the implementation thereof, would become a binding requirement.

4.4 Mitigation Hierarchy

Actions to mitigate a potential impact can be done in as systematic manner as guided by what is referred to as Mitigation Hierarchy (Figure 4).

From the onset, the positive impacts of the proposed activity should be enhanced, however, where an impact in is inevitable, the following sequence should be followed.

Impact avoidance: This step is most effective when applied at an early stage of project conceptualization and planning. It can be achieved by:

- Not undertaking certain projects or elements that could result in adverse impacts;
- Avoiding areas that are environmentally sensitive; and
- Putting in place preventative measures to stop adverse impacts from occurring.

Impact minimisation: This step is usually taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It can be achieved by:

- Scaling down or relocating the proposal;
- Redesigning elements of the project; and
- Taking supplementary measures to manage the impacts.

Impact compensation: This step is usually applied to remedy unavoidable residual adverse impacts. It can be achieved by:

- Rehabilitation of the affected site or environment, for example, by habitat enhancement;
- Restoration of the affected site or environment to its previous state or better; and
- Replacement of the same resource values at another location (off-set), for example, by wetland engineering to provide an equivalent area to that lost to drainage or infill.

Figure 7: Mitigation Hierarchy

5 ENVIRONMENTAL IMPACT ASSESSMENT

Due to the type of activities associated with road construction, it is almost definite that there would be hazardous and toxic material present on site. Construction of a gravel road requires consideration of environmental and social aspects that may be affected. This section presents the potential impacts that may arise from the proposed road upgrade activities. The full mitigation measures are presented in the EMP.

The objectives of the assessment are to identify and quantify the potential positive and negative impacts which the proposed gravel road will have on the receiving biophysical and socio-economic environment. The following impacts were identified, and their mitigation measures are described below.

5.1 Landscape Alteration

With the excavations and establishment of borrow pits to source gravel material for road construction, the mining activity makes use of heavy machinery and deep excavations that has potential to alter (change) the natural view of the landscape.

<table>
<tr><td>IMPACT DESCRIPTION:</td><td colspan="3">Vegetation clearing</td></tr>
<tr><td>Predicted for (specific activity)</td><td colspan="3">Cutting and Excavations</td></tr>
<tr><td>Dimension</td><td>Rating</td><td colspan="2"></td></tr>
<tr><td>Duration</td><td>Permanent</td><td rowspan="3">Reversibility:
Reversible</td><td rowspan="4">Degree to which impact can be mitigated:
High</td></tr>
<tr><td>Extent</td><td>Site specific</td></tr>
<tr><td>Magnitude</td><td>Low</td></tr>
<tr><td>Probability</td><td colspan="2">Fairly likely</td></tr>
<tr><td colspan="4">MITIGATION:
• If possible, rehabilitate borrow pits that were used to source construction material by refilling the pit with overburden top-soil, and revegetation.
• Should the local community opt to maintain the borrow pit, the contractor must level it off in a manner that does not leave a steep gradient. The edges must be well compacted to avoid slipping of livestock and humans.</td></tr>
</table>

5.2 Access Roads

Establishment or creation of access roads to transport and from the borrow pit to the road construction site.

IMPACT DESCRIPTION:	Access Roads		
Predicted for (specific activity)	**Establishment of Road Tracks**		
Dimension	**Rating**		
Duration	**Permanent**	Reversibility: **Reversible**	Degree to which impact can be mitigated: **High**
Extent	**Site specific**		
Magnitude	**Low**		
Probability	**Very likely**		
MITIGATION: • Limit the number of access roads as far as possible.			

5.3 Borrow pit edges and steepness.

Steep borrow pit edges presents potential danger to people and wildlife and should be smoothened to create gentle slopes.

IMPACT DESCRIPTION:	Borrow pit edges and steepness		
Predicted for (specific activity)	**Excavations**		
Dimension	**Rating**		
Duration	**Long term**	Reversibility: **Reversible**	Degree to which impact can be mitigated: **High**
Extent	**Site specific**		
Magnitude	**Low**		
Probability	**Very likely**		
MITIGATION: • Smoothen the borrow pit edges to ensure that the angles are not steep sloped, but rather gentle sloped at less than < 30° slope angles. • The principle idea is for the borrow pit edges to gentle so that the is no tipping point, where people or livestock can fall in. Meaning even if the is water, people and livestock can go in with minimal danger.			

5.4 Biodiversity (Fauna and Flora)

Although the sand mining site is barren (and cleared of vegetation), due consideration should be made to ensure minimal disturbance to the general landscape of the area.

IMPACT DESCRIPTION	Biodiversity (Fauna and Flora)		
Predicted for (specific activity / project phase)	**Sand Mining Excavations**		
Dimension	**Rating**		
Duration	**Long term**	Reversibility: **Reversible**	Degree to which impact can be mitigated: **High**
Extent	**Site specific**		
Magnitude	**Low**		
Probability	**Unlikely**		
MITIGATION: • Stockpile the topsoil overburden, to be re-used during rehabilitation after sand mining operations and to aid the re-establishment of vegetation.			

5.5 Pollution: Noise and Dust

The proponent should ensure noise from excavator machinery and transportation trucks is kept below the recommended noise levels of -85dB (A).

IMPACT DESCRIPTION	Noise and Dust		
Predicted for (specific activity / project phase)	**Extraction and transportation of the sand**		
Dimension	**Rating**		
Duration	**Short term**	Reversibility: **Reversible**	Degree to which impact can be mitigated: **High**
Extent	**Local**		
Magnitude	**Medium**		
Probability	**Definite**		
MITIGATION: • Where possible, use dust suppression measures to mitigate dust impacts • Provide dust masks and ear muffs to machinery operators • Where possible, install silencer on exhaust to reduce noise levels • Avoid working during times with excessive wind			

5.6 Oil Spills (Pollution)

Soil pollution may occur as a result of oil and fuel leakages from machinery.

IMPACT DESCRIPTION	**Soil Pollution**		
Predicted for (specific activity / project phase)	**Oil Leakages from Machinery**		
Dimension	**Rating**		
Duration	**Short-term**	Reversibility: **Reversible**	Degree to which impact can be mitigated: **Medium**
Extent	**Local**		
Magnitude	**Low**		
Probability	**Definite**		
MITIGATION: • Operators should be trained on dangers of oil pollutions & response action • There must be an oil spill response kit on site • If an oil spill occurs, collect the contaminated soil, store in drums or appropriate structures and dispose at approved waste disposal site; • Ensure all vehicles / machinery are well serviced, install drip trays and conduct regular leak inspection.			

5.7 Ground Water abstraction and Storm water management

Proper management of storm water runoff is essential to prevent ponding and flooding. The road design must include sufficient drainage ditches, culverts, and retention ponds to control and treat stormwater runoff, thus reducing the risks.

IMPACT DESCRIPTION:	**Ground water abstraction**		
Predicted for (specific activity / project phase)	**Ground Water Abstraction**		
Dimension	**Rating**		
Duration	**Short term**	Reversibility: **Reversible**	Degree to which impact can be mitigated: **High**
Extent	**Local**		
Magnitude	**Medium**		
Probability	**Highly likely**		
MITIGATION: • Conduct borehole testing to determine borehole yield and optimum water abstraction rates. • Allow borehole resting for recharge.			

5.8 Solid Waste Management

Construction camps throughout the project construction phase must be managed effectively. Such camps can have significant impacts on surrounding communities for the duration of the road construction. Waste management should be prioritized accordingly.

Domestic and waste generated at the contractor camps can be easily managed through implementation of waste management plans. Therefore, a waste management plan should be developed to minimize accumulation of construction materials. Hazardous materials such as used oil and metals must be disposed according to prevailing national regulations.

<table>
<tr><td>IMPACT DESCRIPTION:</td><td colspan="3">Solid Waste Management</td></tr>
<tr><td>Predicted for (specific activity / project phase)</td><td colspan="3">Mining Operations</td></tr>
<tr><td>Dimension</td><td colspan="3">Rating</td></tr>
<tr><td>Duration</td><td>Short term</td><td rowspan="3">Reversibility:
Reversible</td><td rowspan="4">Degree to which impact can be mitigated:
High</td></tr>
<tr><td>Extent</td><td>Local</td></tr>
<tr><td>Magnitude</td><td>Medium</td></tr>
<tr><td>Probability</td><td colspan="2">Highly likely</td></tr>
<tr><td colspan="4">MITIGATION:
• No random disposal of solid waste (use designated sites to dispose)
• Adopt the principle of what goes in the camp, goes out.</td></tr>
</table>

5.9 Socio-Economic Opportunities

The assessment revealed that several T-Junctions, accesses and intersections (including staggered intersections) will also be upgraded as part of the road upgrade.

Often intersections are popular spots for vendors to erect business structures, as well as hitchhikers wait for a lift. Thus, this increases accident risks at such spots. Provision for properly designed pick-up areas close to intersections should be considered as this will prevent vehicles from stopping at these high accident risk zones.

5.10 Potential Positive Impacts

Positive impacts can be considered as those induced by the activity, either directly or indirectly, that provides benefits to the local communities and receiving environment. These can be identified as the following:

Short term employment opportunities

Short term opportunities of employment will be created with the commencement of the road construction and this will benefit the local communities in the area. To harness these employment opportunities, it is recommended that the contractor be compelled to prioritise locals for labour intensive construction methods. Where feasible, local sub-contractors should also be considered. The jobs created will increase spending power, from the wages and salaries earned, as well as from local procurement of goods, materials and services.

Increased safety – traffic

The gravel road will be safer to the road users. Improvement of the road signage is also a requirement. Awareness will be required to sensitize people on the danger of driving at higher speeds and to adapt their usage and lives accordingly, especially pedestrian users.

Reduced travel times and operating costs

One of the most significant benefits of the upgrading will be the decrease in travel time. This will constitute tremendous cost savings and increase production turn-around times significantly thereby stimulating the local and regional economy. Vehicle operating costs in terms of maintenance and energy inputs will be decreased through the upgrade, once again contributing to stimulating efficiency and cost savings.

Improved access to markets and commerce

Increased access will enhance the local and regional economies by allowing faster and more efficient access to local, regional and export markets. Produce spoil will also be decreased with accelerated transportation. The provision of services and commodities in the local communities and settlements will also increase with the easier access and delivery of goods. Faster access will further open the area to the easy promotion of tourism opportunities.

The road will play a critical role towards improved road infrastructure and subsequently also improved socio-economic conditions. In summary the above potential negative impacts are not significant to stop the project from proceeding due to most impacts already existing from the road which was initially constructed.

6 PUBLIC PARTICIPATION PROCESSESS

Public consultation is a requirement by law (EMA No 7 of 2007) to be incorporated into an EIA process, hence it is a fundamental part of the EIA. Public consultation ensures robust decision making by involving Interested and Affected Parties (I&APs). The PPP has therefore been structured to provide I&APs an opportunity to gain more information on the proposed project and for them to provide inputs through the review of documents/reports, and to flag any issue of concern during the PPP process.

6.1 Authority Consultation

Consultations were made with the Regional Council in Omuthiya where a public meeting was convened at Oshikoto Regional Council Offices. The meeting was chaired by the Constituency Councillor of Omuthiya. Another public meeting was convened at Oomanya Primary School which was chaired by the Councillor for Eengodi Constituency. Referrer to Annexure A on public participation documents.

6.2 Public Meeting

- 1st public meeting was convened on 23 March 2023 at Oshikoto Regional Council Offices in Omuthiya.
- 2nd public meeting was convened on 23 March 2023 at Oomanya Primary School in Eengodi Constituency.

Meeting participants indicated that unemployment is a serious problem/concern in their area that affects their lives negatively. As a coping mechanism to unemployment and to supplement income, some community members venture into small and medium business enterprises most of which are informal. The proposed road construction is expected to improve accessibility to products and associated business services for entrepreneurs and business owners.

Access to social amenities in the project site are not easily accessible due to improper roads. The new road would further improve living standards as community members would be able to reach health facilities in amble time.

Participants further highlighted that development also brings with social ills such as theft of property. The construction of the road would also mean that criminals would also have easier access to properties and even livestock.

7 CULTURAL HERITAGE

7.1 Cultural Heritage – Legal Requirements

The principal instrument of legal protection for heritage resources in Namibia is the National Heritage Act (27 of 2004), Part V Section 46, which prohibits the removal, damage, alteration or excavation of heritage sites or remains (defined in Part 1, Definitions 1), whilst Section 48 sets out the procedure for application and granting of permits as may be required in the event of damage to a protected site occurring as an inevitable result of the proposed development. This legislation obliges a developer to identify any heritage sites before project implementation.

Furthermore, Section 51 (3) sets out the requirements for impact assessment. Part VI Section 55 Paragraphs 3 and 4 require that any person who discovers an archaeological site should notify the National Heritage Council.

In-addition to the National Heritage Act (No. 27 of 2004), international guidelines such as the World Bank OP and BP of 2006, particularly guideline no: 4.11 which refers to the “Physical Cultural Resources” (R2006-0049), and provide direction regarding project screening, baseline survey and mitigation.

Archaeological impact assessment is also a requirement of the Environmental Management Act (7 of 2007) and EIA regulations (Government Notice 30 of 2012) includes the mitigation of impacts on archaeological sites, remains or and artefacts.

7.2 Archaeological Assessment Methodology

The archaeological assessment carried out in and around the project site relies on the indicative value of surface finds for cultural and heritage artefacts.

Following standard practice both in Namibia and internationally, a chance-find procedure for cultural heritage should be recommended as a component of the Environmental Management Plan (EMP), and the necessary precautions should be taken throughout the project lifespan.

7.3 Cultural Heritage sites / artefacts within the Proposed Road upgrade area

a) **NO** cultural heritage sites or artefacts are registered by the National Heritage council in or around the proposed sand mining site.

b) **NO** cultural heritage sites or artefacts are known to occur in or around the sand mining site (local knowledge),

c) **NO** cultural heritage sites or artefacts were observed within the proposed Sand mining site,

7.4 Limitations

Although, there were no surface finds for cultural and heritage artefacts, there is a possibility that there could be cultural or heritage artefacts underground (e.g., unknown war graves, fossils etc), that could be uncovered during excavations for road works and establishment of borrow pits for road construction material.

7.5 Recommendations

Based on the limitations, it is recommended that:

i. All employees, contractors or sub-contractors working on the sand mining site should be made aware that it is a legal requirement under the National Heritage Act that if any items protected under the definition of heritage is found during the course of development should be reported to the National Heritage Council.

ii. The management of the sand mining operation should be conducted in a vigilant and cautious manner, and

iii. If any cultural artefacts are found during the sand mining activities, the necessary steps and due process as presented in the EMP should be followed.

8 REHABILITATION PLAN

Socio-economic development is very important for our livelihood and provides services, income and employment opportunities, and hence activities such as road construction are vital and necessary for development. However, such developmental activities should be conducted in a thoughtful and forward-looking manner. In other words, developmental activities, such as establishment of borrow pits to source road construction material should consider the future land use after such activity has come to an end. Therefore, to ensure that the land remains valuable for other land uses in the future, rehabilitation should be part and parcel of such developmental activity right from the beginning and throughout the project lifespan.

The aim of the rehabilitation plan is to ensure soil conservation, prevent soil erosion, reduce safety risk (safety for both animals and people) and to ensure that areas such as those that were used as borrow pits for gravel material does not become an eye shore.

8.1 What is Rehabilitation?

Rehabilitation is the process of repairing and taking all necessary actions to limit the damage caused by the developmental activity, to minimise potential danger, to make the land suitable for other uses or simply to beautify the affected area (so that it does not become an eyesore). Rehabilitation can also be referred to as the measures taken to repair damaged environments (example refilling of borrow pits with the overburden, re-vegetating, removal of unwanted infrastructure / cleaning up, etc).

8.2 Designing a Rehabilitation Plan

A rehabilitation plan refers to a set of steps or measures to be taken in-order to ensure that negative impacts associated with the development at hand are mitigated. This however requires prior planning and integration of rehabilitation activities throughout the project lifespan. Meaning, rehabilitation measures should be taken right from the beginning of the project.

The environmental characteristics of an area where a project is located plays a vital role in designing a rehabilitation plan.

9 CONCLUSION

Roads are the veins of economic development and facilitate the movement of goods and services (logistics). Meaning, a comprehensive Road network is one of the key building blocks for socio-economic development in the country. However, road construction requires significant quantities of gravel and Water. Hence, mining of gravel and water abstraction as construction material are inevitable (cannot be avoided).

The proposed gravel road to be constructed will require clearance of trees and bush to pave way for road alignment. The number of indigenous fruit trees that will be cleared is not determined as yet and it will form part of the compensation plan that the surveyors will submit to Roads Authority. Implementation of prevention measures such as waste management, pollution prevention and control as well as effective borrow pit rehabilitation will prevent any significant long-term negative effects associated with this project during construction.

The new gravel road will bring about the most positive impacts associated with the operational phase of the project. These include reducing the travel time for the road user, improved road user safety and ensuring better access to the nodes of Omuthiya and other areas.

Tortoise Environmental Consultants is of the opinion that should mitigation and management measures be implemented as indicated; the project will not affect the natural environment in any detrimental sense. The competent authority should consider issuing the Roads Authority with an Environmental Clearance Certificate (ECC) as the development will bring about great positive socio- economic benefits to the project area.

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