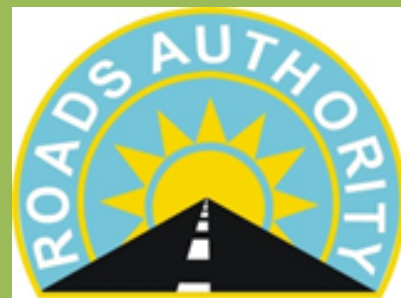


ENVIRONMENTAL SCOPING REPORT



2016

**CONTRACT NO. RA/CS-CR/05-2014
DESIGN, CONTRACT ADMINISTRATION AND SITE
SUPERVISION
RURAL ACCESS ROADS IN THE OHANGWENA REGION**



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1. EXECUTIVE SUMMARY

The Roads Authority of Namibia appointed WML Consulting Engineers (Pty) Ltd to perform consultancy services for the detail design, tender documentation, contract administration and site supervision for the **DESIGN, TENDER DOCUMENTATION, CONTRACT ADMINISTRATION AND SITE SUPERVISION OF RURAL ACCESS ROADS IN THE OMUSATI AND OHANGWENA REGIONS.**

Enviro Management Consultants Namibia was then appointed WML Consulting Engineers (Pty) Ltd to conduct a site visit, facilitate the Public Participation Process and identify and assess the environmental impacts this proposed project will have on the socio-economic and bio-physical environment. Furthermore to compile and Environmental Management Plan to avoid or mitigate any negative environmental impacts and enhance the positive impacts associated with this project.

The project comprises of the construction of 10 new access roads to flood affected schools and clinics in the Ohangwena Region. The total combined road length of all the proclaimed access roads under this project is approximately 24.5km.

We are convinced that this project will not have a detrimental negative impact on the environment and that the positive impacts associated with this project will out weight the negative impacts associated with the construction and operational phases of the roads.

2. INTRODUCTION

Enviro Management Consultants Namibia is appointed by WML Consulting Engineers (Pty) on behalf of the Roads Authority of Namibia, to conduct a site visit, assess the environment and compile the Environmental Scoping Report indicating the impacts this proposed project will have on the socio-economic and bio-physical environment.

This environmental assessment process focuses on Lot 2 of the proposed Project, which are the access roads in the Ohangwena Region ensuring access to 10 facilities with a combined length of 24.5km.

A site visit was conducted during the month of August 2015 to determine the environmental sensitivity of the area. This area is not very sensitive and with proper implementation of mitigation measures the negative impacts associated with roads construction will be limited.

Various schools and clinics are inaccessible during the rainy season due to flooding. This project will improve access to these facilities therefore having a largely positive impact on the Ohangwena Region.

There were no environmental specialist investigations conducted for the purpose of this Environmental Assessment Report.

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This section deals with the regulatory requirements that are applicable to this project.

NAMIBIAN LEGISLATIVE FRAMEWORK

During the preparation of the Scoping Report, the following legislative and policies were considered:

- Environmental Management Act, 2007; Act 7 of 2007 ;
- Environmental Regulations of 2012;
- Roads Authority Environmental Manual

The activities listed in Table 2, as contained in Appendix B of the Republic of Namibia's Environmental Regulations, may be applicable and will require Environmental Clearance.

Table 1: Listed Activities in Terms of the Environmental Management Act

Activity No.	Activity Description
10.2	The route determination of roads and design of associated physical infrastructure where - (a) it is a public road;

Activity No.	Activity Description
	(b) the road reserve is wider than 30 meters; or (c) the road caters for more than one lane of traffic in both directions.

Currently, Environmental Impact Assessments are guided and reviewed by the Directorate of Environmental Affairs (DEA) in the Ministry of Environment and Tourism. Guidelines for various projects have been compiled to help improve EIA practice in Namibia.

There are a number of sector laws in Namibia that have relevance to Scoping and EIAs. The following table provides a summary of the relevant sector legislation.

Table 2: Legislation relevant to the Project

Statute	Provisions	Project Implications
Forest Act 12 of 2001	Provision for the protection of natural vegetation. No regulations promulgated yet. Section 22(1): It is unlawful for any person to " <i>cut, destroy or remove</i> : <ul style="list-style-type: none"> • any living tree, bush or shrub growing within 100 meters from a river, stream or watercourse on land that is not part of a surveyed erf or a local authority area without a license. • Vegetation which is on a sand dune or drifting sand or on a gully unless the cutting, destruction or removal is done for the purpose of stabilizing the sand or gully. 	<ul style="list-style-type: none"> • Permits should be obtained from Department of Forestry for the removal of protected trees.
National Heritage Act 27 of 2004	Heritage resources to be conserved in development.	All archaeological sites to be identified and protected.
Nature Conservation Ordinance 4 of 1975	Requires a permit for picking (the definition of "picking" includes damage or destroy) protected plants without a permit.	In case there is an intention to remove protected species, then permits will be required.
Preservation of Trees and Forests Ordinance	Protection to tree species.	The Contractor will require a permit to remove any protected trees.
Soil Conservation Act 76 of 1969	Prevention and combating of soil erosion; conservation, improvement and manner of use of soil and vegetation, and protection of water	Removals of vegetation cover to be avoided and minimized at all costs.

Statute	Provisions	Project Implications
	<p>sources.</p> <p>The Minister may direct owners or land occupiers in respect of <i>inter alia</i> water courses. No Regulations exist to this effect.</p>	<p>Soil pollution to be avoided.</p>
<p>Water Resources Management Act 24 of 2004</p>	<p>Section 32 states that no person may abstract or use water, except in accordance with a license issued under this Act. Abstraction of water including open waters, aquifer, brackish or marine water.</p> <p>Section 46 states that any drilling to be conducted or enlargement of an existing borehole can only be conducted under a permit issued under the Act.</p> <p>Section 56 states that a person may not discharge any effluent directly or indirectly to any water resource on or under the ground or construct any effluent treatment facility or disposal site unless in compliance with a permit issued under Section 60 of the Act. Where “effluent” means any liquid discharge as a result of domestic, commercial, industrial or agricultural activities.</p> <p>Section 78 states that a person may not engage in any construction activity that impounds, blocks or otherwise impedes the flow of water in a watercourse without the Minister’s written approval authorising such activity.</p>	<p>Obligation not to pollute surface water bodies.</p> <p>The following permits are required in terms of the Water Act:</p> <ul style="list-style-type: none"> • water abstraction permits that will form part of the contract obligations.
<p>Public Health Act 36 of 1919</p>	<p>Provides for the prevention of pollution of public water supplies.</p>	<p>A general obligation for the Contractor not to pollute the water bodies in the area.</p>

4. PROJECT DESCRIPTION

4.1 OVERVIEW

The Namibian Government represented by the Roads Authority as Executing Agency has committed itself to improve the road infrastructure of the Ohangwena and Omusati Regions of Namibia. The Government, with co-financing from the Kreditanstalt für Wiederaufbau (KfW), has agreed to fund the Detail Design, Tender Documentation and Site Supervision and the Construction of Rural Access Roads in the Ohangwena Region in Central North Namibia.

The project comprises of the construction of 10 new access roads to flood affected schools and clinics in the Ohangwena Region. The total combined road length of all the proclaimed access roads under this project is approximately 24.5km.

Nine (9) gravel access roads to 10 flood affected schools and clinics in the Ohangwena Region will be constructed while five (5) new gravel access roads to flood affected schools and Clinics will be constructed. However the Omusati Region is also mentioned is only for interest sake. This document will only focus on the Ohangwena Region.

The total combined road length of all the proclaimed access roads in the Ohangwena Region is approximately 25.0km.

The project has been split into three (3) construction areas ie. 7 & 8 in the Ohangwena Region and Area 3 in the Omusati Region. The different amounts and lengths of access roads to be constructed in the Ohangwena Region are summarized as follows:

Ohangwena : Area 7

Area 7 consist of 3 roads with a combined length of 11.7km which will connect to 3 Schools

- Road 37: Tulihongeni CS (4.2 km)
- Road 38: Onambebwe CS (4.9 km)
- Road 39: Engungumano PS (2.6 km)

Ohangwena : Area 8

Area 8 consist of 6 roads with a combined length of 12.9km which will connect to 6 schools and 1 clinic

- Road 30: Onangubu PS (1.5 km)
- Road 32: Shituwa SS (0.3 km)
- Road 33: Endola CS (0.2 km)
- Road 34: Endola Clinic (2.0 km)
- Road 35: Evatelo CS & Ehafo CS (5.9 km)
- Road 36: Onepandaulo CS (2.9 km)

The following maps indicate the locality of the various access roads to be constructed in the Ohangwena Region:

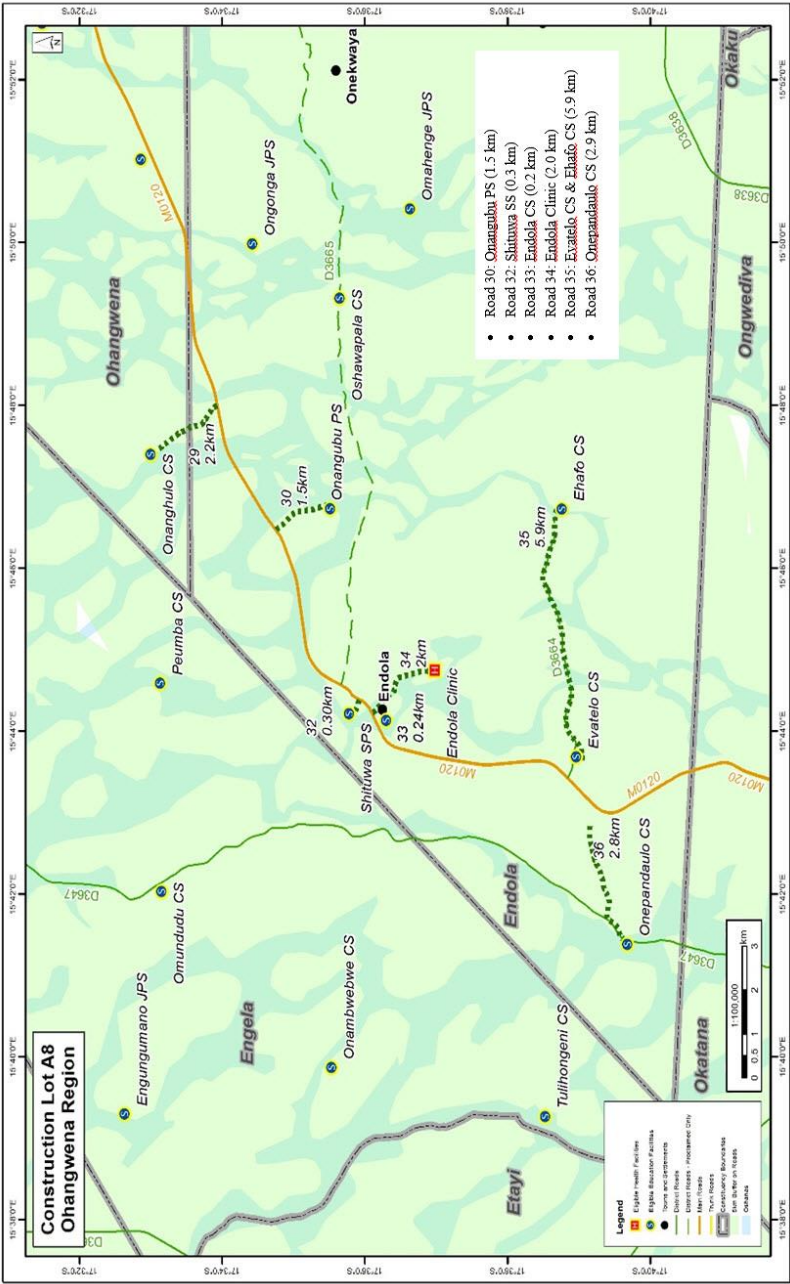


Figure 1: Access roads close to Endola

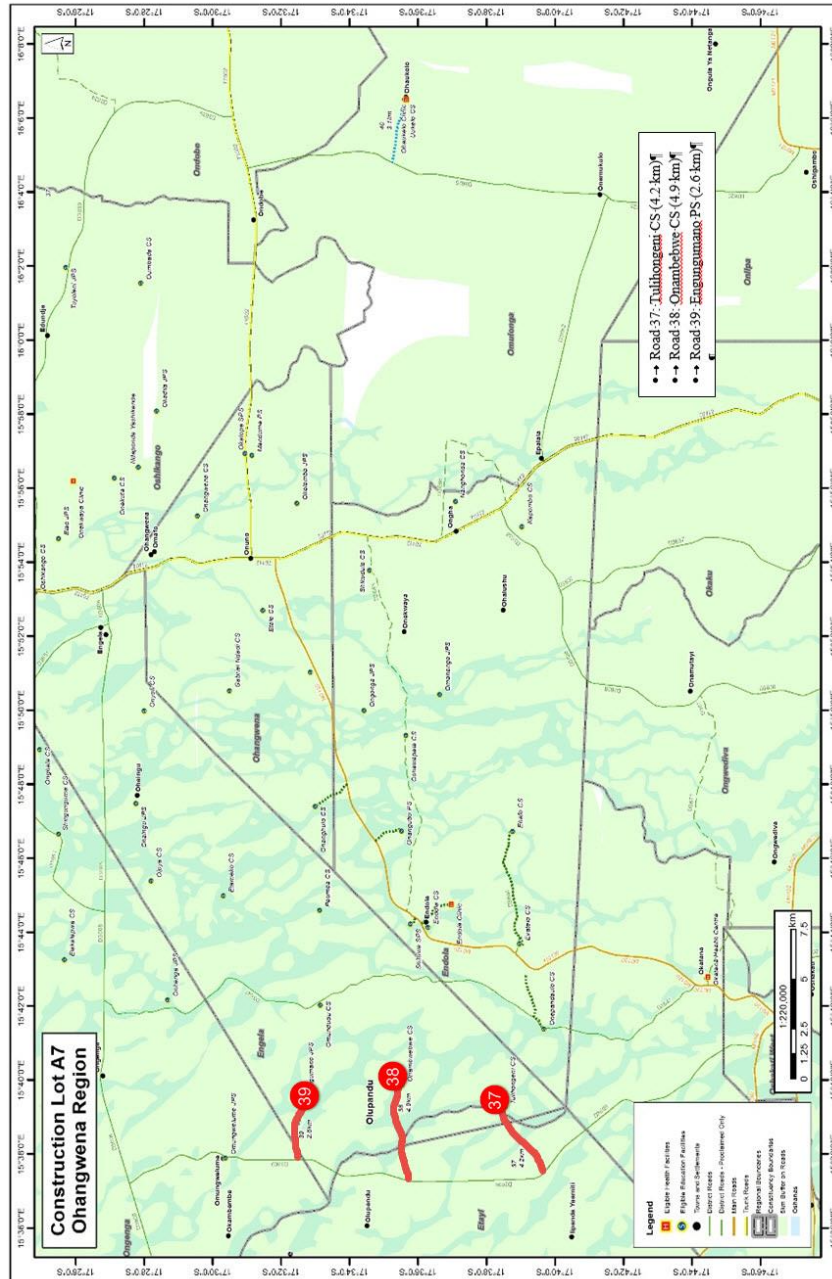


Figure 2: Access roads close to Olupandu

4.2 PROJECT ROADS & CONNECTED FACILITIES

The table below gives a clear overview of the project roads and connected facilities and also the access road lengths:

Roads and Connected Facilities in the Ohangwena Region			
Road no.	Facility 1	Facility 2	Road Length (Km)
Ohangwena Region : Area 7			
37	Tulihongeni CS		4.2
38	: Onambebwe CS		4.9
39	Engungumano PS		2.6
Ohangwena Region : Area 7			
30	Onangubu PS		1.5
32	Shituwa SS		0.3
33	Endola CS		0.2
34	Endola Clinic		2
35	Evatelo CS	Ehafo CS	5.9
36	Onepandaulo CS		2.9
Omusati Region : Area 3			
9	Oshatotwa CS	St Gabriel CS	4.6
10	Onembaba CS		3.2
11	Eshakeno CS	Epoko Clinic	1.6
12	Epoko CS		3.6
24	Ondobeyohumba CS		4.4

Table 4: Project Roads & Connected Facilities

4.3 APPROACH AND DESIGN PHILOSOPHY

During the preparatory study, the Consultant has already visited all facilities and agreed to the preferred routes with the relevant staff (doctors, nurses, principals and teachers). Each access was driven in presence of a staff member and the track was logged with a handheld GPS device in order to record the position.

The recorded tracks were modified in such a way, that an engineered alignment of a design speed of minimum 60km/h can be achieved.¹ This was done with the aid of aerial photographs with contour lines (in-house available to the Consultant), in-house available DTM data, recordings from the Consultant's site visits as well as area-specific experience of team members and first consultations with the local authorities.

The draft alignment options have been prepared on this basis and have been agreed with the Roads Authority. After slight modifications, as requested by the RA, the Consultant has visited all facilities again to confirm the alignments with the relevant staff of the schools and clinics. The entire roads were shown to them in the field and on especially prepared maps, in order to obtain their approval.

During the site visit, the design team reviewed the horizontal and vertical alignment of the existing tracks together with the adjacent land use in order to find the most suitable option and in order to ensure the alignment and drainage features are in line with RA standards.

The principle approach for determining the routes was as follows:

- *Routes are aligned along the existing tracks as well as along boundaries of properties in order to minimise the effect of the proposed road reserve on properties;*
- *Avoidance of water channels and pans.*
- *Utilization of bush cleared areas as far as possible;*
- *Avoidance of fruit trees, other large trees, agricultural fields, homesteads and grave yards, which are important for the local population;*

In view of the above design criteria, the access road alignments cannot meander too much in order to avoid all low lying areas, which are flood prone, agricultural fields, homesteads, fruit trees, and other areas important to the local communities. Where it cannot be prevented to cross agricultural fields, the fields will be crossed in such a way that only on the sides land will have to be cut off, where possible.

¹ It was however agreed in the project start-up meeting with the Roads Authority, that the road to Oshaaluwata CS shall be designed for 100km/h as it is part of the proclamation of future road DR3668.

These areas will be surveyed and compensation will be paid to the land owner by the Roads Authority in line with the legally binding gazetted rates. Fences that will have to be removed will be reinstated at the edge of the road reserve at no cost to the owner. As discussed in the startup meeting, a field coordinator shall be appointed to prepare the compensation forms in line with the revised compensation policy of the RA, prior to construction start.

Where the road crosses oshanas, flood planes or low lying areas that will be filled with water during the rain reason, the Consultant will provide for appropriate drainage facilities, sufficiently sized and correctly positioned, in order not to block the free flow of water. Thus flooding of adjacent property on the one hand and on the other hand cutting off people from their water sources will be prevented.

The Consultant will closely liaise with the local population as well as the local authorities in order to address this matter appropriately.

4.4 DESK STUDY

The Consultant, together with the information gathered during the preparatory study, used, Google Earth maps, aerial photos, topographical maps, proclamation and flood water information to determine the access road routes. Coordinates of PI's were determined and alternative routes were scrutinized, based on the design guidelines. The preferred route alignment was submitted to the Roads Authority (Draft Alignment Options) and principal approval, subject to approval by the local authorities, was obtained.

4.5 ROUTE VERIFICATION

A comprehensive site visit by the key personnel that will be involved in the detail design was conducted at the end of July 2015 to the beginning of August 2015.

The main purpose of the site visit was to verify the draft alignment options in the field. Although the tracks have already been driven and recorded during the preparatory study, the Consultant intended to confirm that the engineered alignment with a design speed of 60km/h suits the ground conditions and reduces compensation as much as possible. The centerline coordinates which have been loaded onto a hand-held GPS device served as route identification.

Another objective of the site visit was to further familiarization of the design team with the terrain and associated features to evaluate the drainage options for each access road. Although this has

already been done to a certain extent during the preparatory study, the Consultant took the opportunity to deepen their site specific analysis and record findings in a holistic manner.

The Consultant invited the relevant staff at the respective public facility to accompany them during the route confirmation. As the staff was already familiar with the design team and the project due to their involvement during the predatory study, no major deviations or comments were received, except in the case of Road 16: Eengolo Clinic & Ongolo CS, where the proposed route was not agreed on by the community.

A new route approximately 10.5km long compared to the original proposed route of 6.5km long was recorded. The new route was agreed upon by the Road Authority and it was confirmed that the community's requested should be followed.

4.6 TRAFFIC

Low traffic volumes (less than 50 v.p.d) are expected on the access roads.

It was agreed with the Roads Authority at the project Start-up meeting that Design Traffic is not to be considered due to pre-determined access road characteristics (width and pavement designs).

4.7 ROAD WIDTH

A pre-determined Pavement Design was confirmed during the Project Start up Meeting to be a 150mm Wearing Course, compacted to 95% Mod. AASTHO and Fill Layers not exceeding 150mm thickness, compacted to 90% Mod AASTHO.

It was agreed that a top fill layer of 150mm, compacted to 93% of Mod. AASTHO shall form part of the pre-determined pavement design.

It was further agreed at the Project Start-up Meeting that, in order to improve maintenance operations, the typical cross-section for the project road shall be 6.0 m without shoulders and a cross fall of 3 – 4 % to both sides as depicted in Figure 6.1. The exception will be for Road 16 to Ongolo CS, which shall be 7.5m due to heavy population along this road. (see figures on the next page).

Both proposals are in line or exceed the minimum recommendations of TRH20 (Unsealed Roads: Design, Construction and Maintenance), where the minimum road width is specified with 6m for

minor formed roads in flat and rolling terrain and an existing traffic from more than 50 vehicle per day.

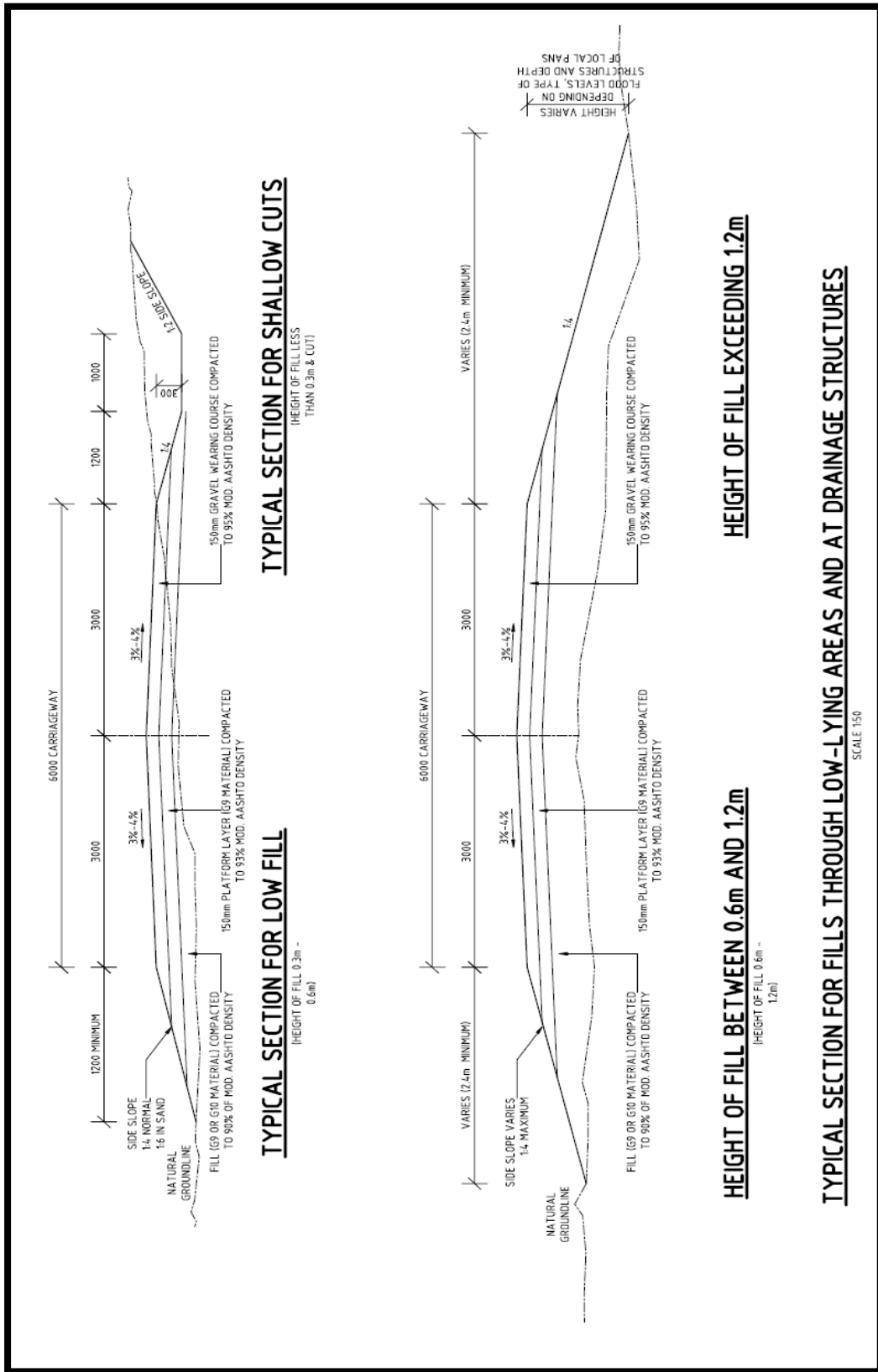


Figure 3: Typical cross-section for 6.0 m wide gravel roads

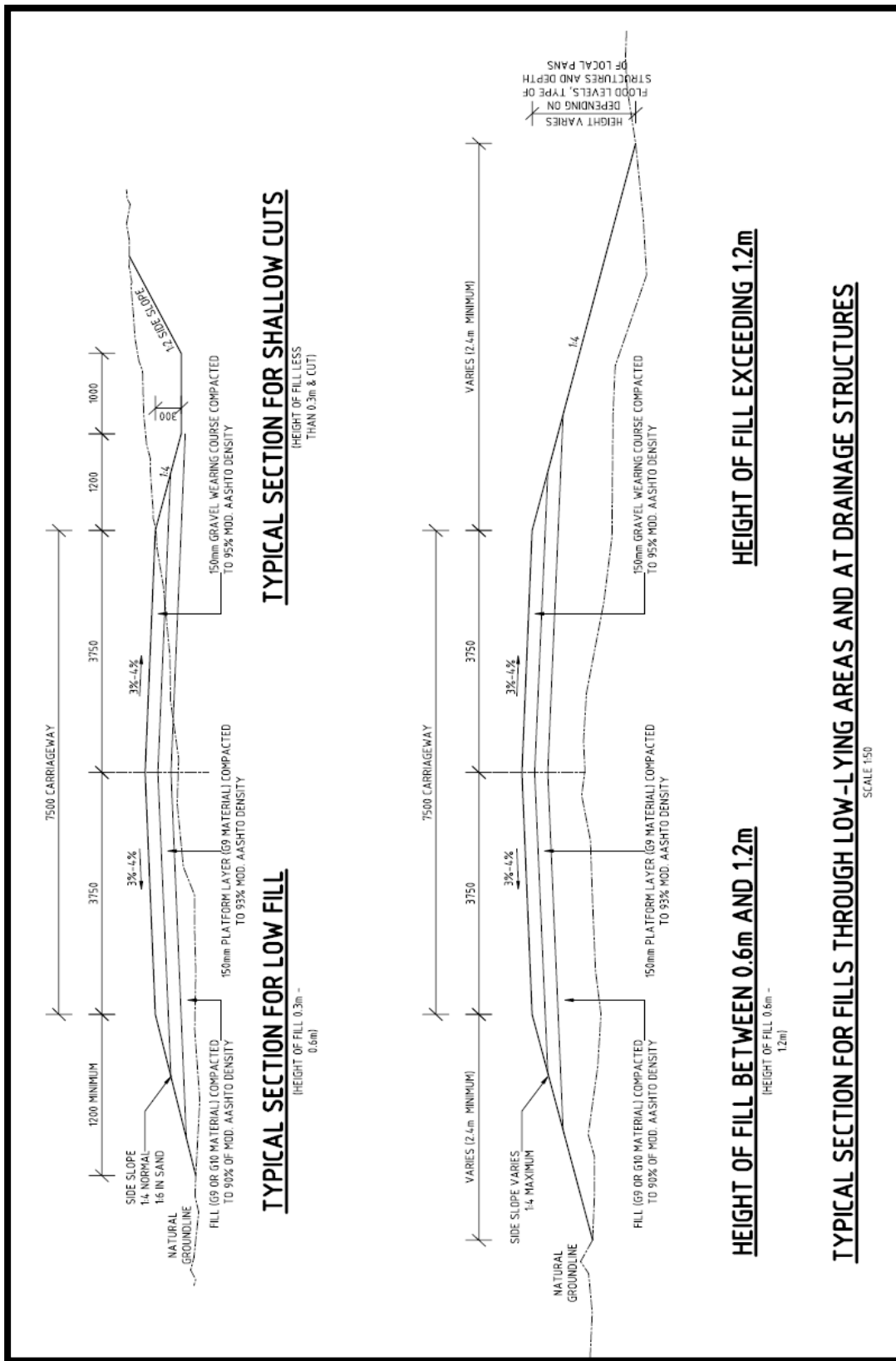


Figure 4: Typical cross-section for 7.5 m wide gravel roads

4.8 ROAD RESERVE WIDTH

The Oshikoto, Oshana, Omusati, Ohangwena and Kavango Roads Master Plan Revision 2008 recommend a clearing width of 30 m for all gravel district roads.

The RA confirmed in the startup meeting, that the same shall apply to all access roads and a minimum road reserve width of 30 m is therefore used for the project roads in order to minimize the effects on properties. It was however agreed not to clear larger trees, especially fruit bearing trees, and existing structures that may be located in the outer half of the road reserve. Only a width of 15 m (7.5 m either side of the centre line) shall be cleared entirely from all vegetation, but at least the area outside the shoulder breakpoint plus 2 m must be cleared.

It was further agreed, that no buildings should be removed if they encroach the outer edges of the road reserve, due to the access road characteristics.

5. ENVIRONMENTAL AND SOCIAL BACKGROUND

The proposed project is situated in the Ohangwena Region – therefore the environmental description will focus on the Region as a whole.

5.1 THE NATURAL ENVIRONMENT

This section describes the bio-physical environmental aspects of the study area to allow for identification of elements of environmental sensitivity and to provide the context for the assessment of significance of impacts related to the proposed project.

Climate

The climate in the Ohangwena Region is representative of the Northern Regions of Namibia when the climate is considered, namely subtropical. Temperatures are relatively high during the summer months ranging between 34-46 degrees Celsius and average above 22 degrees Celsius annually. Ohangwena Region is also known for above Namibian average rainfall of around 425 - 525mm annually with most of the precipitation occurring during the months of November to March.

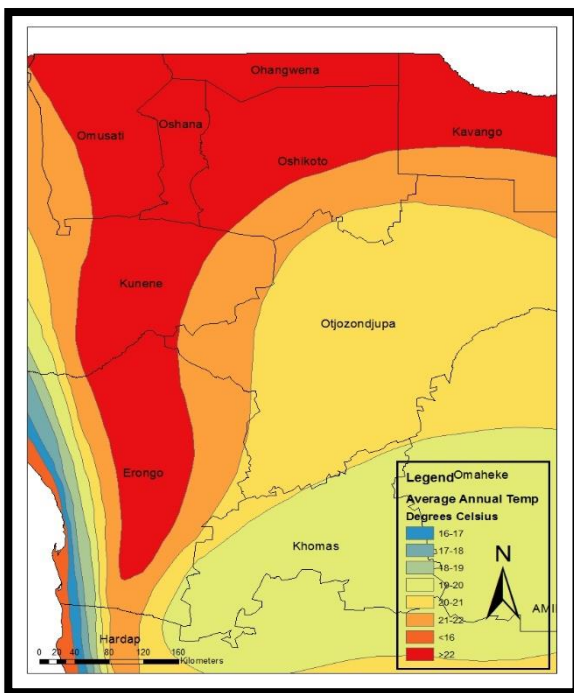


Figure 5: Average Annual Temp.²

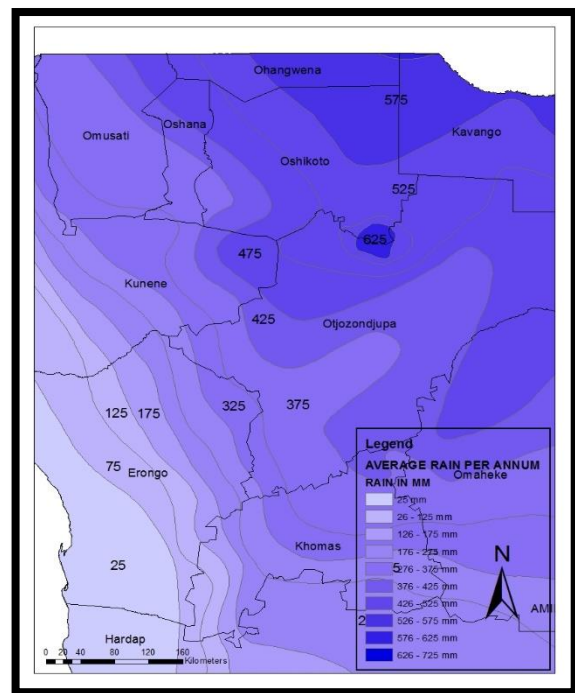


Figure 6: Average Annual Rain

The annual evaporation rate of the area is approximately 1820 – 1960 mm with a water deficit figure of 1500 – 1700 mm per annum. This makes the area very dependant on good annual rains as to avoid drought conditions (MET).

Dominant wind direction in the Ohangwena Region is from the East (15%) but the area has a 57% frequency of calm wind days which is very high (Mendelsohn, 2003). This indicates that winds are

² All graphical representation of the data was obtained from the Digital Atlas of Namibia (2002).

northwest of Tsumkwe. Recent deposits in form of a thin but extensive veneer of soil and hill wash material occur throughout the area. Sand dominates the topographical higher areas (dunes) with silty clay in depressions (interdunes).

No dominant mineral deposits are found in these geological structures, but some coal has been discovered in the lower Permian Prince Albert Formation at depths of 10m.

Surface Hydrology

The most important drainage system in central northern Namibia is the Cuvelai. The Cuvelai originates in Angola, its catchment falling between those of the Kunene River in the west and the Okavango River in the east. The system is fed by a number of rivers some of which receives more than 800 mm of rain per year in their catchment areas. Perennial tributaries occur only in Angola while the Namibian part of the Cuvelai basin flow only in the rainy season.

These oshanas are shallow, often vegetated, poorly defined but are interconnected flood channels and pans through which surface water flows slowly or form pools depending on the intensity of the floods. These seasonal flows provide fishing grounds, renew pastures and recharge aquifer water supply. Cattle and other animals depend highly on the surface water for drinking purposes during and after the rainy seasons.

During the rainy season the oshanas may fill and slowly flow in a south-easterly direction towards the Etosha Pan (refer to Figure 7: Topographical Characteristics).

There are no known existing water pollution discharge points in the Ohangwena Region.

Geohydrology

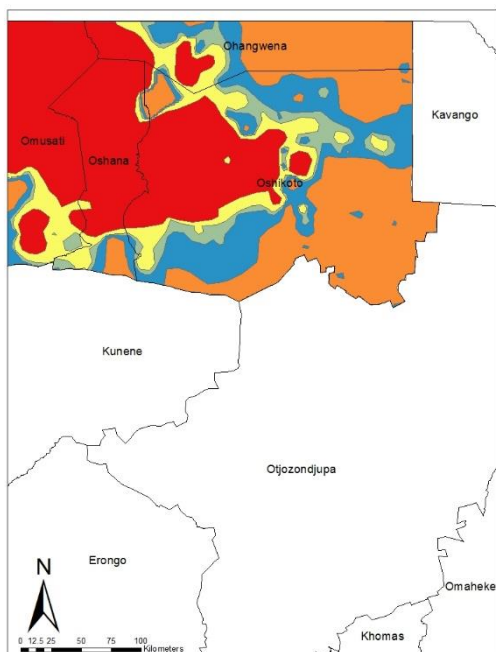


Figure 9: TDS Aquifer Water

All groundwater within the Cuvelai basin flows south towards the Etosha Pan due to the structure of the basin and because the pan, as the lowest point, forms the base level of the groundwater flow system (Christelis 2001).

Geo-hydrology in the Ohangwena Region area is characteristic of shallow aquifer levels (between 10-30 m below surface) of water which is sustained during the year. However this might be the case, the quality of the water varies considerable due to the saline soils and high salt content. The surface water percolates through the top soils and is then isolated by the clay layer underneath.

The water quality over much of the Region is extremely poor and severely limits its usefulness. The TDS (Figure 9: TDS Aquifer Water) is a good measure to determine the quality of the water and for classification: a TDS of over 1500mg/l is not suitable for humans and 5000 mg per liter is not even suitable for livestock.

The Omusati Region, Ohangwena and Oshana Regions all have readings above the 5000 mg/liter threshold. Even though the water quality is very poor in the Ohangwena Region area the borehole yields are also low. Mendelsohn (2000) indicates that the yield of boreholes is less than 2 cubic meters of water per hour which emphasises the dependence on surface water for commercial and subsistence stock farming and also for the production of crops.

Soils

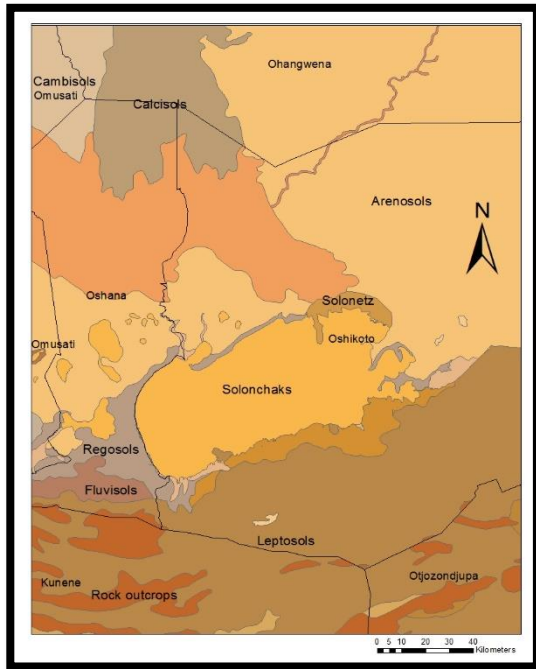


Figure 10: Dominant Soils

Namibian soils vary greatly and different forces impact on the development of the various soils. The western Ohangwena Region lies in the dominant Eutric Cambisols (fertile soils with high base saturation) soil group (Christelis 2001). This soil type is best described as soils that were formed quite recently in geological time, mainly from medium and fine-textured parent material deposited during sporadic flooding. Since the parent material is only slightly weathered, Cambisols are characterised by the absence of appreciable quantities of accumulated clay, organic material, and aluminium and iron.

Nevertheless, their fertility is usually moderate to high and in the Ohangwena Region area even higher due to the good water holding capacity and internal drainage of the dominating soils found at the site (Mendelsohn 2003).

Fauna

During the site visit limited fauna was observed. Looking at current secondary data it is also evident that diversity of various fauna species is low around the Ohangwena Region area. The reason is that animals and birds are direct dependant on their habitat. The Ohangwena Region area does not host a large bio-diversity composition and therefore also limits fauna diversity.

From the Critically Endangered and Endangered bird species list it must be noted that the following birds should require special attention in the region:

- | | |
|---------------------------------|--------------------------------------|
| 1. Saddlebilled stork | <i>Ephippiorhynchus senegalensis</i> |
| 2. Egyptian vulture | <i>Neophron percnopterus</i> |
| 3. Bateleur | <i>Terathopius ecaudatus</i> |
| 4. Southern Ground
-Hornbill | <i>Bucorvus leadbeateri</i> |
| 5. Greater Flamingo | <i>Phoenicopterus roseus</i> |
| 6. Blue crane | <i>Anthropoides paradiseus</i> |

No other critically endangered species would be found around the Ohangwena Region area. Even though this is the case the Northern parts of Namibia is known to be on route of various birds

migrating to Europe, but the proposed project will not have any effect on these birds (Sinclair 2009).

According to Mendelsohn (2011) the whole Cuvelai area has a low bio-diversity level due to topographical characteristics, climatic conditions, vegetation types and soils.

Another impacting factor is the fact that Ohangwena Region and surrounding areas are one of the more densely populated areas in Namibia. This tendency also impact negatively on fauna diversity and numbers.

Mendelsohn 2003 indicates levels of diversity in various groups. These groups give an indication of the diversity found in fauna but even more indicates the variation of habitat on which these different species and genera live. The higher the index of species (high classification), the more complex the habitat can be considered to be. There will also be a strong correlation between the index of specie with regards to the diversity and the vulnerability of the habitat.

Type of Diversity	Number of	Low
	Species / genera	Medium
		High
Overall terrestrial diversity		Low
Plant diversity	50-99	Low
Bird diversity	111-140	Medium
Frog diversity	12-15	Medium
Mammal diversity	46-60	Medium
Reptile diversity	41-50	Medium
Scorpion diversity	6-9	Low

Table 3: Index of Species diversity

Flora

The project site is situated in the Cuvelai drainage system which greatly influences the vegetation diversity and characteristics. The occasional flooding results in low to medium plant diversity in the Ohangwena Region area (Mendelsohn 2000).

Grasses and shrubs dominate in areas which have more flooding where these soils are relatively shallow, clayey and salty (Mendelsohn 2003).

During the site visit it became evident that the site lies in the Acacia tree and shrub Savanna (Mannheimer 2009). Species that were identified, but also limited to, were the following:

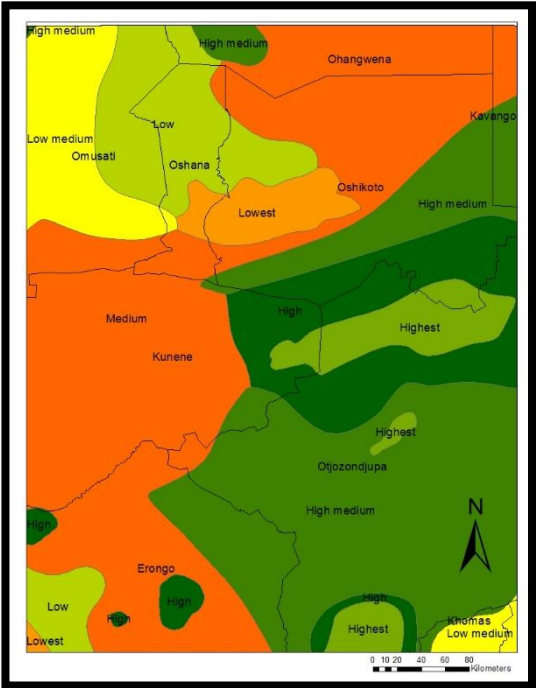


Figure 11: Plant diversity

- | | | |
|----|---------------------------|---|
| 1. | Sand thorn | <i>Acacia arenaria</i> |
| 2. | Weeping candle-pod acacia | <i>Acacia hebeclada</i> subsp. <i>Tristis</i> |
| 3. | Scented-pod acacia | <i>Acacia nilotica</i> |
| 4. | Mopane | <i>Colophospermum mopane</i> |

None of the recorded species are protected or require special attention with regards to conservation efforts. No other species that is protected under any law was noted during the site visit.

Grasses identified at the Ohangwena Region site are very common in these areas and include the following species:

- | | | |
|----|---------------------|---------------------------------|
| 1. | Common Crowfoot | <i>Dactyloctenium aegyptium</i> |
| 2. | Feather-top Chloris | <i>Chloris virgate</i> |
| 3. | Pinhole grass | <i>Bothriochloa insculpta</i> |
| 4. | Kalahari Sour grass | <i>Schmidtia kalahariensis</i> |
| 5. | Jungle Rice | <i>Echinochloa colona</i> |

These grass species are all common in these areas and no conservation status exists (Van Oudtshoorn 2002).

5.2 THE SOCIAL ENVIRONMENT

Ohangwena region is one of the fourteen regions of Namibia. In the north, Ohangwena borders the Cunene Province of Angola. Domestically, it borders the Ohangwena region to the northeast, Oshana to the east, and Kunene to the south and west. The region comprises nine constituencies: Onesi, Tsandi, Outapi, Okalongo, Oshikuku, Elim, Okahao, Anamulenge, and Ogongo.

Important landmarks of the region include Ruacana town and waterfall. The region is traversed by a high standard trunk road which provides a direct link to adjacent regions and the rest of the country. Although passenger and freight transport along this route is easy, the rest of this road network, in common with all the communal areas of northern Namibia, and many of these roads have been upgraded to very good standards. Okahao and Outapi both have small hospitals, and a network of clinics provides basic services.

The intercensal population growth rate between 2001 and 2011 was 1.4% compared to 2.6% between 1991 –2001. The annual growth rate for urban areas was 4.0%, which is much higher than the national rate. There was however, a negative growth rate (- 0.1%) in rural areas due to high migration to urban areas.

Ohangwena Region accounts for 12% of the population of Namibia (Population and Housing census 2011). The breakdown of households' main sources of income is shown in Table 4. As can be seen from this table, agriculture is by far the most common source of livelihood in the region; dependence on this sector is greater than in the rest of Namibia, even when only the rural areas are

considered. Reliance on wages and salaries is significantly lower than in the rest of the country. The region is characterised by a largely traditional lifestyle: 88% of households live in traditional dwellings (vs. the national average of 41% of households).

Table 4: Household sources in income in Namibia and the region

Households' main source of income	Namibia	Urban	Rural	Ohangwena
Farming	25%	2%	42%	72%
Business activities non farming	8%	11%	6%	4%
Wages and Salaries	47%	73%	27%	12%
Old-age pension	9.6%	3%	14%	8%
Cash remittance	6%	6%	6%	1%
Old-age pension (retirement)	3%	3%	3%	2%
Orphans' grant	0.5%	0.3%	0.7%	0.4%
Disability grant	0.6%	0.4%	1%	1%
Other	1%	1.4%	1%	0.5%

6. PUBLIC PARTICIPATION PROCESS

Once the Consultant had determined the preliminary routes of the proposed access roads, the Draft Alignment Options were submitted to the Roads Authority for comments and approval.

After approval from the Roads Authority, meetings were organized with the local authorities in the Ohangwena Region in order to introduce the project and obtain their comments.

Stakeholder Consultation Meetings took place in Okalongo (Okalongo Constituency) and Outapi (Outapi Constituency) in the Omusati Region on the 3rd of August 2015. The Consultant explained the project, the design philosophy and approach, and presented the proposed horizontal road alignment of each of the proposed access road through projected aerial.

From both meetings no major comments were received on the presented alignment options. However, during both Stakeholders meeting, there were various requests that some access roads perhaps be extended to include further facilities. These specific requests were minuted and referred to the Roads Authority for further action in an e-mail correspondence dated 6 August 2015 and an official letter from the Okalongo Constituency addressed to the Consultant requesting the same.

From the start of the project it was clear that there are not any negative socio-economic impacts associated with this project. The Regional and Local leaders are all very positive together with school teachers and medical personnel of the various clinics. The access roads will have a positive socio-economic effect on the communities due to greatly improved accessibility to schools and clinics.

The public participation process was undertaken in accordance with the principles and requirements of the Namibian Environmental Management Act, No 7 of 2007 and associated Regulations.

The approach to the public participation process was open and participatory with the full involvement of Interested and Affected Parties (IAPs). This approach ensured that reasonable measures were taken to identify stakeholder issues and concerns.

The Methodology for the Public Participation was as follows:

The proposed upgrading of the road was advertised twice in two different newspapers as to comply with the Environmental Management act No.7 of 2007 and the applicable Environmental Regulations.

The advertisements were placed as follows;

The New Era: Monday 11 April 2016

Monday 18 April 2016

The Namibian: Thursday 14 April 2016

Thursday 21 April 2016

There were no comments received after the notifications placed in the newspapers.

Consultation meetings were held with the Regional Council and the affected heads of schools and clinics. The first meeting was held at Okalongo on the 3rd August 2015 where the proposed project was introduced to the Omusati Regional Council, Ministry of Education, Ministry of Health & Social Services and the Roads Authority. Representatives of the Okalongo Constituency were also present at the meeting (please refer to the attached minutes and attendance register).

The project is well received and there were some comments on the alignments and access to certain schools that could be changed. These comments were well received and incorporated into the final planning.

The second meeting was held on the 3rd August 2015 at 14:00, Offices of Omusati Regional Council. The meeting was well attended by the various stakeholders including school headmasters and health workers at the various clinics. Again the project was well received and some comments were taken into consideration for the finalization of the planning phase for this project (please refer to the attached minutes and attendance register).

PICTURES TAKEN DURING THE PUBLIC MEETINGS



7. ENVIRONMENTAL IMPACTS ASSESSMENT PROCESS

It is important to understand the gist of any project as to understand the possible environmental impacts associated with such a project. The following activities are generically associated with the construction of a road. These activities are kept in mind during the environmental impact assessment process.

- **Site establishment**
 - Demarcation of the site
 - Protection of vegetation and natural features
 - Protection of fauna
 - Protection of cultural historical aspects
 - Topsoil conservation
 - De-bushing and de-stumping
- **Site infrastructure**
 - Structures and accommodation
 - Contractors camp and lay-down areas
 - Batching plants
 - Crusher plants
 - Sand washing plants
 - Nurseries
 - Roads and access
 - Gates and fences
- **Site management**
 - Rubble and waste rock
 - Solid waste
 - Liquid waste
 - Hazardous waste
 - Pollution control
 - Implements and equipment
 - Blasting
 - Air quality
 - Noise control
 - Fire control
 - Health and Safety
- **Borrow pits and quarries**
- **Earthworks**
 - Prospecting boreholes and test pits
 - Excavations and trenches
 - Cut and fill
 - Shaping and trimming
- **Stockpiles, storage and handling**
 - Topsoil
 - Spoil
 - Vehicles and equipment
 - Fuel
 - Hazardous substances
- **Erosion control**
 - Surface water management
 - Erosion protection
- **Control of alien plants**

7.1 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

A checklist is designed to help users identify the likely significant environmental effects of proposed projects during scoping. It is to be used in conjunction with the Checklist of Criteria for Evaluating the Significance of Impacts.

There are two stages:

- **First**, identifying the potential impacts of projects;
- **Second** selecting those which are likely to be significant and therefore require most attention in the assessment.

A useful way of identifying the potential impacts of a project is to identify all the activities or sources of impact that could arise from construction, operation or decommissioning of the project, and to consider these alongside the characteristics of the project environment that could be affected, to identify where there could be interactions between them. The two parts of the Scoping Checklist have been developed to assist in this process.

Start with the checklist of questions set out below. Complete Column 2 by answering:

- yes - if the activity is likely to occur during implementation of the project;
- no - if it is not expected to occur;
- ? - if it is uncertain at this stage whether it will occur or not.

For each activity for which the answer in Column 2 is "Yes" or "?", refer to the second part of the Scoping Checklist which lists characteristics of the project environment which could be affected, and identify any which could be affected by that activity. Information will be used about the surrounding environment in order to complete this stage. Note the characteristics of the project environment that could be affected, and the nature of the potential effects in Column 3.

Finally, use Checklist of Criteria for Evaluating the Significance of Impacts to help complete Column 4.

This will identify those impacts which are expected to be significant. The questions are designed so that a "yes" answer will point towards a significant impact. It is often difficult to decide what is or is not significant but a useful simple check is to ask whether the effect is one that is of sufficient importance that it ought to be considered and have an influence on the development consent decision.

PART 1 OF THE SCOPING CHECKLIST: QUESTIONS ON PROJECT

CHARACTERISTICS

1. Will construction, operation or decommissioning of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc)?

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
1.1	Permanent or temporary change in land use, land cover or topography including increases in intensity of land use?	Yes	The quarry operations will temporarily alter the land use, land cover and, for the borrow pits - topography of the area.	Low significance because of possible mitigation measures that can be implemented. Rehabilitation of borrow pits normally return the land use to its original state.
1.2	Clearance of existing land, vegetation and buildings?	Yes	Clearing of vegetation for construction operations influencing the vegetation, soils and topography.	Clearing of vegetation is always regarded as significant when it comes to road construction. However, mitigation measures can reduce the significance of the impact.
1.3	Creation of new land uses?	No	New access roads will be constructed to facilities such as schools and clinics. Even though this is the case, these new roads will most probable be constructed on existing access roads with few exceptions.	Low significance due to very short distances to facilities.
1.4	Pre-construction investigators egg boreholes, soil testing?	No		
1.5	Construction works?	Yes	During construction aspects such as social, soil, surface water, vegetation and geology can be affected.	Flooding in the area is a real risk for road construction. The change in water bodies might be significant if proper planning during the design phase of the road is neglected. The other aspects will not be significantly impacted.
1.6	Demolition works?	Yes	The possible removal of old culverts and bridges.	Very low or no significance if the materials be removed and spoiled.
1.7	Temporary sites used for construction works or housing of construction workers?	Yes	Temporary construction camps will probably be constructed where water and waste management are the most important activities that need to be mitigated.	Should these activities not be managed, it might have a negative impact on the soils, water and health and safety of the contractor workers. No permanent changes to the area are predicted.
1.8	Above ground buildings, structures or earthworks including linear structures cut and fill or excavations?	Yes	The above ground earthworks will be regarded as primarily for the road construction.	It is anticipated that the impact will not be significant due to the flat topography of the area.
1.9	Underground works including mining or tunnelling?	No		
1.10	Reclamation works?	No		
1.11	Dredging?	No		

1.12	Coastal structures egg seawalls, piers?	No		
1.13	Offshore structures?	No		
1.14	Production and manufacturing processes?	No		
1.15	Facilities for storage of goods or materials?	Yes	Possible storage of machines and bulk fuel.	The storage of goods or materials can be mitigated therefore limiting the significance.
1.16	Facilities for treatment or disposal of solid wastes or liquid effluents?	No		
1.17	Facilities for long term housing of operational workers?	No		
1.18	New road, rail or sea traffic during construction or operation?	Yes	Construction of short bypasses and limited traffic increase due to movement of construction vehicles.	Low significance.
1.19	New road, rail, air, water borne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	Yes	Short access roads will be designed to the facilities.	The significance will be low due to the scale and current alignment to be used.
1.20	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	Yes	There will be temporary bypasses constructed.	The significance is likely to be low due to the temporary nature of the activities.
1.21	New or diverted transmission lines or pipelines?	No		
1.22	Impoundment, damming, culverts, realignment or other changes to the hydrology of watercourses or aquifers?	No		
1.23	Stream crossings?	Yes	Various streams and oshanas will be crossed.	The significance is low because off their current existence.
1.24	Abstraction or transfers of water from ground or surface waters?	Yes	Water will be extracted for the construction phase of the project.	Water from the oshanas and water in old borrow pits will be used but the significance will be low.
1.25	Changes in water bodies or the land surface affecting drainage or run-off?	No		
1.26	Transport of personnel or materials for construction, operation or commissioning?	Yes	People and materials will be transported for the construction the access roads.	No significance.
1.27	Long term dismantling or decommissioning or restoration works?	No		
1.28	Ongoing activity during decommissioning which could have an impact on the environment?	No		
1.29	Influx of people to an area in either temporarily or permanently?	No		
1.30	Introduction of alien species?	No		

1.31	Loss of native species or genetic diversity?	Yes	Surface disturbances always impact on the bio-diversity of an area.	There might be low significant impact on the genetic diversity.
1.32	Any other actions?	No		

2. Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply?

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
2.1	Land especially undeveloped or agricultural land?	Yes	During construction, geological materials will be used for the filling. Soils will be affected and might therefore impact negatively on the agricultural land.	The significance is low. The existing alignment will be followed with some small adjustments.
2.2	Water?	Yes	Water is used for domestic and construction purposes.	The available water will be used but the significance might be low due to the volumes available.

3. Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
3.1	Will the project involve use of substances or materials which are hazardous or toxic to human health or the environment (flora, fauna, and water supplies)?	Yes	Hydrocarbons always pose a risk to the environment.	Water and soils are normally affected by spillages of hydrocarbons. The significance might be high without mitigation measures.
3.2	Will the project result in changes in occurrence of disease or affect disease vectors (eg insect or water borne diseases)?	No		
3.3	Will the project affect the welfare of people eg by changing living conditions?	?	There is always a risk of altered quality with regards to living conditions of the adjacent people and the environment. This is with reference to HIV/AIDS.	The significance of such risks can be mitigated, ensuring low impact significance.
3.4	Are there especially vulnerable groups of people who could be affected by the project eg hospital patients, the elderly?	Yes	The proposed access roads will impact positively on the vulnerable groups due to improved mobility network and increased safety.	Positive medium significance.

3.5	Any other causes?	No		
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4. Will the Project produce solid wastes during construction or operation or decommissioning?

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
4.1	Spoil, overburden or mine wastes?	Yes	Spoils will be generated during construction affecting the aesthetics appeal of the area.	No. This activity can be mitigated very successfully. Low significance.
4.2	Municipal waste (household and or commercial wastes)?	Yes	Domestic waste will be generated.	No. The domestic waste can be managed.
4.3	Hazardous or toxic wastes (including radioactive wastes)?	Yes	Used oils and old batteries.	Mitigation measures are important to manage the handling and disposal of used oils and old batteries.
4.4	Other industrial process wastes?	No		
4.5	Surplus product?	No		
4.6	Sewage sludge or other sludge from effluent treatment?	Yes	Sewage is produced at the construction camps.	Sewage is always a very important impact that might have a negative impact on soils, water and health and safety.
4.7	Construction or demolition wastes?	No		
4.8	Redundant machinery or equipment?	No		
4.9	Contaminated soils or other material?	Yes	There is always a possibility that contamination of soils can occur during operation due to spillage of oils / diesel.	No. The scale of contamination is very limited and can be mitigated.
4.10	Agricultural wastes?	No		
4.11	Any other solid wastes?	No		

5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
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5.1	Emissions from combustion of fossil fuels from stationary or mobile sources?	Yes	Gasses such as Nox and Sox are deposited in the air from the machines.	No. The quantity of these gasses will not impact negatively on the environment.
5.2	Emissions from production processes?	No		
5.3	Emissions from materials handling including storage or transport?	No		
5.4	Emissions from construction activities including plant and equipment?	Yes	The movement from vehicles will generate dust and gaseous emissions as well as the crusher plant.	The impacts might be significant if not managed properly.
5.5	Dust or odours from handling of materials including construction materials, sewage and waste?	Yes	Dust from mineral handling and transport.	Yes. Dust might be a nuisance to receptors.
5.6	Emissions from incineration of waste?	No		
5.7	Emissions from burning of waste in open air (eg slash material, construction debris)?	No		
5.8	Emissions from any other sources?	No		

6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
6.1	From operation of equipment eg engines, ventilation plant, crushers?	Yes	The mining of borrow pits and production equipment produces noise and vibrations	No. The ambient receptors are minimal. The Health and Safety within close distance must be noted.
6.2	From industrial or similar processes?	No		
6.3	From construction or demolition?	Yes	Construction might produce noise.	Low significance.
6.4	From blasting or piling?	No		
6.5	From construction or operational traffic?	Yes	The hauling trucks will produce noise and vibration.	No. The impact is very local and is not significant.
6.6	From lighting or cooling systems?	No		

6.7	From sources of electromagnetic radiation (consider effects on nearby sensitive equipment as well as people)?	No		
6.8	From any other sources?	No		

7. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
7.1	From handling, storage, use or spillage of hazardous or toxic materials?	Yes	Spillage of oils and other hydrocarbon may affect the water and soil.	No. Mitigation measures will limit the risk and therefore the significance.
7.2	From discharge of sewage or other effluents (whether treated or untreated) to water or the land?	Yes	Effluent at the construction site might impact negatively on the surface water, soils and health and safety of the workforce.	Should the sewage not be properly managed the negative impact might be significant.
7.3	By deposition of pollutants emitted to air, onto the land or into water?	Yes	Gasses from the machines.	No. The volumes of emissions are limited.
7.4	From any other sources?	No		
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No		

8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment?

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous or toxic substances?	No		
8.2	From events beyond the limits of normal environmental protection eg failure of pollution control systems?	No		

8.3	From any other causes?	No		
8.4	Could the project be affected by natural disasters causing environmental damage (eg floods, earthquakes, landslip, etc)?	Yes	Floods are a real treat in this region and could affect the human environment.	The significance might be low due to proper warning systems. The floods are usually not associated with flash flooding.

9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
9.1	Changes in population size, age, structure, social groups etc?	No		
9.2	By resettlement of people or demolition of homes or communities or community facilities eg schools, hospitals, social facilities?	No		
9.3	Through in-migration of new residents or creation of new communities?	?	In-migration of people might be a possibility.	The significance is unsure.
9.4	By placing increased demands on local facilities or services eg housing, education, health?	No		
9.5	By creating jobs during construction or operation or causing the loss of jobs with effects on unemployment and the economy?	Yes	The local and larger community will benefit from the construction phase.	The significance might be positive medium due job creation and increased mobility.
9.6	Any other causes?	No		

10. Are there any other factors which should be considered such as consequential development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality?

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
10.1	Will the project lead to pressure for consequential development which could have significant impact on the environment eg more housing, new roads, new supporting industries or utilities, etc?	Yes	New access roads will be constructed which will benefit the communities. Access to schools and clinics will have a long term positive effect.	The significance will be positive but the extent uncertain.

10.2	<p>Will the project lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment eg:</p> <ul style="list-style-type: none"> • supporting infrastructure • housing development • extractive industries • supply industries • other? 	Yes	No.	
10.3	Will the project lead to after-use of the site which could have an impact on the environment?	No		
10.4	Will the project set a precedent for later developments?	No		
10.5	Will the project have cumulative effects due to proximity to other existing or planned projects with similar effects?	No		

PART TWO OF THE SCOPING CHECKLIST: CHARACTERISTICS OF THE PROJECT ENVIRONMENT

For each project characteristic identified in Part 1 consider whether any of the following environmental components could be affected.

<p>Question - Are there features of the local environment on or around the Project location which could be affected by the Project?</p> <ul style="list-style-type: none"> • There are no areas protected by law in the vicinity of the proposed site. • No areas were identified that could be regarded as sensitive with reference to bio-diversity or historic importance. • There is a low possibility of features of high historic or cultural importance. • Surface drainage patterns will be addressed through proper engineering design.
<p>Question - Is the Project in a location where it is likely to be highly visible to many people?</p> <p>The access roads will be travelled extensively but the distances are very short and there are existing routes to the facilities.</p>
<p>Question - Is the Project located in a previously undeveloped area where there will be loss of Greenfield land?</p> <p>No, the road will be constructed on existing track to the facilities.</p>
<p>Question - Are there existing land uses on or around the Project location which could be affected by the Project?</p> <p>There will be a few borrow pits that will be opened but will not affect the existing land uses significantly.</p>
<p>Question - Are there any plans for future land uses on or around the location which could be affected by the Project?</p> <p>No.</p>
<p>Question - Are there any areas on or around the location which are densely populated or built-up, which could be affected by the Project?</p> <p>There are no densely populated areas around the project, only agricultural activities and dwellings.</p>
<p>Question - Are there any areas on or around the location which are occupied by sensitive land uses which could be affected by the Project?</p> <p>No.</p>
<p>Question - Are there any areas on or around the location which contain important, high quality or scarce resources which could be affected by the Project?</p> <p>There are no scarce resources found around the project that could be influenced by the construction or operational phases of these access roads.</p>
<p>Question - Are there any areas on or around the location of the Project which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?</p> <p>No. The area has been subject to agricultural and semi-urban activities.</p>
<p>Question - Is the Project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present environmental problems?</p> <p>Yes, Flooding is a real possibility during the rainy season. No other environmental problems are envisaged.</p>
<p>Question - Is the Project likely to affect the physical condition of any environmental media?</p> <p>No, the proposed project will be constructed on the existing alignment.</p>

Question - Are releases from the Project likely to have effects on the quality of any environmental media?

- The air quality might deteriorate due to dust generation during construction but will improve during operation.
- The quality of soil might deteriorate without proper management.
- Acidification of soils or waters will probably not occur.
- There will be some noise generated during the construction and operational phase of the road, but will be limited to the site.

Question - Is the Project likely to affect the availability or scarcity of any resources either locally or globally?

- The project will use fossil fuels in liquid (diesel).
- Water will be used for dust suppression, construction and domestic use.
- The quarrying activity extracts minerals on a non-renewable basis.

Question - Is the Project likely to affect human or community health or welfare?

- The quality of air will be affected due to construction activities and hauling. Even though this is the case, human health might not be problematic.
- No mortality or morbidity might be experienced by human receptors.
- The project will have a positive impact on the social economic welfare of the region.

In the Scoping checklist, the significance must be indicated. To facilitate this procedure, the following questions were considered during the rating:

Questions that were considered to determine significance:

1. Will there be a large change in environmental conditions?
2. Will new features be out-of-scale with the existing environment?
3. Will the effect be unusual in the area or particularly complex?
4. Will the effect extend over a large area?
5. Will there be any potential for trans frontier impact?
6. Will many people be affected?
7. Will many receptors of other types (fauna and flora, businesses, facilities) be affected?
8. Will valuable or scarce features or resources be affected?
9. Is there a risk that environmental standards will be breached?
10. Is there a risk that protected sites, areas, features will be affected?
11. Is there a high probability of the effect occurring?
12. Will the effect continue for a long time?
13. Will the effect be permanent rather than temporary?
14. Will the impact be continuous rather than intermittent?
15. If it is intermittent will it be frequent rather than rare?
16. Will the impact be irreversible?
17. Will it be difficult to avoid, or reduce or repair or compensate for the effect?

7.2 ENVIRONMENTAL IMPACT ASSESSMENT SUMMARY

The following environmental impacts were identified during the assessment procedure as described above. The impacts are classified as either positive or negative and the significance ratings as low, medium and high.

Activity	Aspect / Impact	Positive / Negative	Significance
Land use / topography, and land use cover.	The quarry operations will permanently alter the land use, land cover and, for the borrow pits - topography of the area.	Negative	Low
Clearance of existing land, vegetation and buildings.	Clearing of vegetation for construction operations influencing the vegetation, soils and topography.	Negative	Low
Creation of new land uses.	New access roads will be constructed to facilities such as schools and clinics. Even though this is the case, these new roads will most probable be constructed on existing access roads with few exceptions.	Negative	Low
Construction activities.	During construction aspects such as social, soil, surface water, vegetation and geology can be affected.	Negative	Low
Temporary sites used for construction works or housing of construction workers?	A temporary construction camp will probably be constructed where water and waste management are the most important activities that need to be mitigated.	Negative	Low
Above ground buildings, structures or earthworks including linear structures cut and fill or excavations.	The above ground earthworks will be regarded as primarily for the road construction. Permanent changes will take place (land use).	Negative	Low
Facilities for storage of goods or materials.	Pollution of soils and water.	Negative	Medium
New road, rail or sea traffic during construction or operation?	Limited traffic increase due to movement of construction vehicles.	Negative	Low
Impoundment, damming, culverts, realignment or other changes to the hydrology of watercourses or aquifers.	This aspect is probably of greatest concern for this project. The road will be built on a flood plain to the east.	Negative	Low
Stream crossings?	Various streams on the flood plain will be crossed.	Negative	Low
Loss of native species or genetic diversity?	Surface disturbances always impact on the bio-diversity of an area.	Negative	Low

Resources such as land and water.	Very limited agricultural land will be affected due to the construction of the road.	Negative	Low
	Water is used for domestic and construction purposes.	Negative	Low
Will the project involve use of substances or materials which are hazardous or toxic to human health or the environment (flora, fauna, and water supplies)?	Hydrocarbons always pose a risk to the environment.	Negative	Medium
Will the project affect the welfare of people eg by changing living conditions?	The proposed access roads will impact positively on the vulnerable groups due to improved mobility network	Positive	Medium
Pollution on site (domestic and construction waste).	Pollution of the natural environment (soil and water).	Negative	Low
Sewage sludge or other sludge from effluent treatment?	Sewage is produced at the construction camp.	Negative	Medium
Contaminated soils or other material.	There is always a possibility that contamination of soils can occur during operation due to spillage of oils / diesel.	Negative	Medium
Emissions from combustion of fossil fuels from stationary or mobile sources	Gasses such as Nox and Sox are deposited in the air from the machines.	Negative	Low
	The movement from vehicles will generate dust and gaseous emissions.	Negative	Medium
Could the project be affected by natural disasters causing environmental damage (eg floods, earthquakes, landslip, etc)?	Floods are a real treat in this region and could affect the human environment.	Negative	Medium
By creating jobs during construction or operation or causing the loss of jobs with effects on unemployment and the economy?	The local community will benefit from the construction phase through additional employment opportunities.	Positive	Medium
Will the project lead to pressure for consequential development which could have significant impact on the environment eg more housing, new roads, new supporting industries or utilities, etc?	New access roads will be constructed which will benefit the communities by improving access to schools, clinics and churches.	Positive	Medium

Will the project lead to development	Access improvement to facilities in the region will benefit the local and regional communities.	Positive	Medium
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8. ANALYSIS OF ALTERNATIVES

The following alternatives were considered during the planning phase of the proposed project:

8.1 HORIZONTAL ALIGNMENT OF THE ROADS:

Various alignment alternatives were considered during the planning phase. Final decisions were made by taking into consideration the needs of the I&AP's as well as the best alternatives routes to avoid flooding during the rainy season.

8.2 CONSTRUCTION METHOD

The use of heavy duty machines were the only considered means of construction. Hand labour will be done where possible.

8.3 CONSTRUCTION MATERIALS

Various areas were prospected to identify suitable materials for the construction of this road. The availability of suitable material is very important and various alternative sites have been identified for these materials.

8.4 THE "NO-GO" OPTION

If this option is executed the status quo of the environment will prevail. Access to these facilities will still be restricted during the rainy season.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Program (ESMP) will be implemented during construction. The ESMP is intended to bridge the gap between the Environmental Impact Assessment (EIA) and the implementation of the project, particularly with regard to implementing the mitigation measures recommended in the Environmental Impact Assessment (EIA). Monitoring, auditing and taking corrective actions during implementation are crucial interventions to successfully implement the ESMP.

The ESMP detail actions to ensure compliance with regulatory bodies and that environmental performance is verified through information on impacts as they occur.

ESMP implementation is a cyclical process that converts mitigation measures into actions and through cyclical monitoring, auditing, review and corrective action, ensures conformance with stated ESMP aims and objectives. Through monitoring and auditing, feedback for continual improvement in environmental performance must be provided and corrective action taken to ensure that the ESMP remains effective.

9.1 ESMP ADMINISTRATION

Copies of the ESMP shall be kept at the site office and will be distributed to all senior contract personnel. All senior personnel shall be required to familiarize themselves with the contents of this document.

9.2 ROLES AND RESPONSIBILITIES

The implementation of the ESMP requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during each phase.

Engineer's Representative (ER)

The Engineer will delegate powers to the Engineer's Representative (ER) on site who would act as the Employer's implementing agent and has the responsibility to ensure that the Employer's responsibilities are executed in compliance with relevant legislation and the ESMP. The Engineer also has the responsibility to approve the appointment of the Environmental Control Officer (ECO).

Any on-site decisions regarding environmental management are ultimately the responsibility of the ER. The ER will have the following responsibilities in terms of the implementation of this ESMP:

- Controlling that the necessary environmental authorizations and permits have been obtained by the Contractor.
- Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO (Environmental Control Officer) where necessary.
- Taking appropriate action if the specifications are not followed.

- Ordering the removal of person(s) and/or equipment not complying with the EMP specifications.
- Recommending and issuing fines for transgressions of site rules and penalties for contravention of the ESMP.
- Advising on the removal of person(s) and/or equipment not complying with the specifications.
- Auditing the implementation of the ESMP and compliance with authorization on a monthly basis.
- Undertaking a continual review of the ESMP and recommending additions and/or changes to the document after completion of the contract.

Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) will be a competent person from the staff of Contractor to implement the on-site environmental management of this ESMP by the Contractor. The ECO shall be on site daily and the ECO's duties will include the following:

- Assisting the ER in ensuring that the necessary environmental authorizations and permits have been obtained.
- Maintaining open and direct lines of communication between the ER, Employer, Contractor and interested and affected parties (I&APs) with regard to environmental matters.
- Convening and facilitating public meetings.
- Regular site inspections of all construction areas with regard to compliance with the ESMP.
- Monitoring and verifying adherence to the ESMP, monitoring and verifying that environmental impacts are kept to a minimum.
- Assisting the Contractor in finding environmentally responsible solutions to problems.
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel coming onto site.

9.3 ENVIRONMENTAL AWARENESS TRAINING

Before any work is commenced on the Site, the Contractor shall ensure that adequate environmental awareness training of senior site personnel takes place and that all construction workers receive an induction presentation on the importance and implications of the ESMP. The Contractor shall liaise with the Engineer during establishment phase to fix a date and venue for the training and to agree on the training content.

The Contractor shall provide a suitable venue and ensure that the specified employees attend the course. The Contractor shall ensure that all attendees sign an attendance register, and shall provide the ER with a copy of the attendance register. The presentation shall be conducted, as far as is possible, in the employees' language of choice.

As a minimum, training should include:

- Explanation of the importance of complying with the ESMP.
- Discussion of the potential environmental impacts of construction activities.
- The benefits of improved personal performance.
- Employees' roles and responsibilities, including emergency preparedness.
- Explanation of the mitigation measures that must be implemented when carrying out their activities.
- Explanation of the specifics of this ESMP and its specification (no-go areas, etc.)
- Explanation of the management structure of individuals responsible for matters pertaining to the ESMP.
- The contractor shall keep records of all environmental training sessions, including names, dates and the information presented.

9.4 PUBLIC PARTICIPATION

An on-going process of public participation shall be maintained during construction to ensure the continued involvement of interested and affected parties (I&APs) in a meaningful way. Public meetings to discuss progress and any construction issues that may arise shall be held at least every two months and more regularly if deemed necessary by the ER. These meetings shall be arranged by the ECO but shall be facilitated by the ER. The Contractor shall present a progress report at each public meeting. All I&APs that participated in or were informed during the EIA shall be invited to each of the public meetings.

9.5 ENVIRONMENTAL MITIGATION MEASURES

The following mitigation measures are sufficient to reduce or avoid negative impacts associated with the construction of a road. It is based on the activities mentioned in this report that will occur during the construction phase of the project:

COMPONENT	OBJECTIVE	MANAGEMENT MEASURES	RESPONSIBILITY/ PARTNERSHIPS
9.5.1 MANAGEMENT AND MONITORING	To ensure that the provisions of the ESMP are implemented during construction.	<ul style="list-style-type: none"> a. The environmental and social consultant shall ensure that all aspects of the ESMP are implemented during construction. b. The environmental and social consultants shall attend regular site inspections and meetings and minutes shall make provision for reporting on every aspect of the ESMP. 	Environmental and social consultant together with the ECO.
9.5.2 COMMUNICATION AND STAKEHOLDER CONSULTATION	To ensure that all stakeholders are adequately informed throughout construction and that there is effective communication with and feedback to the consultant and client.	<ul style="list-style-type: none"> a. The Contractor shall appoint an ECO from the construction team to take responsibility for the implementation for all provisions of this ESMP and to liaise between the contractor, community, client and consultants. The ECO must be appointed at least 14 days after the site-handover. b. The Contractor shall at every site meeting report on the status of the implementation of all provisions of the ESMP. c. The contractor shall implement the environmental awareness training as stipulated in Section 9.3 above. d. The Contractor shall liaise with the social and environmental consultants regarding all issues related to community consultation and negotiation as soon as possible after construction commences. 	Contractor/ Environmental and Social Consultant to monitor.
9.5.3 HEALTH AND SAFETY	To ensure health and safety of workers and the public at all times during construction	<ul style="list-style-type: none"> a. The Contractor shall submit a strategy to ensure the least possible disruption to traffic and potential safety hazards during construction. b. The strategy should include a schedule of work indicating when and how road crossings (construction at existing intersections) will be made. The schedule should be updated and distributed to all stakeholders. c. The Contractor shall also liaise with the Traffic Authorities in this regard. d. Proper traffic and safety warning signs must be placed at the construction site to 	Contractor will ensure the mitigation measures are enforced at his own expense. The ECO will monitor.

COMPONENT	OBJECTIVE	MANAGEMENT MEASURES	RESPONSIBILITY/ PARTNERSHIPS
		<p>the satisfaction of the Engineer and the Roads Authority.</p> <ul style="list-style-type: none"> e. The Contractor must adhere to the regulations pertaining to Health and Safety, including the provision of protective clothing, failing which the Contract may be temporarily suspended until corrective actions were taken. f. Dust protection masks shall be provided to task workers if they complain about dust. g. Surface dust will be contained by wetting dry surfaces periodically with a water bowser, sprinkler system or any suitable method. This applies for the construction site as well as all the roads. h. Potable water shall be available to workers to avoid dehydration. This water shall be of acceptable standards to avoid any illness. At least 3 litres of drinking water per person per day shall be made available during construction. i. The contractor shall enforce relevant Health and Safety Regulations for these specific activities. j. The contractor shall also comply with relevant Labour Laws as stipulated by the Labour Act. k. The Contractor shall implement a HIV/AIDS awareness programme as part of Health and Safety. l. Blasting may only be conducted by a qualified person and all laws and regulations will be enforced before and during blasting. Blasting must be done in accordance with Clause 1222 of the Standard Specification of the Roads Authority of Namibia. 	
9.5.4 CONSERVATION OF THE NATURAL AND HISTORICAL ENVIRONMENT	<p>To minimise damage to soil, vegetation and historical resources during the construction phase. This includes soil crusting, soil erosion and unnecessary</p>	<ul style="list-style-type: none"> a. At the outset of construction (or during construction as may be applicable), the ECO and the contractor shall visit all proposed borrow-pits, haul roads, access roads, camp sites, and other areas to be disturbed outside the road reserve. Areas to be disturbed shall be clearly demarcated, and no land outside these areas shall be disturbed or used for construction activities. b. Detailed instructions and final arrangements for protection of sensitive areas, keeping of topsoil and rehabilitation of disturbed areas shall be made, in line with 	<p>Contractor will ensure the mitigation measures are enforced at his own expense.</p> <p>The ECO will</p>

COMPONENT	OBJECTIVE	MANAGEMENT MEASURES	RESPONSIBILITY/ PARTNERSHIPS
	<p>vegetation destruction.</p> <p>Management of water (domestic and construction).</p>	<p>the guidelines in this document. The ECO shall be consulted before any new areas are disturbed which have not yet been visited.</p> <ul style="list-style-type: none"> c. No off-road driving shall be allowed, except on the agreed haul and access roads. d. Vegetation shall be cleared within the road reserve as necessary for the construction of the road, while trees with a trunk diameter exceeding 500 mm (1 meter above ground) shall be left intact. The reserves on either sides of this corridor may not be cleared of vegetation, unless permission is given to do so for detours or access roads. This measure is subjected to the Roads Authority of Namibia specifications with regards to the road reserve. e. A prescribed penalty will be deducted from the Contractors payment certificate for every mature tree removed without approval. f. No trees may be felled or live wood in the project area removed by any member of the construction team, including sub-contractors. Contravention of this arrangement is liable for a prescribed penalty. g. A prescribed penalty will be deducted from the contractor's payment certificate if it is shown that trees and/or branches have been broken down willfully and unnecessarily, or that any plants have been collected illegally, by any of the staff or sub- contractors. h. Trees that need to be trimmed should be done so with the right equipment and aesthetical acceptable. The use of any type of saw is obligatory and the branches of trees will not be broken off by the use of other machinery. i. Where topsoil is available, this must be stockpiled separately in 1,00 m high piles and this used to cover the damaged areas outside the road reserve such as access roads to borrow pits, and clearing and grubbing areas. j. Where compaction has taken place in disturbed areas, these areas must be ripped and covered with topsoil separately kept for this purpose. k. Poaching or collecting of wild animals is prohibited unless a permit has been obtained for legal hunting purposes. l. The killing of any animal (reptile, bird or mammal) is prohibited, unless for legal 	<p>monitor.</p>

COMPONENT	OBJECTIVE	MANAGEMENT MEASURES	RESPONSIBILITY/ PARTNERSHIPS
		<p>hunting purposes.</p> <p>m. A prescribed penalty will be deducted from the contractor's payment certificate if it is shown that any of his staff or sub-contractors are involved in trapping, hunting or any kind of collecting of wild animals in the vicinity of the work sites. Offenders will be handed to the authorities for prosecution.</p> <p>n. Pipelines for the pumping of construction water shall as far possible run within the road reserve and along existing tracks and other roads.</p> <p>o. Water will not be allowed to be wasted. This includes water required for construction and domestic purposes.</p>	
<p>9.5.5 BORROW PIT MANAGEMENT AND REHABILITATION</p>	<p>To ensure proper soil management (combat soil erosion and promote biological activities).</p> <p>Preserve and manage natural vegetation.</p> <p>To ensure health and safety around the borrow pits (decommissioning phase).</p> <p>To stimulate ecological processes after decommissioning (to stimulate vegetation and other biological activities).</p> <p>To establish borrow pits which is aesthetically pleasing after decommissioning.</p>	<p>a. The removal of material at borrow-pit sites shall be focused where the least significant vegetation exists. If material is only available around significant mature trees (more than 500 cm circumference – 1 meter above ground), clusters of trees should be preserved while suitable material is excavated around them. A 3 meter buffer must be conserved around the cluster of mature trees. The ER shall visit all proposed borrow-pit areas and indicate where and how material may be removed, before works commence. A cluster constitutes 5 or more trees in close proximity (within 20m radius).</p> <p>b. The Contractor shall use safety tape to mark these tree clusters as to avoid confusion or miss-understandings.</p> <p>c. The Engineers and surveyors must draft a plan for approval before commencement of a borrow pit. This plan must indicate the required resources and sensitive areas that may not be mined (indication of the mature trees).</p> <p>d. The borrow pit areas will be clearly marked by using brightly painted markers. These markers will demarcate the area where materials might be removed and stored.</p> <p>e. All borrow-pits must be rehabilitated.</p> <p>f. The contractor shall liaise with the applicable local headmen OR residents regarding whether their borrow-pits shall be shaped as water reservoirs during rehabilitation.</p>	<p>Contractor will ensure the mitigation measures are enforced at his own expense.</p> <p>The ECO will monitor.</p>

COMPONENT	OBJECTIVE	MANAGEMENT MEASURES	RESPONSIBILITY/ PARTNERSHIPS
		<ul style="list-style-type: none"> g. At those borrow-pits not to be shaped as reservoirs, topsoil (the top layer of organic material, even if the topsoil is non-existent, the top layer of organic material) at borrow pits shall be stockpiled separately and the stockpile maintained for use at the end of the contract to rehabilitate the borrow pits. h. The top soil shall be marked as to inform the machine operators that the material is top soil and should be left alone for rehabilitation purposes. i. The borrow pits shall be rehabilitated by trimming the sides to a slope not steeper than 18° (1:3) and evenly spreading the top soil over the slopes to allow for the growth of new vegetation. j. All spoil material at the borrow pits shall be neatly shaped and no loose material (oversized) will be left inside the borrow pits. k. Access to borrow pits shall be controlled (using gates or manned positions). l. The borrow pit floor shall be levelled evenly as part of rehabilitation. m. A Borrow Pit Rehabilitation Plan will be compiled indicating the rehabilitation schedule (time-frames) for the various borrow pits to be rehabilitated. n. After the borrow pit has been rehabilitated, the Rehabilitation Checklist will be completed and signed by the relevant parties (See Appendix B). 	
9.5.6 WASTE AND POLLUTION MANAGEMENT	<p>To avoid contribution to potential surface and groundwater pollution.</p> <p>To avoid contribution to potential soil pollution.</p> <p>To ensure that sound waste management practices are adhered to during construction.</p>	<ul style="list-style-type: none"> a. Construction rubble and other waste generated during construction will be disposed of on a regular basis at an approved waste disposal site. A temporary waste site may be demarcated for temporary storage of waste, but this area will be identified and clearly marked. b. The temporary domestic waste site will be fenced off with access control to the area. c. Adequate separate containers for hazardous and domestic waste will be provided on site and at the construction camp. d. The workforce will be sensitised to dispose of waste in a responsible manner and not to litter. e. Waste bins will be placed in and around the construction site to facilitate proper waste management. f. No waste may remain on site after completion of the project. 	<p>Contractor will ensure the mitigation measures are enforced at his own expense.</p> <p>The ECO will monitor.</p>

COMPONENT	OBJECTIVE	MANAGEMENT MEASURES	RESPONSIBILITY/ PARTNERSHIPS
		<ul style="list-style-type: none"> g. Toilet facilities will be available in the following ratio: 2 toilets for every 50 females and one toilet for every 50 males. The toilets should be such that it can be transported for various site selections and to be emptied at an approved sewage site. No person should have to walk more than 1km for the use of a toilet. h. A demarcated vehicle service area will be provided. This area will have an impermeable floor, oil trap and dedicated wash bay area. All used water will first run through the oil trap before the effluent is allowed to exit. The oil trap will be cleaned on a regular basis to ensure its efficiency. i. Servicing of vehicles is only permitted in the demarcated vehicle service area, except for large immobile vehicles which may be serviced on site, on condition that oils and lubricants are prevented from spilling through the use of drip trays or other suitable containers. j. Drip trays will be available for all vehicles that are intended to be used during construction. These trays will be placed underneath each vehicle while the vehicles are parked. The drip trays will be cleaned every morning and the spillage handled as hazardous waste. k. Machines operating during the day that shows signs of excess leaking (verified by ECO or ER) should be withdrawn from the task and repaired by the contractor. l. Accidental spills will be cleaned immediately. The contaminated soil will be suitably disposed of in a container suitable for hazardous waste. 	
		<ul style="list-style-type: none"> m. Oil, lubricants, and other hazardous materials will be stored in separate containers (concrete liner, container, or metal or plastic drip tray) and stored for transport and disposal at an approved waste disposal site or for collection by an oil recycling company such as WESCO Salvage (this company collects significant quantities of oil from central locations throughout the country). n. Fuel tanks on site will be properly bunded. The volume of the bunded area will be sufficient to hold 1.5 times the capacity of the storage tanks. The floor of the bunded area will be impermeable and the sides high enough to achieve the 1.5 times holding capacity. There will be a valve installed in the bunded area to allow 	

COMPONENT	OBJECTIVE	MANAGEMENT MEASURES	RESPONSIBILITY/ PARTNERSHIPS
		<p>rain water drainage.</p> <p>o. Foam fire extinguishers will be in close proximity to fuel kept on site. There will be trained personnel to handle this equipment. At least two extinguishers will be placed at every fuel storage area.</p>	
9.5.7 REHABILITATION OF CONSTRUCTION SITE, SERVITUDES AND CLEARED AREAS (WHICH INCLUDES STOCKPILES)	<p>To rehabilitate the site office, work sites, servitude areas, tracks and other areas disturbed during construction as close to their original state as reasonably possible.</p>	<p>a. All bunded areas, equipment, waste, temporary structures, stockpiles etc. must be removed from the camp and work sites.</p> <p>b. All disturbed areas shall be reshaped to their original contours; as close as possible to the natural conditions before construction commenced, including the road reserve, detours, construction camps, and temporary access routes.</p> <p>c. Alien vegetation particularly the Downy thorn apple (<i>Datura innoxia</i>) and Wild tobacco (<i>Nicotiana glauca</i>) that occur in the project corridor must be weeded.</p> <p>d. All cuttings must be shaped with a slope to provide a natural appearance, without having to destroy significant vegetation on top of the slope (this applies to big trees as mentioned in the ESMP only).</p> <p>e. Existing borrow pits adjacent to main roads need also be rehabilitated during rehabilitation phase.</p>	<p>Contractor will ensure the mitigation measures are enforced at his own expense.</p> <p>The ECO will monitor.</p>

A) Procedures

The Contractor shall comply with the environmental specifications and requirements on an on-going basis and any failure on his part to do so will entitle the ER to impose a penalty. In the event of non-compliance the following recommended process shall be followed:

- The ER shall issue a notice of non-compliance to the Contractor through the ECO, stating the nature and magnitude of the contravention.
- The Contractor shall act to correct the non-conformance within 24 hours of receipt of the notice, or within a period that may be specified within the notice.
- The Contractor, through the ECO, shall provide the ER with a written statement describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions.
- In the case of the Contractor failing to remedy the situation within the predetermined time frame, the Engineer shall impose a monetary penalty based on the conditions of contract.
- In the case of non-compliance giving rise to physical environmental damage or destruction, the Engineer shall be entitled to undertake or to cause to be undertaken such remedial works as may be required to make good such damage and to recover from the Contractor the full costs incurred in doing so.
- In the event of a dispute, difference of opinion, etc. between any parties with regard to or arising out of interpretation of the conditions of the ESMP, disagreement regarding the implementation or method of implementation of conditions of the ESMP, etc. any party shall be entitled to require that the issue be referred to specialists for determination.
- The Engineer shall at all times have the right to stop work and/or certain activities on site in the case of non-compliance or failure to implement remedial measures.

B) Offences and Penalties

Where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications, he shall be liable to pay a penalty fine over and above any other contractual consequence.

The Contractor is deemed NOT to have complied with this Specification if:

- a. within the boundaries of the site, site extensions and haul/access roads there is evidence of contravention of the Specification;
- b. environmental damage due to negligence;
- c. the Contractor fails to comply with corrective or other instructions issued by the ER within a specific time;
- d. the Contractor fails to respond adequately to complaints from the public.

Penalties for the activities detailed below, will be imposed by the ER on the Contractor and/or his Subcontractors:

- | | |
|-------------------------------------|---|
| a. Actions leading to erosion | A penalty equivalent in value to the cost of rehabilitation plus 20% |
| b. Oil spills | A penalty equivalent in value to the cost of clean-up operation plus a N\$ 3000 fine. |
| c. Damage to indigenous vegetation | A penalty equivalent in value to the cost of restoration plus N\$ 5 000 |
| d. Damage to sensitive environments | A penalty equivalent in value to the cost of restoration plus N\$ 5 000 |
| e. Damage to cultural sites | A penalty to a maximum of N\$100 000 shall be paid for any damage to any cultural/ historical sites |
| f. Damage to trees | A penalty to a maximum of N\$15 000 shall be paid for each tree removed without prior permission, or a maximum of N\$5 000 for damage to any tree, which is to be retained on site. |
| g. Damage to natural fauna | A penalty to a maximum of N\$5 000 for damages to any natural occurring |

animals.

- h. Any persons, vehicles, plant, or thing related to the Contractors operations within the designated boundaries of a "no-go" area N\$4,000
- j. Litter on site N\$1,000
- k. Deliberate lighting of illegal fires on site N\$ 5,000
- l. Any person, vehicle, item of plant, or anything related to the Contractors operations causing a public nuisance N\$1,000

- Penalties may be issued per incident at the discretion of the Engineer. The Engineer will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract.
- For each subsequent similar offence the fine may, at the discretion of the ER, be doubled in value to a maximum value of N\$10, 000.
- Payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.
- In the case of a dispute in terms of this section, the Engineer shall determine as to what constitutes a transgression in terms of this document.

9.7 ENVIRONMENTAL MONITORING AND AUDITING

Environmental audits should be conducted at least once every three months during construction. Benefits derived from the audit process might include:

- identification of environmental risk;
- development or improvement of the environmental management system;
- avoidance of financial loss;
- avoidance of legal sanctions;
- increase in staff awareness;
- identify potential cost savings;
- improve dealings with employees, environmental groups, the community, regulators, media, shareholders, or insurance & finance institutions; and
- establish a history of environmentally responsible operations, e.g. through environmental incident reports, environmental monitoring & recording, & reporting to committees or Authorities.

Commonly, the environmental audit of a site will cover all management procedures, operational activities & systems, and environmental issues. The environmental audit will be compiled objectively and be conducted by an independent, competent entity.

10. CONCLUSION AND RECOMMENDATIONS

This project does not pose significant environmental risks due to the fact that the environment in which the access roads are to be constructed are is very sensitive and due to the short distances of the various access roads. The various negative impacts associated with the construction of the access roads can be mitigated through effective implementation of the Environmental and Social Management Plan.

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.

Construction of access roads to clinics and schools will have a positive long term impact due to required access to facilities even during the flooding season.

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Other citations were done in the document with references.

11.1 APPENDIX A

DAILY QUESTIONS
CONSTRUCTION SITE MONITORING CHECKLIST

Construction site name _____

Environmental/Safety/Health Site Officer Name _____

Date _____

CHECK THE FOLLOWING DAILY ON THE CONSTRUCTION SITE <u>AND</u> AT THE CONTRACTOR'S CAMP				
Category 1: Personal Protective Equipment (PPE), construction site safety, access control and hazardous substance handling				
	Question	Yes	No	If no, describe action taken
1	Have all labourers working today, including sub-contractors, been fully trained in proper health and safety procedures?			
2	Have you conducted a hazard assessment of the worksite and the planned construction activities for today with the Site Foreman and reviewed the EMP/PHPSAP to identify any new issues that might come up during the day?			
3	<p>Are all labourers and staff wearing the required Personal Protective Equipment (PPE)? Minimum PPE includes:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Hard hat <input type="checkbox"/> Safety shoes <input type="checkbox"/> Overalls <p>Certain operations require additional PPE, such as:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Eye protection/goggles/visors <input type="checkbox"/> Face masks <input type="checkbox"/> Gloves <input type="checkbox"/> Ear plugs /ear muffs <input type="checkbox"/> Harnesses 			
7	Are all hazardous substances (eg fuel, paint, oil containers, cement etc) stored in an area marked by			

	danger tape or in a locked room away from public access?			
8	Are any visitors or suppliers expected to visit the construction site today? If so, ensure sufficient PPE is available for their use and that the visitors register is signed when they arrive.			
9	Are labourers and equipment a safe distance away from power lines?			
10	Are extension cords and portable tools in good condition?			
11	Is the first aid kit fully stocked and accessible in case of emergency?			
Category 2: Excavations, stockpiles, storage areas and general housekeeping				
	Question	Yes	No	If no, describe action taken
12	Have all excavations been demarcated with barrier tape (minimum requirement) or fencing if the excavation is deeper than 2m?			
13	If a trench is more than 2m deep, is there a form of protection, such as: <ul style="list-style-type: none"> <input type="checkbox"/> Sloping or benching <input type="checkbox"/> Trench box or shield <input type="checkbox"/> Shoring 			
14	Is any stockpiling taking place today? If so, ensure the stockpile is placed in an area approved by the Site Foreman and that the height does not exceed 2m and that the slopes are not steep. Is the area demarcated with barrier tape?			
15	Are all storage areas neat and tidy with no machinery, vehicles, poles, materials or nails sticking out which may cause an injury or cause someone to trip up? Have the storage areas been demarcated with barrier tape?			
16	Is the construction site in general safe and neat with no waste lying around?			

Category 3: Solid waste management				
	Question	Yes	No	If no, describe action taken
17	Are there sufficient covered waste containers in place on the construction site and in the Contractor's camp in which to store waste material?			
18	Is waste (including construction waste) being disposed of in a designated disposal area and secured to prevent soil contamination (eg plastic lining underneath the waste pile) or covered to prevent it being blown off site?			
19	Have you checked to ensure waste is not being burnt or disposed of in pits on the site?			
20	Are there any signs of accidental/negligent spills of bitumen, fuel, oil, cement, paint etc visible on the site? If so, ensure spillages are cleared and the waste is containerised for subsequent disposal. Such waste should be treated as hazardous and be appropriately sealed prior to disposal.			
21	Is waste being disposed of off-site today and is it being sent to an approved site? Note the name of the site and keep a record of approximate waste volumes or bags taken for disposal. Waste may be separated for later recycling if this is taking place at the disposal site.			
Category 4: Water management				
	Question	Yes	No	If no, describe action taken
22	Are all water taps and points functioning properly and has a paved surface been provided beneath the tap/water point to prevent erosion and channel water to a catch pit?			
23	Is cement mixing taking place within a bunded area, where excess water drains to a lined pit? Are cement mixing trays being used in confined areas?			
24	Are there any flooded areas at the site? If so, have stormwater systems been installed to manage the water drains? If groundwater is encountered in an excavation or pit, ensure the Site Foreman, RE and			

	Environmental Consultant in the Consulting team are consulted about remedial action.			
Category 5: Social aspects				
	Question	Yes	No	If no, describe action taken
25	Have community representatives been consulted about any concerns related to the construction?			
26	Are HIV/AIDS and other health posters/leaflets being displayed at the work site and have sufficient condoms (male and female) been made available? Does any new material need to be ordered?			
27	Is the general hygiene and waste management at the Contractor's camp acceptable?			
28	Is all potable water and wastewater systems working properly on the construction site and in the Contractor's camp?			
29	Have any records been kept of accidents, work related illnesses or injuries that may have occurred today?			
Category 6: Other (e.g. access roads, borrow pits, dust and noise pollution)				
	Question	Yes	No	If no, describe action taken
30	Are any construction/delivery vehicles using the access roads to the construction site or the borrow pits today? If yes, ensure no impacts have occurred at these locations as a result.			
31	Are construction activities causing any dust pollution? If so, ensure mitigation measures are implemented as per the EMP.			
32	Is construction or Contractor's camp activities causing any noise pollution? If so, ensure mitigation measures are implemented as per the EMP.			
33	Did any training (including for HIV/AIDS) or "toolbox talks" take place today? If so, has a record of attendance and the training provided been kept?			
34	Are there any other environmental aspects not mentioned above that should be mentioned for the record – eg tree/vegetation removal, rehabilitation			

	etc?			
35	Are all records pertaining to environmental management updated and on file?			

Notes in Respect of Category 1

- Ensure all excavations are secure by being sealed off with barrier tape. Should access to the excavation be required by staff, or for vehicles, machinery, building supplies or equipment, then the barrier tape should be erected nearby to prevent access to the wider construction area where the excavation is located. If the excavation is deeper than 1.5m, then consideration should be given to installing fencing or a more secure and permanent barrier to prevent access.
- All materials, machinery and equipment should also be stored in secure areas, which as a minimum have been sealed off with barrier tape. Hazardous substances (such as fuel, cement, paints etc) should be stored in structures which can be either locked or to which general access can be prevented. Adequate safety signage should be in place (and on notice-boards) to warn about use of hazardous substances or equipment.
- No poles, planks or building/waste materials should be left outside of secure/safe storage areas unless in use. Such materials should not be placed where they can be tripped over or stacked such that they could jab passers-by. Sharp ends and nails should not be protruding. Stockpiles should not exceed 2m in height.
- Vehicles and machinery should be inspected daily to check they are not spilling any fuel or oils. Where leaks are detected, they should either be sealed or drip trays placed under the point where leaks are occurring.
- At the end of the working day, the construction site should be inspected to ensure all the above mentioned matters are addressed.
- Any observations made where non-compliance with the above matters is noted should be recorded in the comments area of the checklist and the measures taken to address the problem recorded.

Notes in Respect of Category 2

- Ensure all labourers and staff are wearing the required Personal Protective Equipment (PPE). The minimum requirement is a hard hat and safety shoes. Safety glasses, visors, dust masks and gloves should be worn for activities such as welding and grinding. Scaffolding should be in place where labourers are working at a height of greater than 2m. Should gloves or a hard hat be difficult to wear for more intricate jobs (eg painting above head height), then they should still be kept at hand for use when such a task is complete. A standard overall should be worn by all employees for easy identification. Site Foremen and Team Leaders should set an example with the wearing of PPE.
- All sub-contractors should be inducted and trained regarding the EMP and they should also wear PPE.
- All visitors to the construction site should sign-in in a register, be issued with PPE and be inducted on safety matters. A record of such activity should be kept.
- No open fires should be allowed except where this is permitted for cooking and warmth purposes. Firewood should not be sourced from the environment next to the construction site.
- Ensure any fire-fighting extinguishers and first aid kits are accessible and fully operational. Emergency services contact numbers (police, ambulance, fire brigade etc) should be on hand.
- Any observations made where non-compliance with the above matters is noted should be recorded in the comments area of the checklist and the measures taken to address the problem recorded.

Notes in Respect of Category 3

- Adequate waste containers should be placed on site to prevent littering. The construction sites should be regularly checked to ensure waste has not been left to blow around the site. Waste containers should also

be capable of being closed or sealed off to prevent waste from being blown around.

- If waste can be recycled or reused in the region, then waste on site can be separated into different containers to assist in this regard. At some waste disposal sites, recyclers may be present who retrieve certain wastes for reuse. If this is noted, then separation of waste on the construction site may be warranted.
- When waste is taken to a landfill site for final disposal, if the site does not issue a record of the waste disposed, then keep a record at the construction site of the amount/volume of waste taken to the disposal site.
- No waste should be burned on site or in the waste containers, except in the case of paper and wood which can be safely burnt for fires used for cooking or warmth.
- Any spills of fuel, paint or other potentially hazardous substances should be cleaned up immediately and the waste containerised. This waste should ideally be taken to a hazardous waste site if one is available; alternatively, it should be adequately sealed for disposal at a general waste disposal site. Maintenance and washing of vehicles and equipment should take place on a hard impermeable (and preferably bunded) surface.
- Any observations made where non-compliance with the above matters is noted should be recorded in the comments area of the checklist and the measures taken to address the problem recorded.

Notes in Respect of Category 4

- Potable water should be seen as a scarce resource and not wasted. Taps should not be left open. Leaking taps should be repaired. Water should not be allowed to run away from the ground beneath the tap and erode the soil. A hard surface should be installed beneath taps and any flow of water from the area beneath the tap should be safely channelled to plants or to an area where it does not present a hazard.
- Stormwater needs to be managed during the wet season. It should not be allowed to drain into excavations, nor should it be allowed to flood areas where materials and equipment are stored. A plan should be in place to manage stormwater and this must be approved by the RE and the environmental specialists in the Consulting Team.
- Should groundwater be intercepted during excavation work or during construction activities in the wet season, the Site Foreman and RE should be informed and a plan to protect the groundwater table must be approved by the RE and the environmental specialists in the Consulting Team. Any water pumped out from excavations or construction areas must be safely disposed of with the approval of the Site Foreman and RE.
- All wastewater from construction activities and the Contractor's camp must be channelled to lined pits. This includes wastewater from vehicle wash-down and maintenance areas, from areas used to wash tools and brushes used in concrete mixing and painting and from showers and cooking areas.
- Toilets and sanitation facilities should be checked daily for health reasons and records kept of when such facilities are emptied or replaced. Soap, toilet paper and other cleansing materials should be kept in stock.
- Any observations made where non-compliance with the above matters is noted should be recorded in the comments area of the checklist and the measures taken to address the problem recorded.

Notes in Respect of Category 5

- Records should be kept of all complaints received from members of the public or local community. Key stakeholders such as headmasters of schools and community representatives should be consulted on a regular (preferably daily) basis to confirm there are no problems as a result of construction activities. The nature of any complaints should be noted together with the action taken to address the problem, including action to prevent a recurrence of the problem.

- Any observations where local community members' (or schoolchildren at school construction sites) behaviour interferes with construction staff and construction activities, or where construction staff behaviour affects community members/schoolchildren, should be noted and brought to the attention of the Site Foreman. Local livestock and wild animals should be left undisturbed.
- A supply of male and female condoms should be kept on site and records kept of when they are issued or supplies are replaced.
- Ensure posters, pamphlets and information about HIV/AIDS, STDs, TB and general health are readily available on site and placed on notice-boards.
- Records should also be kept of the number of women employed on site and any incidents where they feel they are being discriminated against in terms of access to facilities etc.
- Any observations made where non-compliance with the above matters is noted should be recorded in the comments area of the checklist and the measures taken to address the problem recorded.

Notes in Respect of Category 6

- Access roads should not be allowed to become seriously damaged or unusable as a result of construction activities.
- Borrow pits (sand mining) and the access roads to them should be restored and left safe after use.
- Any disturbances resulting in excessive dust or noise generated as a result of construction activities should be noted and mitigation measures implemented as per the EMP.
- Ensure sensitive areas (eg watercourses, boreholes, oshanas, graveyards, neighbouring land uses, mature trees and areas of undisturbed vegetation) are taped off from the construction areas and educate the staff that such areas are off-limits.
- Ensure all safety, health and environmental awareness/training records are up to date.
- Any observations made where non-compliance with the above matters is noted should be recorded in the comments area of the checklist and the measures taken to address the problem recorded.

NB. Note that completion of the checklist each day does not absolve the on-site safety, health and environmental representative(s) from ensuring all conditions in the EMP/PHSAPs are adhered to. If in doubt about actions to take, consult the full EMP/PHSAP documents which should be kept on site.

11.2 APPENDIX B

Borrow Pit Rehabilitation Checklist

Date: _____

Borrow Pit Name and Number: _____

Location (road-km / GPS coordinates): _____

The above borrow pit shall only be handed over once all of the listed criteria have been met by the contractor.

Item No.	Description	Comments	Complies
			Yes / No
1.	The floor is level and no man made topographical high or low points are present in the borrow pit		
2.	The site in and around the pit is clear of any illegal dumping of foreign material, spoils and construction waste		
3.	Gradients of the pit slopes are less than 18 degrees (1:3) and are finished perpendicular to the slopes to prevent water erosion		
4.	The slopes are covered with overburden/top soil, if available, with a thickness of not more than 300 mm		
5.	Available dead vegetation is placed on the slopes of the borrow pits		
6.	The berm of excess soil outside the pit is not higher than 1.0 m, sloped 1:3 and min. 3.0 m away from the edge of the pit and min. 9.0 m away from any structure		
7.	There are no walls or steps present in or around the borrow pit, if so, then the pit has been fenced off according to spec.		
8.	All alien vegetation has been removed from the floor, the slopes and berms of the pit		

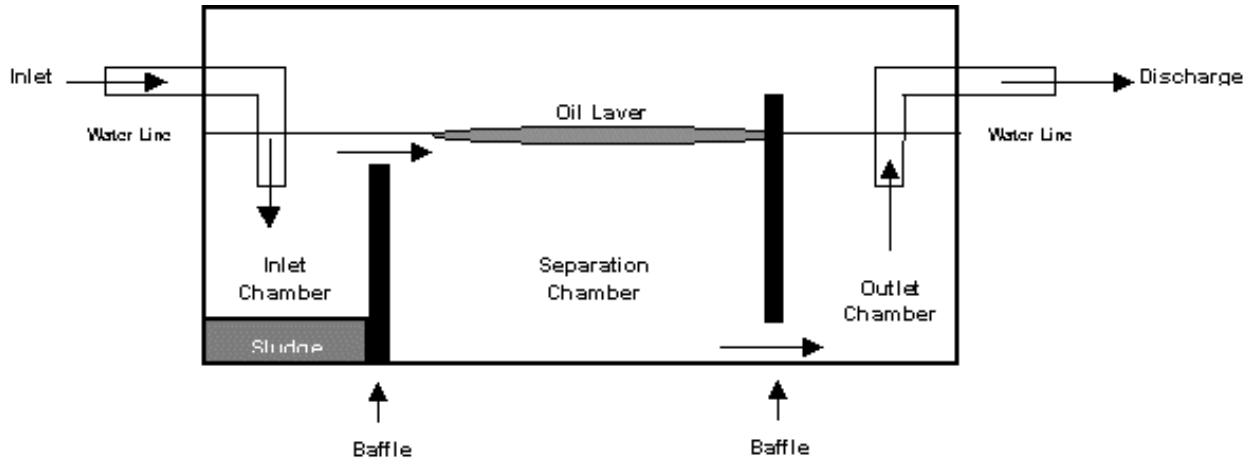
Land Owner: _____
(Name) *(Signature)*

Contractor: _____
(Name) *(Signature)*

Consultant: _____
(Name) *(Signature)*

Client: _____ *(Name)*
(Signature)

Oil – Water separator



This is an example of a very simple but effective silt / oil water separator that should be constructed at the wash bays of all the construction sites. It should be noted that **REGULAR** cleaning is required to ensure effectiveness. Sludge removal and oil skimming is two maintenance actions required to ensure effectiveness.

Curriculum Vitae of the Compiler