

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN  
FOR THE FOLLOWING PROJECT:

SC/DP/RA – 16/2019

RE-GRAVELLING CONTRACTS IN THE  
OTJIWARONGO REGION

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JUNE 2020

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## **SECTION ONE**

### **PROJECT BACKGROUND AND DATA**

# 1. OVERVIEW

The Roads Authority (R.A.) has a well-deserved reputation for maintaining the road network in Namibia over the past few decades. However, faced with changes in legislative requirements, challenging economic environment and an ever-increasing pressure on the road network, maintaining the network is becoming a challenge. The Roads Authority need to be proactive in ensuring that maintenance of the road network is not jeopardized and still be able to uphold the standard of the Namibia roads.

Enviro Management Consultants Namibia (EMCN) submitted a framework for services to support the R.A. in achieving their national road network maintenance objectives. This is done by providing environmental services as required by the Environmental Management Act No.7 of 2007 (EMA) and the associated Regulations (Government Notice 4878 of 2012).

The Roads Authority sets out to maintain the roads network mostly on two bases:

1. Bitumen Maintenance Units (BMU) – which is responsible for the maintenance of the paved roads network;
2. Re-gravelling Units – which is responsible for the maintenance of the gravel roads in Namibia.

According to the EMA both these unit activities require some degree of environmental input and engagement with the Ministry of Environment and Tourism (MET) as to ensure compliance to the EMA. The Act states the following:

The following activities may not be undertaken without an Environmental Clearance Certificate (ECC) –

## **(Regulation 3) Mining and Quarrying Activities**

- 3.2 Other forms of mining or extraction of any natural resources whether regulated by law or not.

## **(Regulation 10) Infrastructure**

- 10.1 The construction of –
  - (b) public roads

According to the term "construction" the following definition is given in the Regulations:

*"means the building, erection or modification of a facility, structure or infrastructure that is necessary for the undertaking of an activity, including the modification, alteration, upgrading or decommissioning of such facility, structure or infrastructure".*

It is therefore clear that some degree of environmental inputs / management actions is required as to ensure compliance to the Act. Just as important is to ensure that the Roads Authority is not hindered by regulatory requirements to fulfil its very important maintenance activities to our national roads network.

## **2. PROJECT OBJECTIVES**

Environmental and Social Management Plans (ESMP) have become an integral part of activities requiring environmental approvals. Discussions with the MET clearly indicated that this is no different for the RA. Maintenance activities (BMU and re-gravelling) and the obtainment of suitable construction materials from borrow pits has become a point of concern. Our objective is to assist the RA to obtain the necessary environmental approvals from the MET as to ensure that maintenance of our road network can continue without time-delays that might arise from environmental legislative requirements.

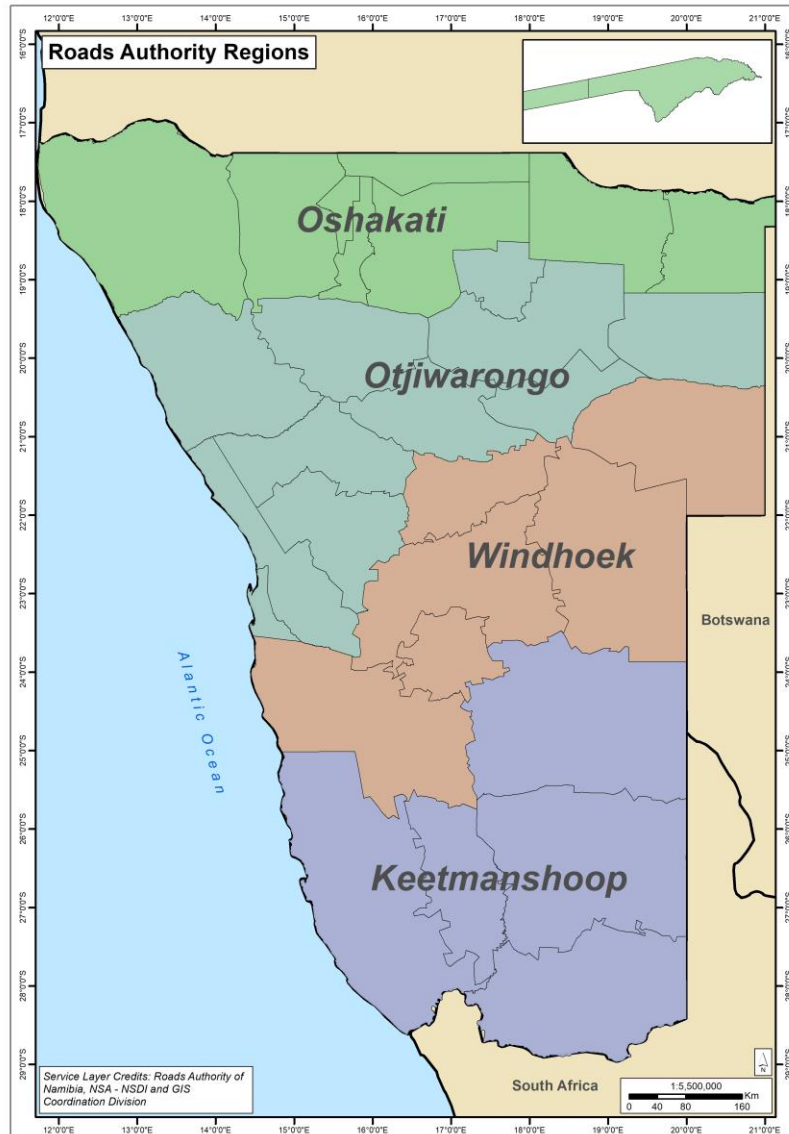
We will draft an ESMP specifically focused at each of the four RA maintenance regions. Each ESMP will address regional specific environmental managements measures dependent on each region's bio-physical and socio-economic characteristics.

Each ESMP will be submitted to the MET for approval and issuing permission to the RA to conduct their maintenance activities and borrow pit utilization (extraction of natural resources) on a regional scale. According to legislation, permission is granted for a period of three years, where review of the ESMP will be required.

## **3. PROJECT BACKGROUND**

This project forms part of the periodic maintenance program of the Maintenance Division of the R.A, with the aim to maintain the gravel road network to acceptable standards. The extended gravelling / re-gravelling program will be performed under multiple contracts, which will be administered separately under each region of the R.A. These regions are divided into the following:

- Keetmanshoop
- Windhoek
- Otjiwarongo
- Oshakati



**Figure 1: Roads Authority Maintenance Regions**

### **3.1 Project Locations**

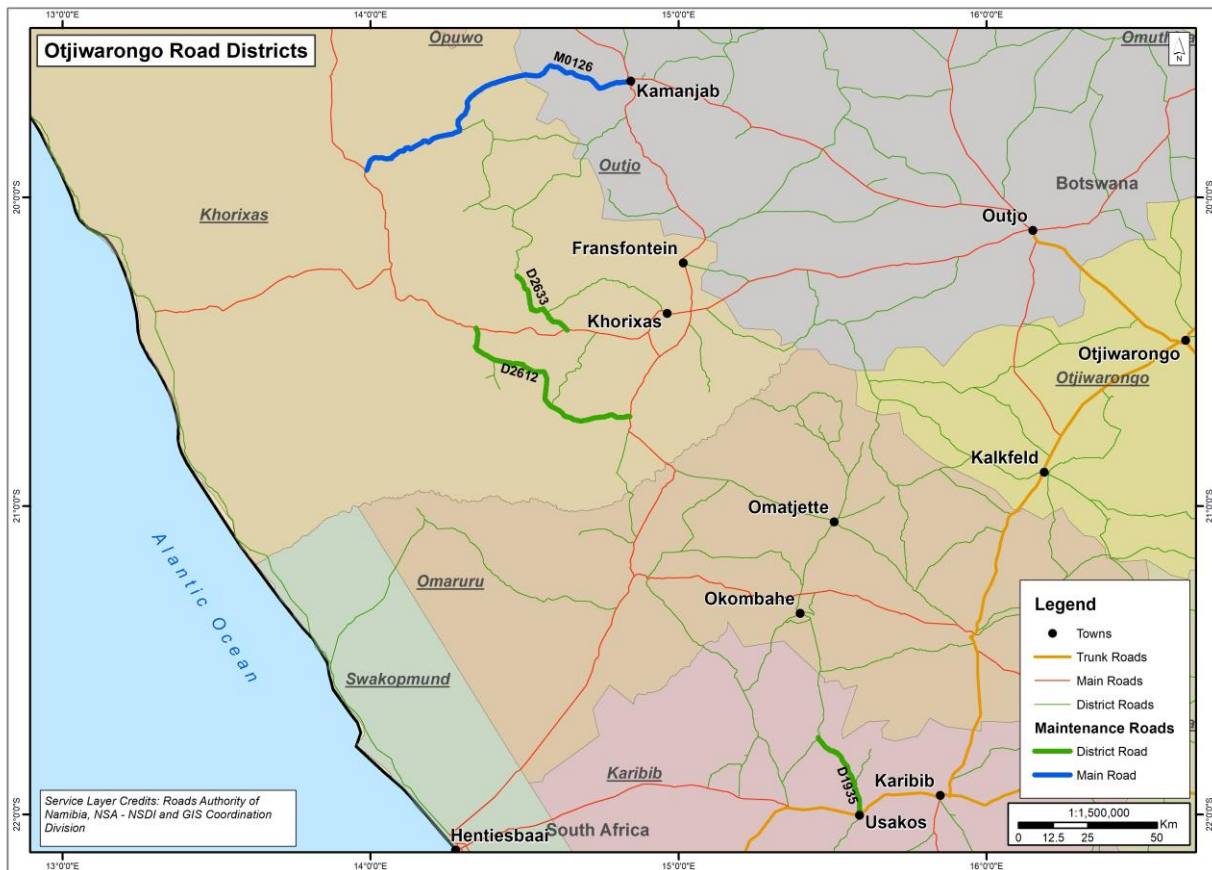
The work will comprise the re-gravelling of existing wearing courses, the construction of gravel and sand layers and related work on selected roads as listed in the table below.

The list of roads was compiled through priority indexing of the road network. The various roads indicated on the list are subject to a bidding process where a contractor will be appointed to conduct the required works. The contract duration is three years.

In this list there are some roads identified as Main Roads (colored in blue) and District Roads (colored in green). All these roads were visited by Enviro Management Consultants Namibia and all the borrow pits to be used for the re-gravelling project were visited to obtain relevant data for this report.

| Road Number  | Start                | End             | Length  |
|--------------|----------------------|-----------------|---------|
| <b>D1935</b> | Km 0 at Usakos       | Junction DR2306 | 32 Km   |
| <b>D2612</b> | Km 0 Junction MR0076 | Junction MR0126 | 77 Km   |
| <b>D2633</b> | Km 0 Junction MR0126 | Km 41.1         | 41.1 Km |
| <b>M0126</b> | Km 0 Kamanjab Town   | MR0128          | 128 Km  |

**Table 1: List of roads to be re-gravelled in the Otjiwarongo Region**



**Figure 2: Location of the roads to be re-gravelled in the Otjiwarongo Region**



## 3.2 Detailed Description of Each Road

### 3.2.1 DR1935

This road serves the rural / farming community north of Usakos. During the site visit it was evident that the community around Usakos uses this road extensively. The following table depicts some of the environmental information associated with the road:

|            |  |
|------------|--|
| Topography | The road is situated on a flat area of Namibia with an average topographical height of 900 - 1000 m above sea-level. Erosion surfaces of the degraded escarpment is characteristic of the environment with some isolated topographical high points. The road traverse numerous small rivers. |
| Climate    | The road is situated in a dry area of Namibia with an average of 150 - 200 mm rain per annum. The average annual temperature in this area is 22 °C.  |
| Vegetation | This part of Namibia is dominated by semi-desert and savanna transition vegetation.  |
| Geology    | The road falls within the Damara sequence with the Swakop group and the Khomas subgroup dominating. Various rock types are present: marble, mica schist, quartzite and graphitic schist dominate.  |
| Soil type  | Petric Calcisols dominate the area.  |
| Land use   | The road is situated in agricultural / rural land.   |

#### District Road - DR1935

##### National

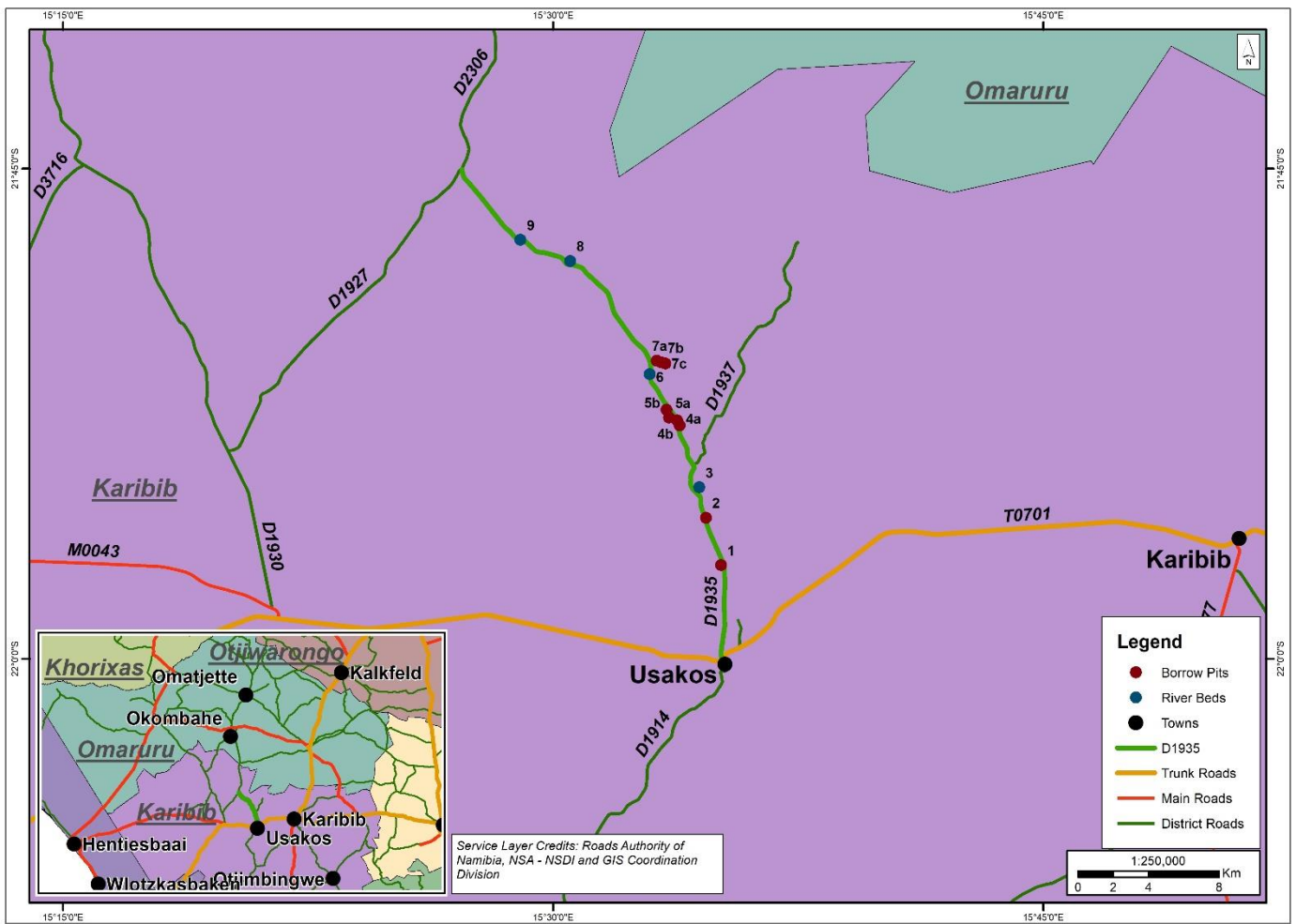
District: Karibib



Region: Erongo



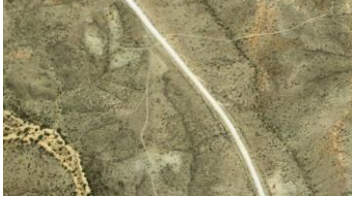




##### Roads Authority

District: Usakos

Region: Otjiwarongo



| No | Chainage | Latitude        | Longitude       | Position   | Area                  | Distance from Road | Photo   |
|----|----------|-----------------|-----------------|------------|-----------------------|--------------------|---|
| 1  | km 5.4   | 21° 57.13341' S | 15° 35.14211' E | Left Side  | 69,870 m <sup>2</sup> | 30m                |  |
| 2  | km 8.3   | 21° 55.68183' S | 15° 34.68352' E | Right Side | 19,598 m <sup>2</sup> | 20m                |  |

|                  |                    |   |   |            |  |                      |   |
|------------------|--------------------|---|---|------------|--|----------------------|---|
| 3                | km 10.0            | 21° 54.75339' S                                       | 15° 34.47315' E                                       | Right Side | River Bed  | 320m                 |    |
| 4<br>a<br>b      | km 14.0<br>km 14.3 | 21° 52.85665' S<br>21° 52.70691' S                    | 15° 33.87508' E<br>15° 33.79597' E                    | Right Side | 9,784 m <sup>2</sup><br>16,529 m <sup>2</sup>                          | 33m                  |    |
| 5<br>a<br>b      | km 15.5<br>km 16.0 | 21° 52.61960' S<br>21° 52.37663' S                    | 15° 33.54954' E<br>15° 33.47311' E                    | Left Side  | 11,167 m <sup>2</sup><br>23,317 m <sup>2</sup>                         | 207m<br>95m          |    |
| 6                | km 18.2            | 21° 51.28977' S                                       | 15° 32.95965' E                                       | Left Side  | River Bed  | 70m                  |   |
| 7<br>a<br>b<br>c | km 19.0            | 21° 50.87711' S<br>21° 50.93028' S<br>21° 50.96426' S | 15° 33.17240' E<br>15° 33.31142' E<br>15° 33.43961' E | Right Side | 14,901 m <sup>2</sup><br>3,331 m <sup>2</sup><br>31,241 m <sup>2</sup> | 318m<br>560m<br>748m |  |
| 8                | km 26.2            | 21° 47.82599' S                                       | 15° 30.52568' E                                       | Right Side | River Bed  | 217m                 |  |
| 9                | km 29.3            | 21° 47.17863' S                                       | 15° 29.00461' E                                       | Left Side  | River Bed  | 70m                  |  |

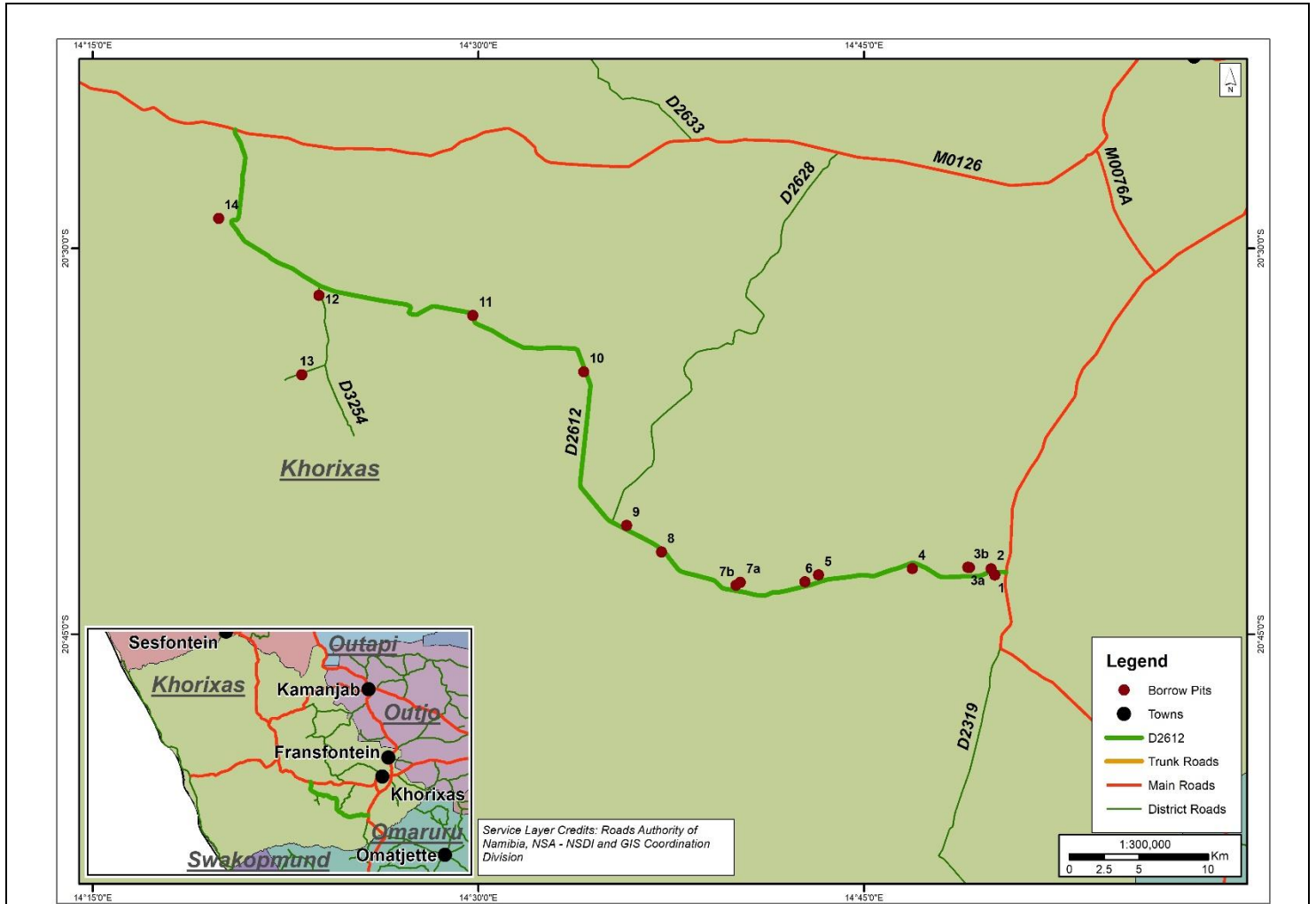
### 3.2.2 DR2612



This road is situated in the scenic environment of Damaraland. This road is mainly travelled by tourists and serves as an economic artery for the area.

The following table depicts some of the environmental information associated with the road:

|            |   |
|------------|---|
| Topography | The road is situated on a flat area of Namibia with an average topographical height of 700 - 900 m above sea-level. Erosion surfaces of the degraded escarpment is characteristic of the environment with some isolated topographical high points.  |
| Climate    | The road is situated in a very dry area of Namibia with an average of 100 mm rain per annum. The average temperature in this area is 21-22°C.   |
| Vegetation | This part of Namibia is dominated by the Mopane Savanna vegetation unit.  |
| Geology    | The northern part of the road falls within the Damara sequence with the Swakop group and the Khomas subgroup dominating. Various rock types are present: marble, mica schist, quartzite and graphitic schist dominate. The south-eastern part is characterized by Salem granite outcrops (Egs). |
| Soil type  | Lithic Leptosols dominate the north-western area around the road, where Eutric Regosols is present in the south-eastern parts of the road.  |
| Land use   | The road is situated in the communal Damaraland, well known for tourism related economic activities.  |

| <b>District Road - DR2612</b> |                        |
|-------------------------------|------------------------|
| <u>National</u>               | <u>Roads Authority</u> |
| District: Khorixas            | District: Outjo        |
| Region: Kunene                | Region: Otjiwarongo    |



| No | Chainage | Latitude        | Longitude       | Position   | Area                  | Distance from Road | Photo   |
|----|----------|-----------------|-----------------|------------|-----------------------|--------------------|---|
| 1  | km 0.8   | 20° 42.69438' S | 14° 50.08756' E | Left Side  | 43,961 m <sup>2</sup> | 80m                |  |
| 2  | km 0.9   | 20° 42.46206' S | 14° 49.94200' E | Right Side | 43,039 m <sup>2</sup> | 139m               |  |



|             |                    |                                    |                                    |            |  |              |   |
|-------------|--------------------|------------------------------------|------------------------------------|------------|--|--------------|---|
| 3<br>a<br>b | km 2.4             | 20° 42.40536' S<br>20° 42.39799' S | 14° 49.10229' E<br>14° 49.03644' E | Right Side | 4,239 m <sup>2</sup><br>3,370 m <sup>2</sup> | 600m         |    |
| 4           | km 6.7             | 20° 42.45050' S                    | 14° 46.87940' E                    | Left Side  | Proposed BP                                  | 409m         |    |
| 5           | km 13.0            | 20° 42.69306' S                    | 14° 43.22615' E                    | Right Side | 55,927 m <sup>2</sup>                        | 339m         |    |
| 6           | km 14.1            | 20° 42.96423' S                    | 14° 42.70497' E                    | Right Side | 7,701 m <sup>2</sup>                         | 269m         |   |
| 7<br>a<br>b | km 18.6<br>km 18.9 | 20° 42.97891' S<br>20° 43.09632' S | 14° 40.18869' E<br>14° 40.02503' E | Right Side | 7,646 m <sup>2</sup><br>8,525 m <sup>2</sup> | 613m<br>352m |  |
| 8           | km 24.8            | 20° 41.80504' S                    | 14° 37.12339' E                    | Left Side  | Proposed BP                                  | 127m         |  |
| 9           | km 27.8            | 20° 40.77049' S                    | 14° 35.77031' E                    | Right Side | 6,869 m <sup>2</sup>                         | 217m         |  |
| 10          | km 40.5            | 20° 34.80297' S                    | 14° 34.09973' E                    | Right Side | 18,706 m <sup>2</sup>                        | 52m          |  |

|    |         |                 |                 |           |                       |                          |  |
|----|---------|-----------------|-----------------|-----------|-----------------------|--------------------------|--|
| 11 | km 50.1 | 20° 32.61099' S | 14° 29.78669' E | Left Side | 22,445 m <sup>2</sup> | 16m                      |   |
| 12 | km 61.6 | 20° 31.82644' S | 14° 23.79547' E | Left Side | 11,401 m <sup>2</sup> | 640m<br>along<br>DR3254  |   |
| 13 | km 61.6 | 20° 34.91056' S | 14° 23.13554' E | Left Side | 13,398 m <sup>2</sup> | 6.5km<br>along<br>DR3254 |   |
| 14 | km 69.3 | 20° 28.83564' S | 14° 19.89956' E | Left Side | 20,187 m <sup>2</sup> | 785m                     |  |

### 3.2.3 DR2633

This road serves as an important access road to a very large date plantation situated in the Huab River. The following table depicts some of the environmental information associated with the road:

|            |   |
|------------|---|
| Topography | This section of D2633 is situated in a mountainous area with a steep slope towards the Huab River. The height drops from 1000 to 600 m above sea-level.                                       |
| Climate    | The road is situated in a low rainfall area of Namibia with an average of 100-150 mm rain per annum. The average temperature in this area is 21-22 °C.  |
| Vegetation | This part of Namibia is dominated by the Mopane Savanna vegetation unit.  |
| Geology    | The Damara sequence dominate with the Nosib group present (NNp). The dominant rock types are alkaline ignimbrite and rhyolite, quartzite, conglomerate, schist, minor andesite and bostonite. |
| Soil type  | Lithic Leptosols dominate the area.   |
| Land use   | The road is situated in the communal Damaraland, well known for tourism related economic activities. This road will link the date plantation with the national road / economic network.       |

#### District Road - DR2633

##### National

District: Khorixas

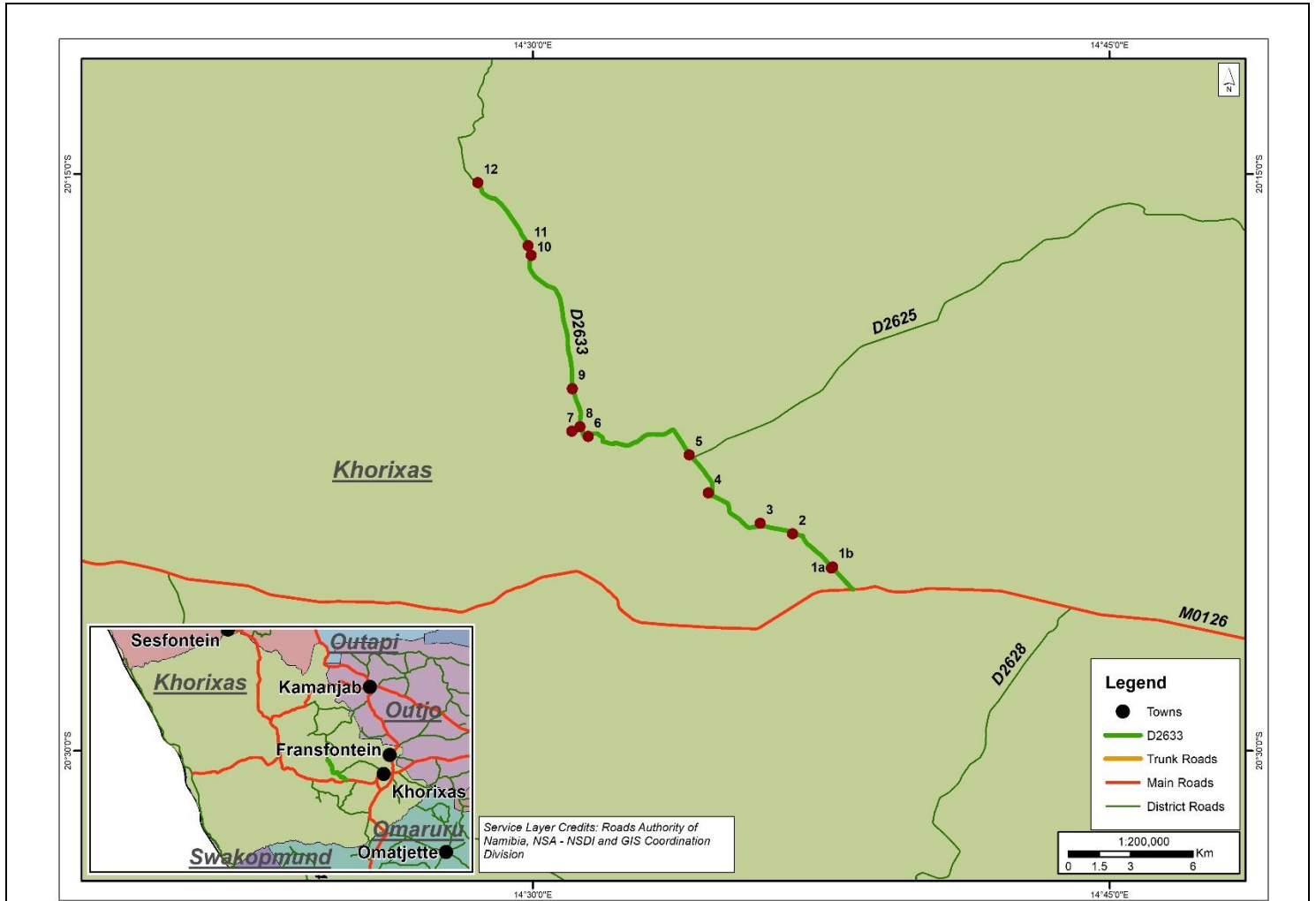
Region: Kunene

##### Roads Authority


District: Outjo




Region: Otjiwarongo





| No          | Chainage | Latitude                           | Longitude                          | Position                | Area   | Distance from Road | Photo |
|-------------|----------|------------------------------------|------------------------------------|-------------------------|--|--------------------|-------|
| 1<br>a<br>b | km 1.4   | 20° 25.25072' S<br>20° 25.21852' S | 14° 37.76462' E<br>14° 37.79688' E | Left Side<br>Right Side | 4,640 m <sup>2</sup><br>5,587 m <sup>2</sup> | 13m                |       |

|   |         |                 |                 |            |  |            |   |
|---|---------|-----------------|-----------------|------------|--|------------|---|
| 2 | km 3.9  | 20° 24.35942' S | 14° 36.76014' E | Left Side  | 7,921 m <sup>2</sup>                         | 18m        |    |
| 3 | km 5.4  | 20° 24.08309' S | 14° 35.91238' E | Right Side | 3,648 m <sup>2</sup>                         | 126m       |    |
| 4 | km 8.5  | 20° 23.29431' S | 14° 34.56031' E | Left Side  | Proposed BP                                  | 188m       |    |
| 5 | km 10.7 | 20° 22.30745' S | 14° 34.06871' E | Left Side  | 6,712 m <sup>2</sup>                         | 13m        |   |
| 6 | km 16.5 | 20° 21.82932' S | 14° 31.43977' E | Left Side  | 2,672 m <sup>2</sup><br>2,641 m <sup>2</sup> | 11m<br>20m |  |
| 7 | km 17.0 | 20° 21.69406' S | 14° 31.01265' E | Left Side  | Proposed BP                                  | 500m       |  |
| 8 | km 17.2 | 20° 21.57484' S | 14° 31.22557' E | Left Side  | 7937.5 m <sup>2</sup>                        | 15m        |  |
| 9 | km 19.1 | 20° 20.58661' S | 14° 31.02537' E | Left Side  | 15,670 m <sup>2</sup>                        | 19m        |  |

|    |         |                 |                 |            |                       |     |   |
|----|---------|-----------------|-----------------|------------|-----------------------|-----|---|
| 10 | km 26.2 | 20° 17.12102' S | 14° 29.95950' E | Right Side | 3,894 m <sup>2</sup>  | 45m |  |
| 11 | km 26.7 | 20° 16.86668' S | 14° 29.87323' E | Right Side | 5,852 m <sup>2</sup>  | 20m |  |
| 12 | km 30.6 | 20° 15.23021' S | 14° 28.56519' E | Right Side | 14,325 m <sup>2</sup> | 20m |  |

### 3.2.4 MR0126

This is a long stretch of road earmarked for re-gravelling with a total length of 128km stretching from Kamanjab and ending close to Palmwag.

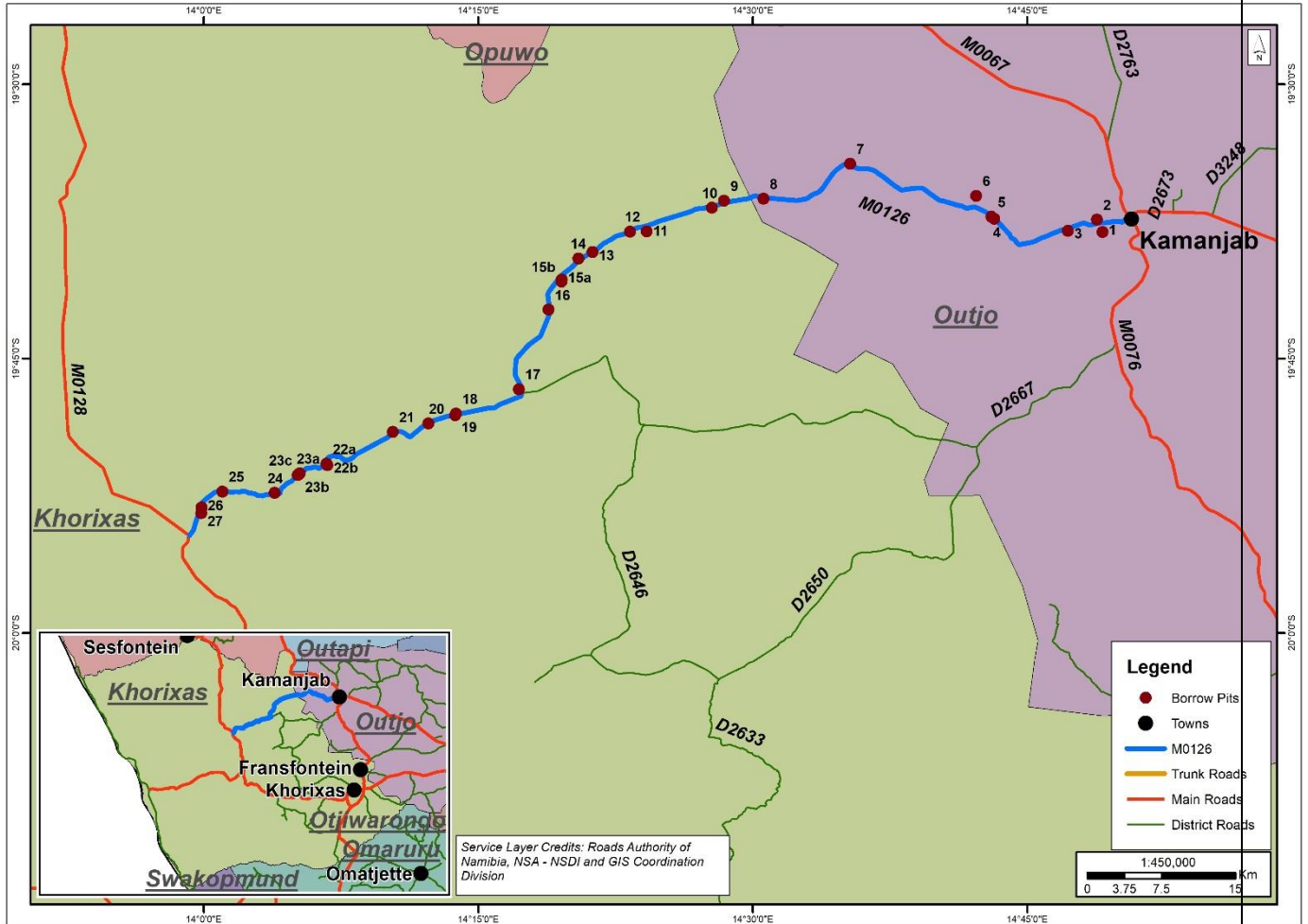
This road serves as an economic artery for the rural western areas of Damaraland. This is also a very popular tourist route connecting the two towns.


The following table depicts some of the environmental information associated with the road:

|            |  |
|------------|--|
| Topography | MR0126 has various topographical characteristics best described from Kamanjab (east) towards Palmwag (west). The road starts at Kamanjab on the erosion surface of the degraded escarpment with an average height of 1300m above sea level. Traversing towards Palmwag, the road passes the plateau remnants of the escarpment (1200m above sea level) and passes the high mountains of the escarpment with heights of between 1500 – 1800m above sea level. |
| Climate    | From Kamanjab (east) towards Palmwag (west) the rainfall steady decrease. To the east of the road, 275mm is average and decreases to 75mm closer to Palmwag. The average temperature decreases from east (21-22°C) to west (19-20°C).  |
| Vegetation | This part of Namibia is dominated by the Mopane Savanna vegetation unit.   |
| Geology    | The road is divided by two major geological structures. The eastern part is dominated by the Huab Complex (Mhu) with the Khoabendus group. Rock types associated are para-/orthogneiss, metasedimentary rocks, granite and metabasite dykes. The western part of the road is situated in the Karoo sequence with the Etendeka (Ke) group dominant. Rocktypes are high-silica basalt, latite, quartz latite and minor aeolian sandstone                       |
| Soil type  | The eastern part of the road is characterized by rock outcrops where the western part Eutric Leptosols dominate.   |
| Land use   | The road traverse through various land uses which include commercial agriculture, communal agriculture and communal lands. Great part of this area is also used for tourism activities.  |









## Main Road – MR0126









|                        |                               |
|------------------------|-------------------------------|
| <b><u>National</u></b> | <b><u>Roads Authority</u></b> |
| District: Khorixas     | District: Outjo               |
| Region: Kunene         | Region: Otjiwarongo           |











| No | Chainage | Latitude           | Longitude          | Position  | Area                     | Distance from Road | Photo   |
|----|----------|--------------------|--------------------|-----------|--------------------------|--------------------|---|
| 1  | km 3.1   | 19°<br>38.07494' S | 14° 49.12459'<br>E | Left Side | 31,277<br>m <sup>2</sup> | 826m               |  |





|   |         |                    |                    |               |                          |       |   |
|---|---------|--------------------|--------------------|---------------|--------------------------|-------|---|
| 2 | km 3.2  | 19°<br>37.39860' S | 14° 48.81504'<br>E | Right<br>Side | 7,978 m <sup>2</sup>     | 335m  |    |
| 3 | km 6.4  | 19°<br>38.01995' S | 14° 47.23524'<br>E | Left Side     | 23,571<br>m <sup>2</sup> | 174m  |    |
| 4 | km 14.9 | 19°<br>37.35598' S | 14° 43.19802'<br>E | Left Side     | 29,947<br>m <sup>2</sup> | 15m   |    |
| 5 | km 15.2 | 19°<br>37.24463' S | 14° 43.05466'<br>E | Left Side     | 22,794<br>m <sup>2</sup> | 43m   |   |
| 6 | km 16.9 | 19°<br>36.09970' S | 14° 42.22151'<br>E | Right<br>Side | 7,982 m <sup>2</sup>     | 1.2km |  |
| 7 | km 30.3 | 19°<br>34.34595' S | 14° 35.32147'<br>E | Right<br>Side | 6,686 m <sup>2</sup>     | 109m  |  |
| 8 | km 40.1 | 19°<br>36.26451' S | 14° 30.58508'<br>E | Left Side     | 10,772<br>m <sup>2</sup> | 46m   |  |
| 9 | km 44   | 19°<br>36.36884' S | 14° 28.43802'<br>E | Right<br>Side | 28,039<br>m <sup>2</sup> | 173m  |  |

|              |                    |  |  |            |  |              |   |
|--------------|--------------------|--|--|------------|--|--------------|---|
| 10           | km 45.5            | 19°<br>36.75098' S                       | 14° 27.76147'<br>E                       | Left Side  | 20,121<br>m <sup>2</sup>                             | 63m          |    |
| 11           | km 54.0            | 19°<br>38.04847' S                       | 14° 24.21219'<br>E                       | Left Side  | 12,947<br>m <sup>2</sup>                             | 492m         |    |
| 12           | km 55.5            | 19°<br>38.05819' S                       | 14° 23.29347'<br>E                       | Left Side  | 4,536 m <sup>2</sup>                                 | 30m          |    |
| 13           | km 59.2            | 19°<br>39.17549' S                       | 14° 21.24310'<br>E                       | Left Side  | 5,881 m <sup>2</sup>                                 | 23m          |   |
| 14           | km 60.6            | 19°<br>39.52278' S                       | 14° 20.47049'<br>E                       | Right Side | 3,713 m <sup>2</sup>                                 | 205m         |  |
| 15<br>a<br>b | km 63.3<br>km 63.5 | 19°<br>40.69207' S<br>19°<br>40.79312' S | 14° 19.56596'<br>E<br>14° 19.54396'<br>E | Left Side  | 14,478<br>m <sup>2</sup><br>21,065<br>m <sup>2</sup> | 239m<br>321m |  |
| 16           | km 66.6            | 19°<br>42.31274' S                       | 14° 18.84308'<br>E                       | Right Side | 9,165 m <sup>2</sup>                                 | 21m          |  |
| 17           | km 76.0            | 19°<br>46.67800' S                       | 14° 17.22008'<br>E                       | Righ Side  | 16,405<br>m <sup>2</sup>                             | 195m         |  |

|                   |                                  |  |  |               |  |             |   |
|-------------------|----------------------------------|--|--|---------------|--|-------------|---|
| 18                | km 82.8                          | 19°<br>48.01408' S                       | 14° 13.77632'<br>E                     | Right<br>Side | 18,099<br>m <sup>2</sup>   | 37m         |    |
| 19                | km 82.9                          | 19°<br>48.10453' S                       | 14° 13.73701'<br>E                     | Left Side     | 7,242 m <sup>2</sup>   | 16m         |    |
| 20                | km 85.7                          | 19°<br>48.54735' S                       | 14° 12.27903'<br>E                     | Left Side     | 37,835<br>m <sup>2</sup>   | 43m         |    |
| 21                | km 89.7                          | 19°<br>49.01834' S                       | 14° 10.33587'<br>E                     | Left Side     | 15,254<br>m <sup>2</sup>   | 23m         |   |
| 22<br>a<br>b      | km 97.7                          | 19°<br>50.75879' S<br>19°<br>50.82898' S | 14° 6.70219'<br>E<br>14° 6.75826'<br>E | Left Side     | 4,429 m <sup>2</sup><br>17,586<br>m <sup>2</sup>                     | 188m<br>95m |  |
| 23<br>a<br>b<br>c | km 100.6<br>km 100.7<br>km 100.8 | 19°<br>51.33047' S<br>19°<br>51.36957' S | 14° 5.18598'<br>E<br>14° 5.13935'<br>E | Right<br>Side | 2,892 m <sup>2</sup><br>5,658 m <sup>2</sup><br>5,574 m <sup>2</sup> | 12m         |  |
| 24                | km 104.1                         | 19°<br>52.34184' S                       | 14° 3.87362'<br>E                      | Right<br>Side | 29,572<br>m <sup>2</sup>   | 60m         |  |
| 25                | km 109.2                         | 19°<br>52.27570' S                       | 14° 1.01658'<br>E                      | Left Side     | 14,051<br>m <sup>2</sup>   | 35m         |  |



|    |          |                    |                    |           |                          |     |   |
|----|----------|--------------------|--------------------|-----------|--------------------------|-----|---|
| 26 | km 111   | 19°<br>53.13987' S | 13° 59.87900'<br>E | Left Side | 7,697 m <sup>2</sup>     | 42m |  |
| 27 | km 111.5 | 19°<br>53.44854' S | 13° 59.85886'<br>E | Left Side | 55,743<br>m <sup>2</sup> | 20m |  |

## **4. ACTIVITIES ASSOCIATED WITH RE-GRAVELLING**

Re-gravelling is not characterised by large scale layer-works as with the construction of roads. During re-gravelling only the top 150mm of the road is either replaced or added and this is known as the "wearing course" of the gravel road. Material (gravel) required for this wearing course is typically obtained from a nearby borrow pit. The gravel is obtained by using heavy machines such as excavators and bulldozers then transported with trucks to the re-gravelling section.

At the re-gravelling section the gravel is dumped in heaps, levelled with a grader and water added with a water truck. Water is needed to ensure the moisture content of the gravel is within specifications as to ensure proper compaction. A compactor is then used to compact the levelled gravel and a final "cut" is done with a grader.

The following activities are generally associated with the re-gravelling of a road. These activities are kept in mind during the compilation of the Environmental and Social Management Plan.

- **Camp site establishment**
  - Demarcation of the camp site
  - Protection of vegetation and natural features
  - Protection of fauna
  - Protection of cultural historical aspects
  - Topsoil conservation
  - De-bushing and de-stumping
  - Structures construction: bulk water, sewage, electricity and accommodation
  - Parking and other required demarcated areas
  
- **Site management**
  - Rubble and waste rock
  - Solid waste
  - Liquid waste
  - Hazardous waste
  - Pollution control
  - Implements and equipment
  - Air quality
  - Noise control
  - Fire control
  - Health and Safety
  
- **Earthworks**
  - Excavations and berms

- Shaping and trimming of borrow pits
- Construction of wearing coarse
  
- **Stockpiles, storage and handling**
  - Topsoil
  - Spoil
  - Vehicles and equipment
  - Fuel
  - Hazardous substances

The following Environmental and Social Management Plan will minimize or avoid any negative impacts associated with re-gravelling of roads in Namibia. Section Two must be used as a separate document and made available to the Contractor responsible for the re-gravelling operations.

**SECTION TWO**  
**ENVIRONMENTAL AND SOCIAL MANAGEMENT**  
**PLAN**

## **1. INTRODUCTION**

Activities associated with re-gravelling were mentioned in Section One of this document and will be used as background for compiling the Environmental and Social Management Plan (ESMP). The ESMP is applicable to all activities conducted during the re-gravelling period.

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. As to ensure the above, some administrative requirements are mentioned below:

### **1.1 ESMP Administration**

The ESMP must be part of the Tender and Contract documentation. 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.

### **1.2 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 and Engineer's Representative (ER)**

The Engineer shall delegate powers to the Engineer's Representative (ER) in respect of implementation of the ESMP. The Engineer 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 Contractor's appointment of the Environmental Control Officer (ECO).

Any on-site decisions regarding environmental management are ultimately the responsibility of the Engineer. The ER shall 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.
- Advising the Contractor and the Contractor's ECO in finding environmentally responsible solutions to problems.
- Taking appropriate action if the specifications are not followed.
- Ordering the removal of person(s) and/or equipment not complying with the ESMP specifications.
- Issuing penalties for non-compliance to mitigation measures pertained in 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:

- Regular site inspections of all construction areas regarding compliance with the ESMP.
- Evaluate and verifying adherence to the ESMP.
- Advising the Contractor in finding environmentally responsible solutions to ESMP non-compliance activities.
- Organise and facilitate environmental awareness training for all new personnel coming onto site.

### **1.3 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 re-gravelling 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.

### **1.4 Public Participation**

An on-going process of public participation shall be maintained during re-gravelling to ensure the continued involvement of interested and affected parties (I&APs) in a meaningful way. This is particularly important since most of the borrow pits are situated on private or communal land.

## **1.5 Environmental Auditing**

Environmental auditing should be conducted at least once every three months during the re-gravelling period. These environmental audits will be conducted by an environmental consultant with the required experience and sub-contracted by the Engineer.

Benefits derived from the audit process include:

- identification of environmental risks observed during a site visit;
- development or improvement of the environmental management system;
- suggested improvements to the ESMP;
- inspecting the required permits and licenses;
- increase in staff awareness with regards to the environment and the ESMP;
- inspect environmental incident reports, environmental monitoring and recording documentation. These documents will be compiled and filed by the ECO.

Commonly, the audit of a site will cover all environmental management procedures, operational activities & systems, and environmental issues.

## **1.6 Documentation, Record keeping and Reporting Procedures**

The Contractor shall develop and implement an effective document handling and retrieval system for all ESMP documentation on site. This will ensure that there is adequate ESMP documentation control and will facilitate easy document access and evaluation. ESMP documentation should include (but are not limited to):

- ESMP implementation activity specifications;
- training records;
- site inspection reports;
- monitoring reports; and
- auditing reports.



## 2. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The following mitigation measures are enough to reduce or avoid negative impacts associated with the re-gravelling of a road. It is based on the activities mentioned in this report (Section One) that will occur during the re-gravelling phase of the project:

| COMPONENT   | OBJECTIVE   | MANAGEMENT MEASURES  | RESPONSIBILITY/<br>PARTNERSHIPS                                 |
|---|---|--|---|
| <b>2.1<br/>MANAGEMENT<br/>AND<br/>MONITORING</b>                      | To ensure that the provisions of the ESMP are implemented during construction.  | <ul style="list-style-type: none"> <li>a. The Environmental and Social Consultants shall ensure that all aspects of the ESMP are implemented during construction.</li> <li>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.</li> </ul>   | Environmental and Social Consultants together with the ECO.     |
| <b>2.2<br/>COMMUNICATION<br/>AND<br/>STAKEHOLDER<br/>CONSULTATION</b> | 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"> <li>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 within 14 days after the site-handover.</li> <li>b. The Contractor shall at every site meeting report on the status of the implementation of all provisions of the ESMP.</li> <li>c. The Contractor shall implement the environmental awareness training as stipulated in Section 1.1.2 above.</li> <li>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.</li> </ul> | Contractor/<br>Environmental and Social Consultants to monitor. |

| COMPONENT  | OBJECTIVE  | MANAGEMENT MEASURES  | RESPONSIBILITY/<br>PARTNERSHIPS                |
|--|--|--|--|
| <p><b>2.3</b></p> <p><b>ESTABLISHMENT OF THE CAMP SITE</b></p> | <p>To ensure that the Contractor camp site and associated infrastructure is properly managed as to minimize any negative impacts on the soil, vegetation, surface and aquifer water quality.</p> | <ul style="list-style-type: none"> <li>a. The Contractor shall establish his camp at a site provided by the Contractor and approved by the Engineer</li> <li>b. Erection of temporary offices or stores within the road reserve will be permitted if they are removed immediately when there is no longer a need for these facilities at any location.</li> <li>c. Proper sewage facilities will be constructed to accommodate the amount of people that will reside / work / visit the camp site. Toilet facilities will be to acceptable standards as to ensure that the workers are willing to use these facilities.</li> <li>d. All associated facilities needed to complete the contract will be designed, constructed and maintained according to this ESMP. These facilities include (but are not limited to) bulk fuel storage areas, new and used oil storage areas, storage areas for used batteries, waste storage areas, vehicle service areas, oil-water separators and wash bays.</li> <li>e. The Contractor shall fence in his camp site and shall in rural areas and where practicable in urban areas provide a five (5) metre wide firebreak around the perimeter of the camp outside the fence line. This firebreak shall be kept free from all vegetation and rubbish for the duration of the Contract. Debris generated from clearing the camp site and firebreak, if appropriate, shall be removed and dumped in a suitable worked-out borrow-pit acceptable to the Engineer, or at a local authority refuse disposal site.</li> <li>f. Tents / temporary structures should be neatly arranged and in close proximity as to reduce the temporary campsite footprint.</li> </ul> | <p>Contractor, Engineer, R.A. and the COW.</p> |

| COMPONENT                    | OBJECTIVE  | MANAGEMENT MEASURES  | RESPONSIBILITY/<br>PARTNERSHIPS   |
|------------------------------|--|--|---|
| <b>2.4 HEALTH AND SAFETY</b> | To ensure health and safety of workers and the public always during re-gravelling. | <ul style="list-style-type: none"> <li>a. The Contractor in consultation with the Engineers shall determine a strategy to ensure the least possible disruption to traffic and potential safety hazards during re-gravelling.</li> <li>b. The Contractor shall also liaise with the Traffic Authorities in this regard.</li> <li>c. Proper traffic and safety warning signs will be placed at the re-gravelling site to the satisfaction of the Engineer and the Roads Authority.</li> <li>d. The Contractor will adhere to the regulations pertaining to Health and Safety, including the provision of protective clothing (PPE); failing to do so the Contract may be suspended until corrective actions are taken.</li> <li>e. Dust protection masks shall be provided to task workers if they complain about dust.</li> <li>f. Surface dust will be contained by wetting dry surfaces periodically with a water truck, sprinkler system or any suitable method. This applies for the re-gravelling site as well as all the roads.</li> <li>g. Potable water shall be available to workers to avoid dehydration. This water shall be of acceptable standards to avoid any illness. At least 5 litters of drinking water per person per day shall be made available during re-gravelling.</li> <li>h. Brewing and/or sale of any kind of alcohol on site should be prohibited, unless in accordance with the law, statues, ordinances of Namibia's government regulations and orders.</li> <li>i. The Contractor shall comply with relevant Labour Laws as</li> </ul> | <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/<br>PARTNERSHIPS   |
|--|---|---|---|
|  |   | <p>stipulated by the Labour Act of Namibia.</p> <p>j. The Contractor shall implement a HIV/AIDS awareness programme as part of Health and Safety.</p> <p>k. Blasting may only be conducted by a qualified person and all laws and regulations will be enforced before and during blasting. Furthermore Clause 1222 of the Standard Specification of the Roads Authority of Namibia shall apply.</p>   |   |
| <p><b>2.5 CONSERVATION OF THE NATURAL AND HISTORICAL ENVIRONMENT</b></p> | <p>To minimise damage to soil, vegetation and historical resources during the re-gravelling phase. This includes soil crusting, soil erosion and unnecessary vegetation destruction.</p> <p>Management of water (domestic and re-gravelling).</p> <p>Management of other sensitive areas.</p> | <p>a. At the outset of re-gravelling (or during re-gravelling 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 re-gravelling activities. Detailed instructions and final arrangements for protection of sensitive areas, preserving of topsoil and rehabilitation of disturbed areas shall be done, in line with the guidelines portrayed in this document.</p> <p>b. Driving outside the road reserve shall not be allowed, except on the agreed haul and access roads.</p> <p>c. During re-gravelling and survey operations, natural features including trees may not be defaced, painted for benchmarks or become otherwise damaged or defaced.</p> <p>d. Vegetation may be cleared within the road reserve as necessary for the re-gravelling of the road. The area on either side of this corridor may not be cleared of vegetation, unless permission is given to do so for detours or access roads. This measure is subject to the Roads Authority of Namibia's specifications with</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/<br>PARTNERSHIPS |
|-----------|-----------|---|---------------------------------|
|           |           | <p>regard to the road reserve.</p> <p>e. A prescribed penalty will be deducted from the Contractor's payment certificate for every mature tree removed without approval.</p> <p>f. Where compaction has taken place in disturbed areas, these areas will be ripped and covered with topsoil kept separate for this purpose. These areas include, but are not limited to, stockpile areas, batching plant areas and crusher areas.</p> <p>g. Poaching or collecting of wild animals is prohibited.</p> <p>h. The killing of any animal (reptile, bird or mammal) is prohibited.</p> <p>i. 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>j. Pipelines for the pumping of re-gravelling water shall as far possible run within the road reserve and along existing tracks and other roads.</p> <p>k. Water will not be allowed to be wasted. This includes water required for re-gravelling and domestic purposes.</p> <p>l. Collection of live plants or parts is forbidden.</p> <p>m. Where possible protected plants will be relocated.</p> <p>n. The Contractor must be sensitive to the various borrow pit areas and shall be aware that certain artefacts could be found here, upon which he shall immediately stop any excavations and record the positions of the items found, as well as the findings, to the National Museum in Windhoek and the National Monuments</p> |                                 |

| COMPONENT | OBJECTIVE | MANAGEMENT MEASURES  | RESPONSIBILITY/<br>PARTNERSHIPS |
|-----------|-----------|--|---------------------------------|
|           |           | <p>Council, who may require certain mitigation actions or further excavations and recordings to be carried out by an archaeologist. Any instructions related to assistance required from the Contractor will be dealt with in terms of the Contract.</p> <ul style="list-style-type: none"> <li data-bbox="875 528 1787 592">o. No new track road may be created outside the road reserve and outside approved borrow pit areas.</li> <li data-bbox="875 603 1787 903">p. The perimeter of each borrow area shall be agreed beforehand with the Engineer and demarcated with a one metre length of red and white safety tape of 100 mm width attached to at least eight trees or large bush around the area near the perimeter. The safety tape shall be replaced when necessary to ensure proper demarcation of the borrow area until commencement of rehabilitation of the borrow area. Extension of any pit beyond its demarcated boundaries shall be approved by the Engineer beforehand.</li> </ul> |                                 |

| COMPONENT  | OBJECTIVE  | MANAGEMENT MEASURES  | RESPONSIBILITY/<br>PARTNERSHIPS   |
|--|--|--|---|
| <p><b>2.6 BORROW PIT MANAGEMENT AND REHABILITATION</b></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 are aesthetically pleasing after decommissioning.</p> | <p>a. Rocky outcrops and surface water drainage lines are the most sensitive areas associated along the route. Borrow pits should not be placed / opened in these highly sensitive areas.</p> <p>b. The removal of re-gravelling material shall be focused where the least significant vegetation exists and where suitable materials are available.</p> <p>c. All borrow pits must be rehabilitated. <b>For the purpose of rehabilitation, it is important to refer to the Roads Authority Borrow Pit Environmental Guidelines attached – APPENDIX A.</b></p> <p>d. A Borrow Pit Rehabilitation Plan will be compiled indicating the rehabilitation schedule (timeframes) for the various borrow pits to be rehabilitated.</p> <p>e. Rehabilitation of the borrow pits will be done in consultation with the landowner.</p> <p>f. Once the pits are scheduled for rehabilitation, the pit should be rehabilitated according to this ESMP. Once rehabilitation is complete, the Borrow Pit Rehabilitation Checklist will be completed (attached to this document). After signing of the Checklist, the borrow pit is closed and NO more activities will be allowed in or around the closed borrow pit.</p> <p><b>NB: A SINGLE GRAVEL STOCKPILE PLACED INSIDE THE REHABILITATED BORROW PIT IS ACCEPTABLE. THIS MATERIAL WILL BE AVAILABLE FOR FUTURE REPAIRS OF THE ROAD.</b></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/<br>PARTNERSHIPS   |
|--|--|--|---|
| <b>2.7 WASTE AND POLLUTION MANAGEMENT OF SOILS AND THE AQUIFER</b> | <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 re-gravelling.</p> | <ol style="list-style-type: none"> <li>a. General 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.</li> <li>b. The temporary domestic waste site will be fenced off with access control to the area.</li> <li>c. Adequate separate containers for hazardous and domestic waste will be provided on site and at the re-gravelling camp.</li> <li>d. The workforce will be sensitised to dispose waste in a responsible manner and not to litter.</li> <li>e. Waste bins will be placed in and around the re-gravelling site to facilitate proper waste management.</li> <li>f. No hazardous or domestic waste may remain on site after completion of the project.</li> <li>g. The construction of properly designed sewage facilities is required at the camp site. The sewage should either be removed on a regular basis and dumped at an approved sewage facility or where it is not possible, the sewage should be managed to such an extent that it does not cause any negative effects on the bio-physical or social environments. Proof of disposal shall be kept as record in the ECO file for environmental performance assessment purposes. No free-flowing sewage is acceptable.</li> <li>h. Toilet facilities will be available in the site camp to the following ratio: 1 toilet for every 15 females and one toilet for every 15 males.</li> <li>i. Temporary toilets should be available at areas of concentrated activities that last for 3 days or more. These include, but are not</li> </ol> | <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/<br>PARTNERSHIPS |
|-----------|-----------|--|---------------------------------|
|           |           | <p>limited to, the construction of culverts and bridges. 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.</p> <p>j. A demarcated vehicle service area will be provided. This area will be large enough to accommodate the servicing of vehicles. This area will have an impermeable floor (lining or concrete), oil trap at the workshop and dedicated wash bay area. At the wash bay all used water will first run through an oil-water separator (that will be constructed and maintained) before the effluent is allowed to exit. The oil trap and oil-water separator will be cleaned on a regular basis to ensure its efficiency.</p> <p>k. Servicing of vehicles is only permitted in the demarcated vehicle service area.</p> <p>l. 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.</p> <p>m. 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.</p> <p>n. Accidental spills will be cleaned immediately. The contaminated soil will be suitably disposed of in a container suitable for hazardous waste.</p> <p>o. Areas which have been contaminated with minor spillages shall be excavated and the contaminated soil shall be placed in PVC bags and taken to the office of the Representative of the</p> |                                 |

| COMPONENT | OBJECTIVE | MANAGEMENT MEASURES   | RESPONSIBILITY/<br>PARTNERSHIPS |
|-----------|-----------|---|---------------------------------|
|           |           | Contractor on Site, from where it shall be disposed of at an authorised hazardous waste site within 24 hours, or as specified by the Engineer.  |                                 |
|           |           | <p>p. Oil, lubricants, and other hazardous materials (batteries) will be stored in separate containers. These containers will have an impermeable floor and will be bunded.</p> <p>q. Disposal of used oils and other hazardous materials will be done at an approved waste disposal site or for collection by an oil recycling company such as WESCO Salvage. Collection or disposal documentation will be kept in the Environmental file for inspection purposes.</p> <p>r. The use of drip trays at the bitumen storage tanks is compulsory. It is proposed that the sprayer nozzles be cleaned on the bypass – where possible.</p> <p>s. Bitumen shall not be allowed to be uncontrollably spilled or dumped. Bitumen waste areas shall be constructed and be lined with thick plastic sheets and be fenced.</p> <p>t. Fuel tanks on site will be properly bunded. The volume of the bunded area will be enough to hold 1.3 times the capacity of the storage tanks. The floor of the bunded area will be impermeable (either lining or concrete) and the sides high enough to achieve the 1.3 times holding capacity. There will be a valve installed in the bunded area to allow rainwater drainage.</p> <p>u. 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> |                                 |

| COMPONENT  | OBJECTIVE   | MANAGEMENT MEASURES  | RESPONSIBILITY/<br>PARTNERSHIPS   |
|--|---|--|---|
| <b>2.8<br/>REHABILITATION<br/>OF RE-<br/>GRAVELLING<br/>SITE,<br/>SERVITUDES<br/>AND CLEARED<br/>AREAS (WHICH<br/>INCLUDES<br/>STOCKPILES)</b> | 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. | <ol style="list-style-type: none"> <li>a. All banded areas, equipment, waste, temporary structures, stockpiles etc. must be removed from the camp and work sites.</li> <li>b. All disturbed areas shall be reshaped to their original contours; as close as possible to the natural conditions before re-gravelling commenced, including the road reserve, detours, re-gravelling camps, and temporary access routes.</li> <li>c. All cuttings must be shaped with a slope to provide a natural appearance, without having to destroy significant vegetation on top of the slope.</li> <li>d. No domestic, construction or hazardous waste may remain on site after completion of the project.</li> <li>e. All temporary water reservoirs will be flattened.</li> <li>f. All areas where soil compaction took place will be ripped.</li> </ol> | <p>Contractor will ensure the mitigation measures are enforced at his own expense.</p> <p>The ECO will monitor.</p> |

### **3. ENVIRONMENTAL AUDITING**

Environmental auditing should be conducted at least once every three months during the re-gravelling operations.

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

The environmental auditing protocol has been established and was conducted as follows:

#### **3.1 Planned Activities:**

This is the auditing procedure that should be followed:

- First meeting with service station owner / manager;
- Acquiring relevant documentation –
  - Environmental Clearance Certificate
  - Previous Audit Reports
  - Environmental Accident Reports
  - Complaints Register
- Site inspection –
  - Focus on the audit checklist
  - Photographs
- Interviews with relevant personnel
- Compilation of draft audit report
- Signing of the draft audit report
- Compilation of the final report incorporating -

Audit protocol, documentation provided by the site operator, auditor's notes & observations, recommendations, results of sampling/monitoring if undertaken, and photos, maps, plans, diagrams & other illustrative material.

### 3.2 Overview of Environmental Audit Activities for the Construction of the Road:



## **4. NON-COMPLIANCE**

### **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 always 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:

- within the boundaries of the site, site extensions and haul/access roads there is evidence of contravention of these environmental Specification;
- environmental damage due to negligence;
- the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time;

Penalties for the activities detailed below, will be imposed by the Engineer 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 or hydrocarbon spillages   | A penalty equivalent in value to the cost of clean-up operation plus an N\$ 5000 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\$5 000  |
| k. | Deliberate lighting of illegal fires  | N\$ 5 000   |

on site

- |   |            |
|---|------------|
| l. Any person, vehicle, item of plant, or anything related to the Contractors operations causing a public nuisance. | N\$1 000   |
| m. Constant leakages from the sewage system.  | N\$ 15 000 |

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.

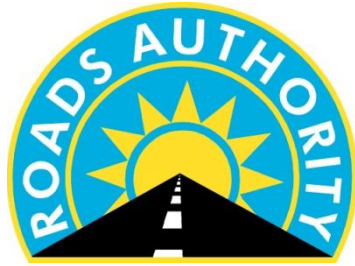
For each subsequent similar offence, the fine may, at the discretion of the Engineer, be doubled in value to a maximum value of N\$10, 000.

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 these Environmental Mitigation Measures and the Non-compliance section of this document.



## **5.APPENDIX A**

# **ROADS AUTHORITY BORROW PIT REHABILITATION GUIDELINES**



Safe Roads to Prosperity

# ROADS AUTHORITY

## PROPOSALS TO REHABILITATE BORROW PITS

### ENVIRONMENTAL GUIDELINES

**JULY 2013**

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## **1. BACKGROUND**

The problem of non-rehabilitated or poorly rehabilitated borrow pits is not new. However, the exceptionally heavy rains and subsequent floods have increased the problem and caused erosion and enlargement of borrow pits.

It is common procedure that towards the end of the construction works for any road project the local communities are consulted, in order to agree on the future use of borrow pits. Even though during the rainy season many areas are flooded also during normal rain years, due to the permeability of the soil, after the end of the rain season, surface water is available only for short periods.

Since water is scarce in the project area, abandoned borrow pits are a welcome means of water storage and therefore the local population often insists that borrow pits are not rehabilitated. Even the mere shaping of the slopes is often not accepted as the soft topsoil, at the bottom of the borrow pit, once soaked with water, often becomes a death trap for cattle, which gets stuck and cannot escape anymore.

On the other hand, steep, often vertical slopes of borrow pits are a safety hazard to the local population and life stock as well, in particular when erosion created overhangs that can break off. Erosion further endangers nearby structures, houses, fences, graveyards, vegetation and roads.

Therefore, technically adequate yet environmentally acceptable methods for the rehabilitation of these borrow pits duly considering the current land use, mainly as water storage facility, is herewith provided. A sensitive and balanced approach was used, reflecting the land use requirements as well as safety and aesthetics.

## **2. INTRODUCTION**

A borrow pit normally constitutes when natural material is obtained for any construction activity normally associated with roads and other structures. The material obtained may vary, but is best described as sub-soil, sand, stone, conglomerates or in many cases here in Namibia – calcrete. These small-scale mining activities associated with borrow pits excavate the material by means of heavy machinery and results in some kind of void within the natural topography of the area.

The most common negative environmental impacts associated with the opening of borrow pits are change of land use, change in topography (high points – berms and low points – voids), on the natural vegetation, surface water runoff characteristics, soils and the sense of place (aesthetics).

Safety issues also need to be considered. Steep slopes and high walls, damming of water and unstable soils carry the potential of injury or even death to animals and people. Therefore, it is important to focus on the rehabilitation guidelines to rectify or mitigate these negative impacts for future and historically opened (used) borrow pits.

Therefore, not only abandoned old borrow pits should undergo a check in line with the guidelines contained herein. **The guidelines for the rehabilitation of borrow pits should be included as standard approach for all Roads Authority road construction, rehabilitation and maintenance projects in the relevant project specifications and environmental management considerations.**

The multitude of potential negative environmental impacts has been consolidated to a 4-tier Severity Class System to describe the potential hazard risk, which is presented below. This easy-to-use guideline enables the Engineer on site to assess the hazard risk of any borrow pit and to instruct the required mitigation measures to rehabilitate any borrow pit technically sound, safe and aesthetically pleasing.

### **3. SEVERITY CLASSIFICATION**

Borrow pits after use have different shapes and depths and are located in different environments. Therefore, they must be considered individually. Nevertheless, general criteria can be used to describe their hazard potential.

The following table determines the Severity Class for the hazard potential of any borrow pit – focussing on the protection of health and safety of both animals and people.

The following methodology is applicable to determine the severity class:

- The borrow pits are checked against the criteria depicted in the table below and their hazard potential is classified as None / Low / Medium / High;
- Should any one class score fall within the next higher class, then the

classification of the borrow pit shall be determined by that higher-class score;

- Example
 

|                              |       |      |
|------------------------------|-------|------|
| 1. High walls:               | <1m   | None |
| 2. Road proximity:           | >100m | None |
| 3. House/Dwelling proximity: | 400m  | Low  |
| 4. Surface water drainage:   | >500m | Low  |
| 5. School proximity:         | >500m | None |
| 5. Livestock present         | 0     | None |

⇒ **Risk Result: Low Risk**

| Severity Classification  | A           | B          | C             | D           |
|--|-------------|------------|---------------|-------------|
| High Walls (height)  | < 1m        | 1-2m       | 2-3m          | >3m         |
| Road Proximity from shoulder of the road   | >100m       | 60-100m    | 20-60m        | <20m        |
| House - Dwelling Proximity distance (if fenced off, from the fence)                              | >250m       | 100 – 250m | 50 – 100m     | <50m        |
| Surface water drainage lines proximity distance (open water course)                              | >500m       | 300 – 500m | 100 – 300m    | <100m       |
| School (and other social services facilities) Proximity distance (if fenced off, from the fence) | >500m       | 300 – 500m | 100 – 300m    | <100m       |
| Livestock present in the camp / area   | 0           | 1-5        | 6-10          | >10         |
|  |             |            |               |             |
| <b>Risk – Result</b>   | <b>None</b> | <b>Low</b> | <b>Medium</b> | <b>High</b> |

## **4. BORROW PIT REHABILITATION**

### **4.1 General**

In order to reduce the hazard potential of borrow pits several approaches are potentially possible, however not all of them will eliminate the hazard in the long run. For instance, fencing-off the borrow pit would eliminate the danger of people or animal falling into the pit, however on the other hand, cattle can also not reach the pit to drink, except if a lockable gate is included. Further, future erosion might extend the borrow pit beyond the fence and subsequently be a potential danger again.

On the other hand, structural measures are more expensive; however, they potentially mitigate the danger sustainably. Nevertheless, also structural measures will have to be selected carefully.

The typical measure is to slope the pit in such a way, that it is safe, but still accessible. However, this might require the upper rim to be extended further, and adjacent land use (e.g. homesteads) might be too close to realize this option.

Further, dozing soil into the pit in order to reduce the slope and to prevent future erosion reduces the storage volume, which will be opposed by the local community, as experienced on numerous occasions in the past. Depending on the soil type, the loose soil in the borrow pit, once soaked with water poses a life treat to animals as they can get stuck and if not being able to free themselves, they will die.

### **4.2 Rehabilitation Options**

The above discussion demonstrates that there is no “one-type-fits-all” solution. Therefore, despite general rehabilitation options being prescribed in these guidelines, a careful selection and application of the rehabilitation options, considering the individual circumstances, is required.

Implementing the mitigation measures will ensure a safe environment for both wild and domestic animals and inhabitants of the adjacent land, ensuring a stable bio-physical environment, where natural processes can re-establish.

Two preferred rehabilitation options are available for borrow pits according to the material available for rehabilitation and the Severity Classification, based on the

above table. Generally, Option One is to be applied wherever possible.

Should there not be enough material or space available, to rehabilitate the borrow pit as described in Option One, the only viable option for rehabilitation will be Option Two.

Additionally, in order to prevent further erosion, especially where the borrow pit through erosion encroaches into the road reserve or where human safety at settlements and near social service facilities is compromised, the rim and slope of the borrow pit shall be protected using low strength concrete (15 Mpa) reinforced with mesh wire.

This additional erosion protection measure will ensure that after rehabilitation the borrow pit will not become a hazard in the future again through the continued uncontrolled extension.

Generally, it is not encouraged to remove vegetation that has already re-grown in the borrow pit area, especially when the borrow pit is old.

Should however bushes be removed during the cutting of the slopes, these shall be treated similar to dead vegetation, as described in Option One below (5).

During all construction related operations the spreading of alien invasive vegetation is an environmental threat, which must be managed. The rehabilitation options below specify the removal (burning) of alien vegetation for that purpose.

However, typically the problem lies with the identification of such species by the laymen. A list of the ten most invasive plant species that shall be eradicated or controlled is attached to these guidelines.

#### 4.2.1 Option One

This option is considered the ideal rehabilitation option and it must be considered as first option for borrow pits, with a Severity Classification of:

- ✓ **None** or
- ✓ **Low** or



✓ **Medium**

and

- ✓ **where enough material and space are available for the rehabilitation actions.**

The following mitigation measures must be applied:

1. The borrow pit floor will be levelled and no topographical high points will be present on the floor;
2. No walls or steps will be present in or around the borrow pit;
3. The borrow pit floor will be free of any spoils, large rocks or any form of construction waste – this material shall be deposited at the bottom of high walls and will thus be covered with material when cutting the slopes;
4. The slopes will have a gradient not steeper than 1:3 and will be graded or bladed;
5. Should dead vegetation be available, it will be distributed evenly on the slopes to prevent wind and water erosion;
6. Overburden, top-soil and any other material, which was removed when the borrow pit was opened and stockpiled on the outer sides of the borrow pit, will be distributed on the slopes and floor of the borrow pit with a maximum thickness of 300 mm;
7. Finishing of the slopes should be done in concentric circles, starting from the borrow pit floor and moving upwards towards ground level to prevent initial erosion induced by water and wind;
8. Remaining material (overburden and topsoil) will be shaped as a berm with a maximum slope 1:3, with a distance of at least 3.0 m from the edge of the borrow pit and not closer than 9.0 m to any structures (roads, buildings, etc.) - the berm will not be higher than 1.0 m;
9. All alien vegetation has been removed from the floor, the slopes and berms of the borrow pit – to date the only method of eliminating alien vegetation (excluding the use of toxins) is to burn it; this shall be done within the borrow pit and remaining material shall be deposited at the bottom of high walls and will

thus be covered with material when cutting the slopes.

#### 4.2.2 Option Two:

Should the application of the first rehabilitation option not be possible, this Option Two shall be considered.

This rehabilitation option is applicable to borrow pits, which have a Severity Classification of

- ✓ **High or**
- ✓ **where sloping to the outside not possible due to adjacent obstacles or**
- ✓ **where not enough material is available for the rehabilitation actions of Option One.**

The following mitigation measures must be applied:

1. The borrow pit floor will be levelled and no topographical high points will be present on the floor;
2. The borrow pit floor will be free of any spoils, large rocks or any form of construction waste– this material shall be deposited at the bottom of high walls and will thus be covered with material when cutting the slopes;
3. The borrow pit will be fenced off:
  - a. with barbed wire and galvanized steel poles, minimum height 1.2 m,
  - b. with one access to the pit, which will be controlled by a gate of the same material as the fence, the gate will be lockable and access granted to the landowner only, if possible,
  - c. with the fence being constructed at least 5.0 m from the edge of the borrow pit, enclosing the entire borrow pit;
4. A distance of at least 9.0 m to any adjacent structures, roads and other obstacles shall be maintained;
5. All alien vegetation has been removed from the floor, the slopes and berms of the borrow pit – to date the only method of eliminating alien vegetation (excluding the use of toxins) is to burn it; this shall be done within the borrow

pit and remaining material shall be deposited at the bottom of high walls and will thus be covered with material when cutting the slopes.

## **5. BORROW PIT TAKING-OVER CERTIFICATE**

It is essential that any borrow pit after rehabilitation meets all requirements set out in Option One (ideally) or Option Two (alternatively). Only after the rehabilitation meeting all requirements, the borrow pit can be handed over to the landowner and officially considered as rehabilitated.

After the borrow pit has been handed over, the contractor or any other party may not be allowed to engage in any further activities in or around the handed-over borrow pit. This includes, but is not limited to activities such as further excavations, dumping of overburden or spoils, sloping, etc.

Should the landowner or any other third party (including RA construction or maintenance contractors) want to make use of the borrow pit in future, these shall be encouraged to apply the same rehabilitation standards as set out in these guidelines.

Under no circumstances shall the borrow pit be extended in such a way that the current Severity Class before rehabilitation would be increased, meaning the borrow pit becoming more dangerous to human and animal life or encroaching into the road reserve.

In order to keep records of the rehabilitation operations meeting all requirements and in order to avoid claims from the public with regard to un-rehabilitated borrow pits, it is prudent to record the completion of the rehabilitation in accordance with the specifications and the acceptance thereof.

The following Borrow Pit Taking-Over Certificate shall therefore be signed by the parties upon completion of the rehabilitation and handed over to the client for record keeping.

## **BORROW PIT TAKING-OVER CERTIFICATE**

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/topsoil, 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)

Engineer: \_\_\_\_\_

(Name)

(Signature)

Consultant: \_\_\_\_\_

(Name)

(Signature)

Client: \_\_\_\_\_

(Name)

(Signature)