





## **ENVIRONMENTAL MANAGEMENT PLAN (EMP)**



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

**JUNE 2023**

DOCUMENT INFORMATION		
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## Executive Summary

This Environmental Management Plan (EMP) is compiled to guide construction activities for the proposed construction works of the 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 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 EMP.

The Environmental Management Plant (EMP) recommends mitigation measures in order to ensure that the recommended road construction activities and associated activities are conducted in an environmentally friendly manner. Upon approval of the Environmental Clearance Certificate, the proponent (Roads Authority) should comply with the Environmental Management Act of 2007 and EIA regulations of 2012 and adhere to the recommended mitigation and rehabilitation measures as prescribed in the Environmental Management Plant (EMP). Furthermore, the EMP outlines specific roles and responsibilities for the proponent (Roads Authority and sub-contractors) and non-compliance is punishable.

## ACRONYMS

BID	Background Information Document
DEA	Department of Environmental Affairs
DSR	Draft Scoping Report
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
ECO	Environmental Compliance Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No. 7 of 2007)
EMP	Environmental Management Plan
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 Consultants

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## 1. INTRODUCTION

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### 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.

### 1.2. Construction of DR3654

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).

Tortoise Environmental Consultants (TEC) has been appointed to carry out the requisite scoping assessment and develop an Environmental Management Plan (EMP). The scoping process has 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. Environmental versus 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 such as road construction and maintaining biological diversity can be a challenge. Therefore, it is of utmost importance that the environment and development sectors should work together and identify synergies in order to ensure that natural resources are harvested in an acceptable and 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, it is of utmost importance that such impacts are mitigated through an Environmental Management Plan (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.

### **1.4. Environmental management plan (EMP) Context**

This document constitutes the Environmental Management Plan (EMP) for the proposed upgrade of MR74 to bitumen standards by the Roads Authority.

### **1.5. What is an EMP?**

The Environmental Management Plan (EMP) is a tool used to mitigate potential environmental risks associated with the proposed project / activity, and provides a risk management strategy and logical framework for implementation of the activities associated with the proposed road upgrade. This is done to minimize potential environmental and social impacts identified during the EIA process, in accordance with the provisions of the Environmental Management Act (Act No.7 of 2007), EIA Regulations of 2012 and any other relevant / applicable legislation.

As a result, the EMP recommends mitigation measures in order to ensure that the recommended road construction activities and associated activities are



conducted in an environmental friendly manner, and in accordance with the provisions of the Environmental Management Act and EIA regulations

Furthermore, the EMP outlines specific roles and responsibilities for role-players against which they can be evaluated and non-compliance is punishable.

## 1.6. Purpose of the EMP

The purpose of the EMP is to identify potential environmental and social impacts associated with the road upgrade activities, in-order to ensure compliance to the EMA.

The aim of the EMP is to ensure that the activities undertaken during the renewal of the sand mining activities are conducted in accordance with the following:

- i. Environmental Management Act (No. 7 of 2007),
- ii. EIA regulations of 2012 (GN: 30), and
- iii. Best environmental practices (benchmarks)
- iv. Any other applicable legislation (*as presented in Table 3.1 to 3.3*)

The EMP provides environmental guidelines to be followed throughout the lifespan of the sand mining activities and comprise of the following:

- a) Environmental Aspects,
- b) Management Objective,
- c) Mitigation Measures / Actions Required,
- d) Monitoring Indicators, and
- e) Party Responsible

## 1.7. Objective

The objective of the EMP is to prevent / minimize (where possible), unacceptable and adverse environmental, social or economic impacts that may arise from the proposed development. Overall, the EMP aims to minimise negative impact/s (real, potential or perceived) that may result from the proposed road upgrade activities.

## 1.8. EMP Scope

The EMP does not only focus, and it is not limited to the road construction activities, but it includes the bigger picture, and serve as the guiding tool to

protecting the natural, bio-physical and socio-economic environment on both the specific site and the surrounding area. The bigger picture is important because, some impacts may not be confined to the immediate construction sites.

### 1.9. Possible adjustments to the EMP

The EMP is an open-ended document and maybe considered inconclusive. In other words, the EMP should allow room for adjustments if new information becomes available at a later stage, in which new / additional mitigation measures may become necessary.

The necessity of possible adjustments to the EMP at a later stage may be attributed to:

- a) Lack of information at the time of drafting the initial EMP,
- b) Evolution or addition of new activities, or
- c) Unintended omission of potential impacts during the initial EIA scoping exercise and development of the initial EMP.
- d) Development of industry best practice.

This implies that, in-addition to the information contained herein, any other relevant information that may surface during the construction operations, through internal monitoring or auditing by the Environmental Compliance Officers (ECOs), can be added to the EMP (evolution of activities), and such changes or inclusions will be binding to the proponent and all contractors / sub-contractors.

### 1.10. Implementation Framework and Accountability to the EMP

For effective implementation of the EMP, the Institutional roles are presented below. However, the specific roles and responsibilities are defined and broken down as presented in Sections 4 and 5, respectively.

*Table 1:1: Role players, Institutional Framework*

<b>Role-player</b>	<b>Company / Institution</b>	<b>Role</b>
Proponent	Roads Authority	Compliance to the EMP
Environmental Consultant	Tortoise Environmental Consultants (TEC)	Development of the EMP
Environmental Compliance Officer/s (ECO)	Ministry of Environment & Tourism (MET) –	Monitoring Compliance to EMP:



	Department of Environmental Affairs (DEA)	<ul style="list-style-type: none"> <li>➤ Un-announced spot checks,</li> <li>➤ Corrective measures, warning, penalties / fines, license suspension, etc</li> </ul>
Public	Interested and affected parties (I&APs)	Report to the ECOs, any activity of environmental concern (e.g Pollution, safety risks, etc)

## 2. PROJECT INFORMATION

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### 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<sup>2</sup> 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:

3. 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).
4. 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).

## 2.4 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.

## 2.5 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°C during winter and 30 to 37°C during the hot months. Tsumeb has the lowest average annual temperature of 22.0°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.

## 2.6 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 2: 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)

## 2.7 Oshikoto Regional Profile

Oshikoto region covers an area of 38 673.1 km<sup>2</sup> and has a total population of 181 973<sup>2</sup>, 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%.

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
	<b>181 973</b>	<b>94 907</b>	<b>87 066</b>

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.

## **2.8 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;

### **2.8.1 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.

### **2.8.2 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.



## 2.9 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 3: Estimations of available wearing course quantities*

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

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 4: 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	<b>1.3</b>	<b>1.2</b>	<b>1.2-3.5</b>

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.

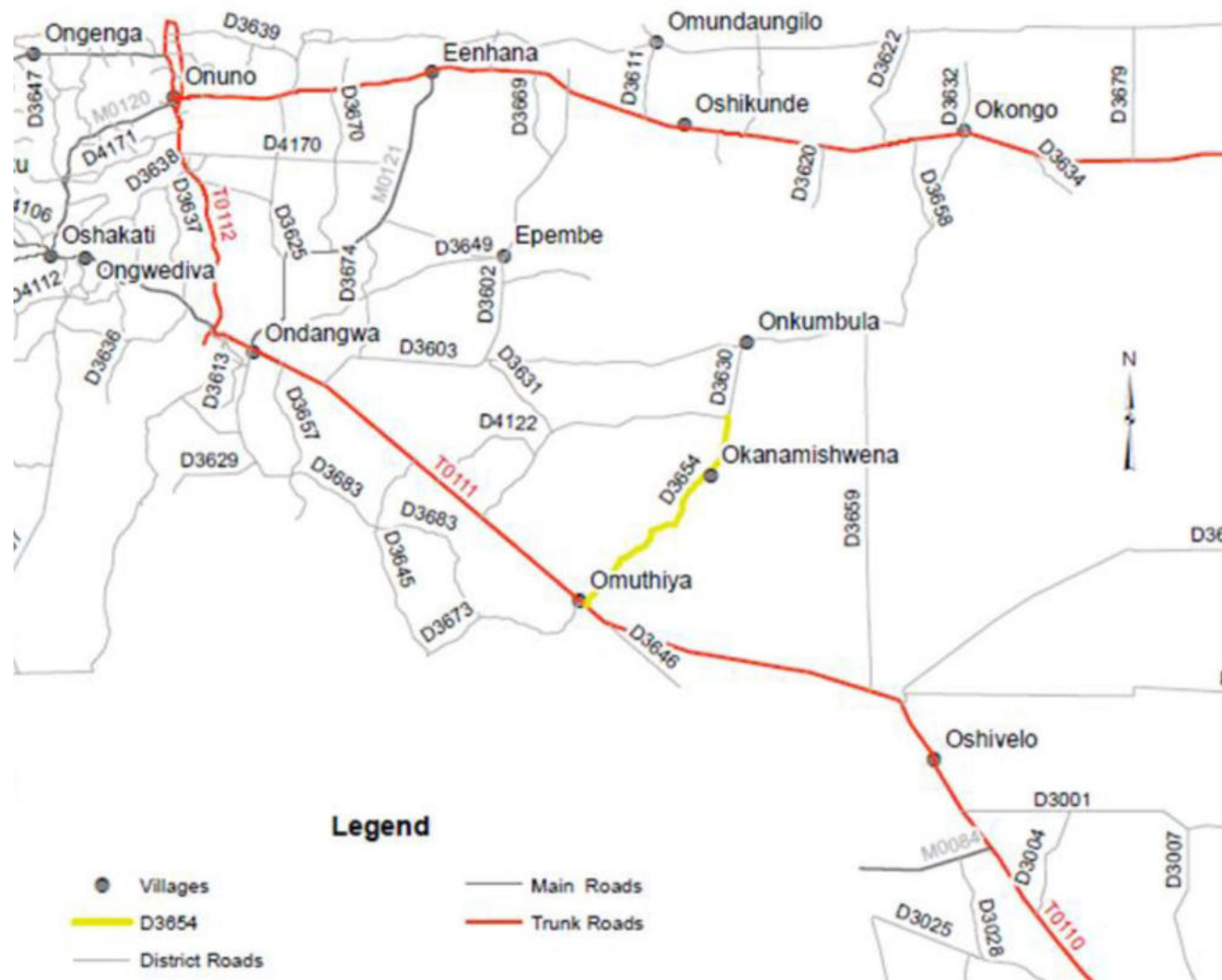


Figure 5: DR3654 as demarcated by the yellow line



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

### 3 COMPLIANCE AND LEGAL FRAMEWORK

This chapter outlines the regulatory framework applicable to the proposed road construction project. Table 2 provides an overview of applicable policies, plans and strategies and Table 3.1 provides a list of applicable national legislation.

#### 3.4 Compliance to the EMP

The EMP is binding to the proponent, and all contractors / sub-contractors. This implies that each and every entity that may have any kind of engagement or involved in / with the activities of the proposed road upgrade should comply with the EMP throughout the project lifespan. Non-compliance may have serious consequences e.g. License withdrawal.

#### 3.5 Environmental Management Act (No.7 of 2007)

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."*

#### 3.6 EMP Requirements

Table 3:1: EMP Requirements as outlined in Section 8 of the EIA Regulations

<b>Requirement</b>
(j) a draft management plan, which includes – (aa) information on any proposed management, mitigation, protection or remedial measures to be undertaken to address the effects on the

*environment that have been identified including objectives in respect of the rehabilitation of the environment and closure;*

*(bb) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and*

*(cc) a description of the manner in which the applicant intends to modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation remedy the cause of pollution or degradation and migration of pollutants.*

### 3.7 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 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 3:2: Listed Activities triggered by the proposed project*

<b>Activity</b>	<b>Applicability</b>
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	The project entails establishment of borrow pits to source gravel and other material for road construction



3.3 Resource extraction, manipulation, conservation and related activities	
Activity 8: Water Resource Development	The project entails Water abstraction for road construction
8.1 The abstraction of ground or surface water for industrial or commercial purposes	

### 3.8 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 3.2, below. The proponent has the responsibility to ensure that the sand mining operations conforms to all other National developmental plans and legal framework.

Table 3.3: Policies, Plans and Strategies

Policy / Plan	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.

Table 3.2: Other Legal Instruments / National Statutes

National Statutes	Relevance	Applicability to the Proposed Project
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)). - Tree species and any vegetation within 100m from a watercourse may not be removed without a permit (Section 22, subsection 1 (b))	Forestry permits maybe required for vegetation clearing
Public Health Act (Act No. 36 of 1919)	Advocates for Public Health and safety	Protective clothing
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”
<u>Local Authority Act No. 23 of 1992</u> <u>Government Notice of No.116 of 1992.</u>	<u>Advocates for inclusive socio-economic development</u>	<u>Ensure communication with community members about the proposed developmental activities</u>
<u>National Heritage Act, No. 27 of 2004.</u>	<u>The Act provides provision of the protection and conservation of places and objects with heritage significance.</u>	<u>No heritage features were observed within or around the site. Procedures and mitigation measures presented in the EMP should be applied</u>

## 4 ROLES AND RESPONSIBILITIES

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This section outlines the roles and responsibilities of the key personnel responsible for the day to day management of activities to ensure effective implementation of the EMP.

### 4.4 Roles and Responsibilities

Assignment of responsibilities is necessary to ensure that key procedures are followed. Ultimately, the overall responsibility for the implementation of the EMP lies with the proponent (RA).

To ensure accountability, it is necessary to assign responsibilities. The key role-players for project implementation are;

- a) The **Environmental Compliance Officer (ECO)** representing the Ministry of Environment, Forestry and Tourism (MET), or an appointed independent environmental officer, who is responsible for monitoring and auditing.
- b) **The Proponent: (Roads Authority)**.
- c) **The Site Manager** the person responsible for the management of construction work throughout the duration of the road upgrade.

#### 4.4.1 The Environmental Compliance Officer (ECO):

The ECO refers to the party responsible for the environmental monitoring and auditing to ensure that the provisions of the EMP are complied with.

The ECO shall have adequate environmental knowledge to understand and interpret the EMP and pertaining environmental aspects associated with the project. The specific tasks of the ECO are as follows:

- To undertake all monitoring and auditing activities in-order to ensure compliance with the EMP.
- Conduct inspections and monitoring at reasonable intervals (e.g. every month, quarterly or annually), throughout the duration of the project. Depending on the risks, some projects may require regular inspections.
- Issue compliance or non-compliance orders to the proponent, contractors / sub-contractors.
- Compile compliance Reports pertaining to any non-compliance incident/s, and a Rehabilitation Report following the conclusion a specific activity.

- Liaise closely with all key stakeholders i.e. the Site Manager and the Environmental Commissioner.
- Provide guidance on any environmental management issues, incidents or emergencies that may arise throughout the project lifespan.
- Assist in providing recommendations for remedial action in the event of non-compliance.
- Auditing or monitoring activities may involve investigation, as well as structured observation, measurement, and evaluation of environmental data over a period of time.

#### 4.4.2 The Proponent:

The proponent, hereinafter referred to as RA, shall assume overall responsibility to ensure implementation of the EMP and will be held accountable against the remedial measures outlined herein. It is recommended that the client should appoint a Site Manager who will be responsible for monitoring of daily operations.

The specific responsibilities of The Proponent are as follows:

- Appoint a Site Manager (SM) to oversee the daily onsite activities.
- Liaise closely with the SM and ECO on any environmental management issues, incidents or emergencies.
- Ensure that all activities on and around the site are conducted in accordance with the requirements of the EMP at all times.
- Ensure that all sub-contractors and visitors to the site are conversant with the requirement of the EMP, relevant to their roles on site.
- Shall develop a **communication strategy** between The Proponent, Project Manager, workers, the ECO and any other relevant stakeholder.
- Shall develop an **organisational structure** to ensure that:
  - There are clear channels of communication;
  - There is an organisational hierarchy for effective implementation of the EMP; and
  - Conflicting or contradictory instructions are eliminated;
  - Ensure that all instructions and official communications regarding environmental matters shall follow the organisational structure as determined
  - Ensure that that EMP requirements are assigned to specific people / positions with the capacity and experience required for implementation.

#### 4.4.3 The Site Manager:

The **Site Manager (SM)** should:

- Ensure that each team recruited to work at the sites, adheres to the EMP;
- Ensure that a **copy of the EMP is kept on site at all times and as it may be requested by authorities conducting spot checks at any time.**
- Ensure that all staff attend an induction session before commencement of any work on site and that they are adequately informed of the requirements of the EMP;
- Take special care to prevent irreversible damage to the environment

#### 4.5 Instructions

All instructions and official communications shall follow the organisational structure as determined by the Proponent. Based on the adopted structure, it is essential that responsibilities outlined are assigned to specific parties with adequate capacity and experience required to implement the EMP.

#### 4.6 Disciplinary Actions

The EMP is a legally binding document. Non-compliance with the EMP may result in disciplinary action being taken against the Proponent. Such actions may take the form of;

- Financial penalties, Legal action, fines, and/or Suspension of work.

The disciplinary action shall be determined according to the nature and extend of the non-compliance, and exact penalties are to be weighed against the severity of the incident.

## 5 POTENTIAL IMPACTS AND MITIGATION MEASURES

### 5.4 Approach to mitigation measures

To enable a systematic approach to impact identification, specific aspects have been identified and for each aspect, specific mitigation measures have been recommended Table 5. It is important to note that this EMP is for the continuation of sand mining activities from existing borrow pit to meet the township development requirements of the RA.

Table 5:1. EMP Impact Identification Section and Associated Aspects

<b>EMP Implementation / Potential Impact Category</b>	<b>Specific Aspects</b>
A. Staff Induction	EMP Provisions (Do's and Don'ts)
	HIV / AIDS
	Communication Channels
B. Operational Phase	Access Roads
	Site Demarcation
	Notice Board
C. Environment and Pollution	Vehicle emissions
	Oil Spills
	Soil Erosion
D. Health and Safety	Safety at Work Place
	Dust
	Noise
E. Socio Economic	Employment opportunities for locals
	Drug and Alcohol abuse
	Working hours
	HIV / AIDS
F. Cultural Heritage	Heritage resources / artefacts

## SECTION A: STAFF INDUCTION

Aspect	Objective	Proposes Mitigation Measures	Monitoring Indicator	Party responsible
<b>Staff induction</b>	To ensure that all staff / employees are conversant with the requirements of the EMP	<ul style="list-style-type: none"> <li>• Induction for all staff / employees on the provisions of the EMP before work commencement, covering but not limited to: environmental awareness, emergency response, Reporting of incidents, HIV/AIDS awareness, alcohol and substance abuse, and Safety, Health and Environment (SHE) measures</li> <li>• Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks</li> <li>• Quarterly induction reviews</li> </ul>	Induction Minutes and Attendance Register, Signed by each and every staff member Staff members appointed at a later stage should also undergo induction Quarterly minutes	Site Manager
	Punitive measures for staff, to ensure compliance	<ul style="list-style-type: none"> <li>• Adopt a disciplinary system to discipline staff for non-compliance, such as littering, speeding, safety risk both to themselves and to others, not using ablution facilities, etc.</li> </ul>	Number of fines/warning issued daily/Monthly	Site Manager
	Availability of the EMP on site for ease of reference	<ul style="list-style-type: none"> <li>• Ensure that a copy of the EMP is kept on site and accessible to team leaders</li> </ul>	Availability of EMP on site and accessibility to team leaders	Site Manager
<b>Communication</b>	To ensure effective communication throughout the project lifespan	<ul style="list-style-type: none"> <li>• Develop a communication strategy (Chanel and medium of communication)</li> <li>• All correspondence should be written and signed off by witnesses (e.g. Site manager)</li> <li>• The contact numbers for the Site Manager or Site Foreman must be available onsite (displayed) in case of emergencies.</li> </ul>	Communication Strategy  Letters, e-mail, Notices, Minutes	Site Manager

## SECTION B: OPERATIONAL PHASE

Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
<b>Access Roads</b>	Prevent driving all over the place	<ul style="list-style-type: none"> <li>• Access road are established already</li> <li>• New roads may only be established if extremely necessary (An amendment to the EMP must be done)</li> <li>• Access roads should be repaired and maintained at acceptable standards</li> <li>• All driving must strictly be on access roads</li> </ul>		Site Manager
<b>Site Demarcation</b>	Contain all project activities within the site boundaries	<ul style="list-style-type: none"> <li>• The road construction site must be clearly demarcated by means of reflective tape (where practical).</li> <li>• Permanent pegs/markers around borrow pits must be firmly erected and maintained in their correct position throughout the life of the operation.</li> <li>• Ensure adequate planning is given to the layout and campsite</li> <li>• Ensure that access to the site and associated infrastructure, and equipment is controlled throughout the construction phase.</li> </ul>	Visible fence around the project site	Site Manager
<b>General Notice Board</b>	To notify and warn the public of the project activities	<ul style="list-style-type: none"> <li>• A general notice board is on site, and must be well maintained</li> </ul>	Notice Board – Visible and Clear	Site Manager



## SECTION C: ENVIRONMENT AND POLLUTION

Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
<b>Vehicle emissions</b>	Reduce greenhouse gas (GHG) emissions from poorly maintained or malfunctioning equipment (vehicles / machinery)	<ul style="list-style-type: none"> <li>All vehicles and equipment shall be kept in good working condition and serviced regularly (in accordance with the servicing frequency of the specific machinery), in order to prevent leakage and emission of poisonous smoke etc.</li> <li>Switch off engines when vehicle is not operations</li> </ul>	<p>Vehicle servicing records</p> <p>Reports of smoke emissions from machinery</p>	Site Manager
<b>Oil Spills</b>	Manage oil spills and leak from heavy vehicles and Machinery	<ul style="list-style-type: none"> <li>Provide drip trays to prevent potential oil leakage</li> <li>Re-fuelling of machinery (e.g excavator / front loader) must be done at appropriate site with impermeable concrete bunding</li> <li>There must be an immediate spill response kit on site and if an oil spill occurs, collect the contaminated soil, store in drums and dispose at appropriate waste disposal site (e.g. RA disposal site)</li> </ul>	Observation of soil contamination	Site Manager
<b>Soil Erosion</b>	To mitigate soil erosion	<ul style="list-style-type: none"> <li>Only use the existing access road to and from the site, do not form other tracks</li> <li>Implement continuous rehabilitation measures, by trimming and smoothing the slopes to be less than one third of the initial slope (1:3).</li> </ul>	Physical Observation	Site Manager
<b>Solid Waste</b>	To prevent littering, pollution, contamination of water and general environmental health hazards	<ul style="list-style-type: none"> <li>All waste produced on site should be contained and disposed as required by law.</li> <li>There must be sufficient temporally ablution facility at the site for designated for males and female.</li> </ul>	Scattered waste, Littering and any other unsightly waste at the site (eyesore)	Site Manager

## SECTION D: HEALTH AND SAFETY

Aspect	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
<b>General Safety at Work Place</b>	Ensure that the safety of workers is not compromised and adhere to the Health and Safety Regulations, Government Notice 156/1997 (GG 1617)	<ul style="list-style-type: none"> <li>• Develop a Health and safety Plan (should be part of the induction)</li> <li>• Ensure that every employee goes through a safety induction;</li> <li>• Employees must be equipped with all necessary Personal Protective Equipment (PPE). These includes, Helmet, Overall, Safety Shoes, Safety Glasses, Gloves, Welding shield, Earmuff etc;</li> <li>• Provide first aid kits to operators;</li> <li>• Only qualified personnel must be allowed to operate special machinery (e.g earthmoving machinery)</li> <li>• Adequate safety signs must be displayed on site.</li> </ul>	<p>Health and Safety included and reflected in the Induction Minutes</p> <p>Adequate protective gear for all staff</p> <p>Availability of the first aid kit onsite</p> <p>Record of warnings</p> <p>Visible safety signs on site</p>	Site Manager
<b>Dust</b>	Mitigate dust and noise impacts to both employees and the public	<ul style="list-style-type: none"> <li>• Provide dust masks and ear muffs to all employees operating in a dusty or noisy environment</li> <li>• Reduce vehicle speed on gravel roads</li> <li>• All vehicles transporting sand or gravel should be covered with a tarpaulin, or any other suitable material, and,</li> <li>• Industrial speed limits of 30 – 40km/h must be maintained</li> </ul>	<p>Incident Report</p> <p>Public Complains</p>	Site Manager
<b>Noise</b>		<ul style="list-style-type: none"> <li>• Employees must NOT be exposed to noise levels above the required -85dB (A) limit over a period</li> </ul>		

Aspect	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		<p>of 8 hours. Should the noise level be higher than 85dB (A), the employer must implement a hearing conservation program such as noise monitoring;</p> <ul style="list-style-type: none"> <li>• Provide worker with earmuffs</li> <li>• Vehicles and machines must be well serviced to avoid unnecessary noise emission</li> <li>• Limit the movement of earth moving machinery and heavy vehicles (tipper trucks) to daylight: 06:00AM – 18:00 PM</li> </ul>		
<b>Ablution</b>	Reduce health risks and environmental pollution	<ol style="list-style-type: none"> <li>1. Ensure adequate, hygienic (clean) and user-friendly ablution facilities for all staff.</li> <li>2. Inspect ablution facilities regularly</li> </ol>	availability, cleanliness and hygienic ablution facilities	Site Manager

## SECTION E. SOCIO ECONOMIC ASPECTS

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
<b>Employment opportunities for Locals</b>	Promote benefits to the local community	<ul style="list-style-type: none"> <li>• Prioritize locals to be recruited for unskilled labour</li> <li>• Where possible, procure materials from local suppliers</li> </ul>	Employee structure and proportion of local employment	RA
<b>Pedestrian Safety</b>	Minimize the risk of pedestrian accidents	<ul style="list-style-type: none"> <li>• Provide sufficient areas to serve as pick-up areas at road intersections for hitchhikers</li> <li>• Provide designated laybys with clear road markings and signage including illuminated pedestrian crossings.</li> <li>• Provide dedicated turning lanes for larger vehicles</li> </ul>	Monitor incidents involving pedestrians Sufficient road markings and signage	RA
<b>Alcohol and Drug use</b>	Prevent alcohol and drug use at work	<ul style="list-style-type: none"> <li>• Ban and warn the employees against the use of alcohol and drugs at work</li> <li>• Provide awareness on the dangers and health impacts of alcohol and drug use</li> </ul>	Drunk / Misbehaving employees  Monitor presence of alcohol at work	Site Manager
<b>Working hours</b>	Adhere to the Labour Act No. 11 of 2007	<ul style="list-style-type: none"> <li>• Operate within the prescribed working days and hours as per the Namibian Labour laws and regulations</li> </ul>	Verification of working hours against the labour Act	Site Manager
<b>HIV / AIDS</b>	Provide HIV / AIDS awareness to employees	<ul style="list-style-type: none"> <li>• The Ministry of Health and Social Services provides free condoms. Avail them to workers.</li> <li>• Arrange for HIV awareness for employees;</li> </ul>	Availability of condoms Induction training report	Site Manager

## SECTION F. HERITAGE AND ARCHAEOLOGY

Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
<b>Heritage Resources / artefacts</b>	Reduce the impacts borehole drilling and associated earthworks on heritage resources / artefacts	<ol style="list-style-type: none"> <li>Heritage remains or artefacts discovered on site must be reported to the National Museum (+264 61 276800) or the National Forensic Laboratory (+264 61 240461).</li> <li>No artefacts must be removed or be interfered with prior to authorisation from the Namibian National Heritage Council (NHC)</li> <li>Recovery of heritage remains or artefacts discovered and removal thereof should be directed by the National Museum</li> </ol>	Sighting report/s of heritage resources / artefacts	Site Manager

## **6 REHABILITATION PLAN**

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Socio-economic development is very important for our livelihood and provides services, income and employment opportunities, and hence activities such as sand mining 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, re-vegetation and to 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 sore.

### **6.4 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).

### **6.5 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.

## 7 CONCLUSION

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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 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. It is recommended that an Environmental Control Officer (ECO) or Site Manager, monitors the preparation, operational and rehabilitation of the borrow pit to ensure that the mitigation and rehabilitation measures prescribed in this report are adhered to.

The aim of the EMP is to ensure legal compliance to prevent environmental fatal flaws. Non-compliance against the EMP is punishable and specific responsibilities has been assigned to role players in-order to ensure that the EMP is implemented. The key role-players are defined under section 4 should:

- **Read** the EMP (particularly the Project Manager) and ensure that they are fully conversant with provisions of the EMP,
- If need be, **Ask for clarity** from the Environmental Assessment Practitioner (EAP), Environmental Compliance Officer (ECO) or relevant authority,
- Ensure implementation of the recommended mitigation measures, and
- Communicate defaults / challenges to the ECO as soon as possible.

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