ENVIRONMENTAL MANAGEMENT PLAN (EMP)

FOR THE OPERATIONS AND MANAGEMENT OF THE EXISTING OKANKOLOSE GRAVEL BURROW PIT IN OMUTHIYA, OSHIKOTO REGION

PREPARED FOR:

Omuthiya Town Council

P. O. Box 19262

Omuthiya

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Table of contents

List of Tables

List of Figures

LIST OF ACRONYMS

CBD:	Central Business District
DEA:	Department of Environmental Affairs
DoF:	Directorate of Forestry
DRP:	Decommissioning and Rehabilitation Plan
EAP:	Environmental Assessment Practitioner
ECC:	Environmental Clearance Certificate
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment
EHP:	Environmental Health Practitioner
EMA:	Environmental Management Act
EMP:	Environmental Management Plan
FEL:	Front-End-Loader
GPS:	Global Positioning System
I&APs:	Interested and Affected Parties
MAWLR:	Ministry of Agriculture, Water and Land Reform
MEFT:	Ministry of Environment, Forestry and Tourism
MURD:	Ministry of Urban and Rural Development
NFA:	Namibia Football Association
OTC:	Omuthiya Town Council
TLB:	Tract-Loader-Bucket

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

The town of Omuthiya is centrally located in the Oshikoto region and serves as a capital town of the region. Omuthiya town is one of the fastest growing town in the northern part of the country. The strategic position of the town within the region has generated a high concentration of commercial and business activities, mostly along the main road (B1 Road).

The Omuthiya Town Council has been operating the gravel burrow pit at Okankololose for more than 10 years now. The gravel pit is located within the Omuthiya townlands jurisdiction and has been in existence for more than 10 years. Gravel roads have an upper layer of gravel (known as a gravel wearing course), which is placed on the roadbed to allow the gravel road to aid the movement of traffic safely and effectively. With time, the gravel-wearing course is eroded away by both traffic and natural elements. This layer needs to be replaced to continue to provide a safe and functional surface to the road user. To undertake the road works, a suitable source of material required for the gravel-wearing course. The site contains suitable gravel material for the supply of gravel wearing materials for roads.

Although the gravel mining activities have been carried out for several years, no Environmental Impact Assessment (EIA) nor an Environmental Management Plan (EMP) has been prepared for this site. According to the Environmental Management Act (EMA), Act No.07 of 2007, all mining and quarrying activities cannot be carried out without an Environmental Clearance Certificate (ECC) being obtained. Hence, the Omuthiya Town Council (OTC) has appointed Green Gain Environmental Consultants cc to prepare an Environmental Management Plan (EMP) and apply for the ECC for their existing gravel mining activities.

This document constitutes the EMP for the existing gravel pit that supply gravel materials for new roads and the re-sealing of gravel roads in the town of Omuthiya. The EMP will serve as a binding document for the Omuthiya Town Council, contractors and subcontractors on their roles and responsibilities concerning environmental management of the gravel mining activities.

1.2 Objectives of the EMP

The EMP has the following objectives:

- To provide information on the potential negative impacts associated with the present and future gravel mining activities.
- Present mitigation measures for the identified negative impacts and enhancement measures for the positives impacts.
- To provide guidelines for the management and monitoring of the identified environmental issues.
- To provide guidelines to the responsible persons to follow appropriate contingency plans in the case of various possible impacts.

1.3 EMP Methodology

Since the Okankolose Gravel Burrow Pit has been in operation for many years, the preparation of an Environmental Management Plan was considered sufficient. The preparation of the EMP is to ensure the gravel mining activities are taking place in an environmentally friendly manner and that potential negative impacts are avoided, mitigated or lessened. The EMP will be submitted to the competent and regulatory authorities n line with the EIA Regulations, to achieve regulatory compliance. The following approach was used during the completion of the Assessment Process:

1.3.1 Baseline assessment

The development of the EMP commenced with the collection of baseline information on the receiving environment in terms of the biophysical settings i.e., the surrounding flora and fauna and adjacent land uses. The baseline information also included the existing mining practices and processes and other related activities. The full description of the site is contained on Section 2 of this report.

In addition to the site visit, the EAP also made use GIS and Google earth mapping to conduct spatial analysis of the area in terms of the elevation and topography, hydrology, soils, geology, distance to adjacent land uses etc. This information is also contained in Section 2. Description of the site.

1.3.2 Review of existing documents

The consultant also made use of existing information to establish the baseline which form the basis of the EMP preparation. Documents reviewed include, Atlas of Namibia, Regional Geography of Oshikoto region, Groundwater in Namibia: an explanation to the Hydrogeological Map as well as relevant national and international legislations as described in Section 3 of this report.

1.3.3 Public Participation Process

Since the existing Okankolose Gravel Burrow Pit are located within the Omuthiya Townlands, there was no need for consent from the Traditional Authorities as it is in many Gravel/sand mining cases. However, the Acting Chief Executive Officer, the Manager: Technical, Planning and Environment and the Environmental Health Practitioner (EHP) provided inputs and contributions toward the preparation of the EMP.

Although, there are traditional homesteads, adjacent to the Okankololose, the resettlement process to move these houses is underway. Hence, obtaining consent from the nearby houses was deemed not necessary, more so because the site is located well within the Omuthiya townland. However, residents and stakeholders from Omuthiya town have been engaged by the Environmental Health Department on numerous occasions and their inputs, concerns were noted and, also incorporated in this EMP. In addition, the EAP have consulted the Roads Authority with regards to the adjacent gravel road, their inputs have been incorporated in this EMP.

Moreover, upon approval of the EMP by the authorities, the EAP is expected to provide training to the Town Council Officials as well as Gravel Miners and/or prospective miners on the content of this EMP and other conditions to be imposed by the authorities. This training will enable the successful implementation of the EMP and ensure all miners or prospective miners are observing high degree of environmental due diligence.

2. DESCRIPTION OF THE ACTIVITIES

2.1 Locality

The existing gravel burrow pit is located about 2 - 3km south of the town in the Okankololose village (see locality map below). The gravel burrow pit is located within the Omuthiya townlands.

Figure 1: Locality map for the gravel burrow pit

2.2 Site Extent

The size of the area, suitable for gravel mining is approximately 10ha in extent (depicted in blue), of which about 4ha has already been mined (depicted in red) and the remaining about 6ha is yet to be mined (see figure below).

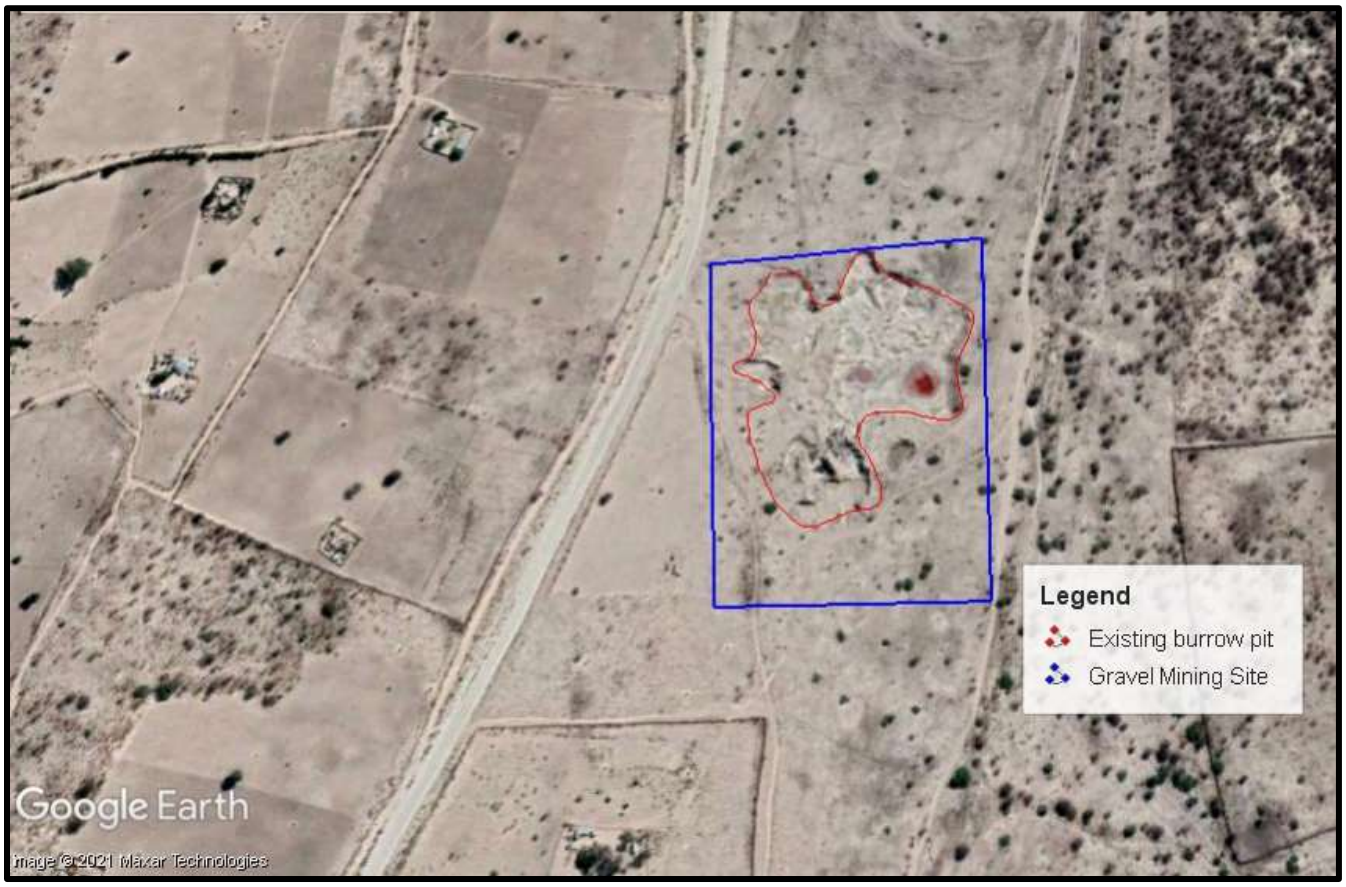

Figure 2: Site extent (Source: Google Earth, 2021)

2.3 Site Accessibility

The site is accessed via an already existing gravel road which links to the town's CBD roads. Since the gravel mining activities has been in existence for several years before the establishment of the formal road, the existing burrow pit lies less than 100m from the road reserve. It is however noted that no further gravel mining activities are to take place within the 100m buffer zone from this existing road reserve.

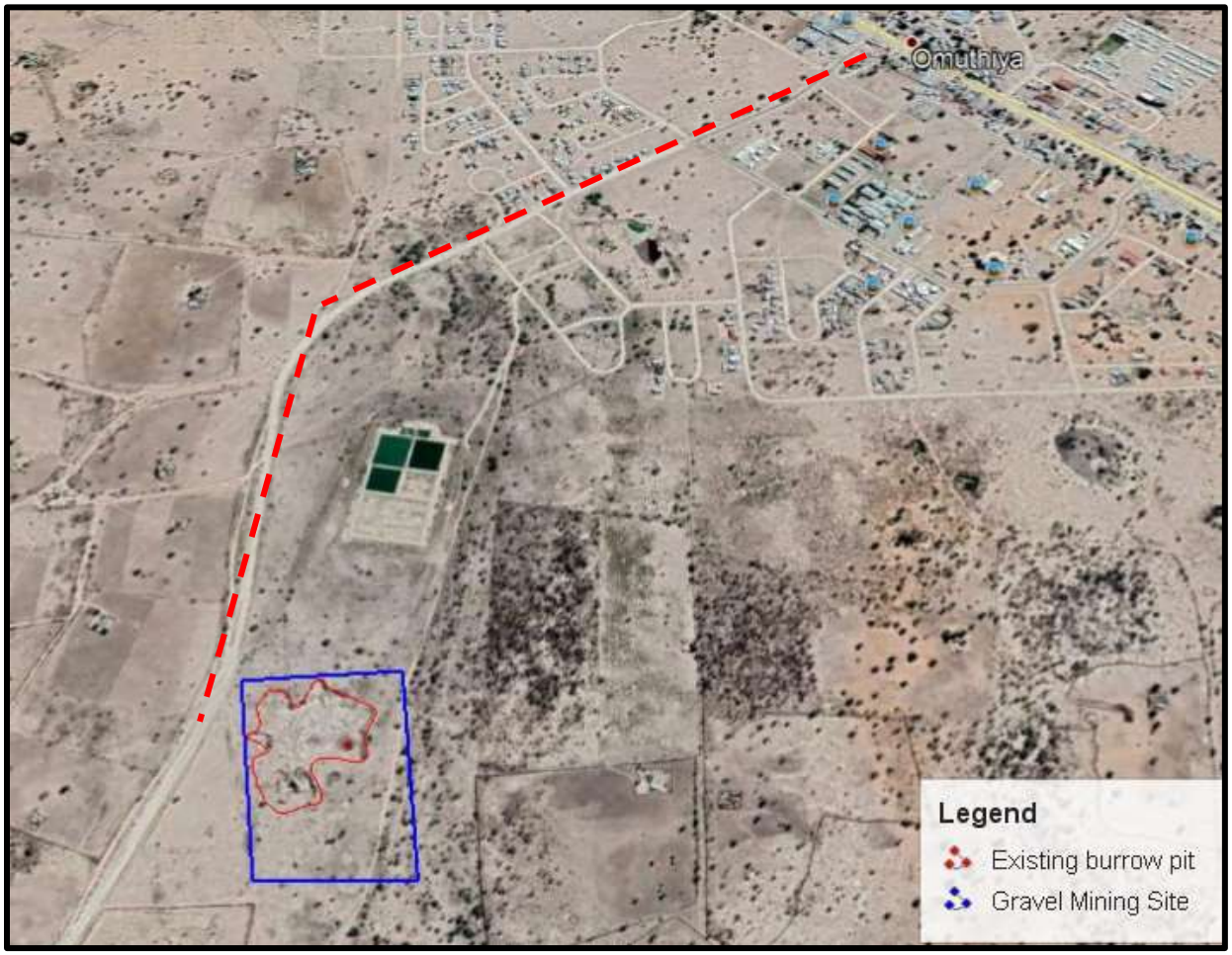

Figure 3: Access to the site (Source: Google Earth, 2021)

2.4 Site Surroundings

The site is surrounded by traditional mahangu fields and homesteads of the Okankololose village. Since the area falls under the Omuthiya approved Townlands, it is noted that the owners of the mahangu fields will be compensated and relocated as per the Government resettlement programme.

Figure 4: Area surroundings (Source: Google Earth, 2021)

2.5 Gravel Mining process

The process of gravel mining entails the removal of the topsoil (soft-black materials) to a depth of ±1.5m, followed by the excavation of white-hard material (G5). The depth at which the G5 material is mined ranges from 2-3m, depending on the quality and availability. The gravel mining process is carried out into two phases namely, operations and decommissioning. The activities associated with these phases are:

- Excavation
- Stockpiling
- Loading
- Transportation
- Offloading at the destination
- Site rehabilitation

Figure 5 (A-D) below present the overview of the existing situation of the gravel mining activities. As displayed in the images below, the existing gravel mining activities have created a large and deep open pit.

Figure 5 Overview of the mining activities (A-D)

Excavations are done by means of Tract-Loader-Bucket (TLB), excavators or Front-End-Loaders (FEL). The gravel is deposited onto the temporary stockpile area within the site and loaded onto tip trucks by the FEL. The loaded gravel is then transported offsite and sold to the local market. This process does not require the use of water.

The mining activities are mainly done by Contractors and Sub-contractors under the supervision of the Department: Technical, Planning Environment. The gravel (G5) material is mainly used in the road construction and serves as the backbone of the development of the town.

2.6 Current Issues

Below are issues that were observed by the EAP upon the site screening and baseline assessment.

a) Site description

- The site falls within the OTC Townlands.
- The site is easily accessible from the existing road.
- The site has a water depression feature and holds water during rainy season.
- Vegetation of the site is mainly herbaceous grass species, thorn bush of *Acacia mellifera, Acacia erioloba*, herbs and shrubs including the invader *Adriana quadripartite* (bitter bush).
- Control of the site by means of a site security and inspections carried out by OTC Council officials.
- Surrounding households are to be relocated through the Government resettlement process.

b) Issues of concerns

- There are no ablution facilities onsite.
- There are no refuse bins.
- The site is not fenced off or out of bound for animals and the public.
- Contractors are not served with formal Permits.

2.7 Project Activities

In terms of Section 3.5 [1] (g) of the EIA Regulations, the baseline report should include an investigation of feasible alternative options to any proposed development. Alternatives to the project refers to the different means of meeting the general purpose and requirements of the activity. Alternatives considered under this Scoping study are such as.

- No action
- Site alternative (the property on which or location where it is proposed to undertake the activity)
- The mining method and technology

2.7.1 No Action

The no action option would mean that the existing site should be closed off and no further gravel mining should take place within the Omuthiya Townlands. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. However, from the socio-economic development perspective, the No-go Action will not be an ideal option since the existing gravel burrow pit is the backbone of all road construction within the town of Omuthiya. Closing the site without giving an alternate option will be detrimental for the development of the fast-growing town of Omuthiya and will halt all major economic development of the town and the Oshikoto region at large.

2.7.2 Alternative site/s

The existing Okankololose gravel burrow pit is the most preferred mining site and has been in existence for 10 years. There is another site which is partially within the Omuthiya townland and partially on the communal land. The latter is an oldest gravel mining site but, it is believed that the material (G5) has been depleted and the site is no longer suitable for mining.

It is highly recommended for the Omuthiya Town Council to do a proper Rehabilitation and Decommissioning of this site to ensure that no further gravel mining will take place from the old site and that the Okankolose Gravel Burrow pit be the only formal and legal gravel mining site within Omuthiya Townlands. Such action will also allow the Omuthiya Town Council to control and monitor all gravel mining activities within its townlands and safeguard the environmental management priorities of the area.

2.7.3 Alternative mining method and technology

As described above, the current mining process entails the removal of the topsoil and extraction of the subsoil which is the hard materials (G5) used in the constructions of gravel roads. The excavation depths range from 3-5m, depending on the availability of the materials. Currently, the excavated topsoil is disposed of indiscriminately and sometimes mixed with overburden and waste materials. It therefore recommended that the gravel mining be conducted in the following manner to reduce the potential negative impacts to the soil and ensure ecological restoration of the area after mining.

- The topsoil must be properly and carefully removed and stored separately from other materials.
- Extraction of subsoil (G5) must be done at a maximum depth of 3.5m, instead of 5m.
- The excavations should be done at same depth (3.5m max.) and no haphazard excavations should be allowed.
- Avoid spillage or leakages of lubricants and chemicals such as oil, grease, etc.
- All spoiled or contaminated soil should be collected and disposed off at a designated disposal site.
- All solid waste should be collected from the site and disposed off at the disposal site.
- The edges of the excavation should be protected from surface drainage to contain soil erosion by water during the rainy season.
- Mined out areas should be backfilled with topsoil and reseeded with seeds of local vegetation.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Socio-economic of the area

3.1.1 Location, History and Demographic

Omuthiya, traditionally known as Omuthiya Gwiipundi is the capital town of Oshikoto Region in northern Namibia and is situated approximately 10 kilometres from the northern border of the Etosha National Park. The town was proclaimed in October 2007 and the Omuthiya Town Council was established in September 2008. The estimated current town population is 3 800 of which 2800 are female and about 1000 male, according to the 2011 census. The council, however, predicts the current town population to be about 5 500.00 people. It is uniquely situated on the world famous Etosha Pan, between the main towns of Ondangwa in the north and Tsumeb in the south.

Figure 6: Omuthiya Townlands (Source: Google Earth, 2021)

The town is servicing a surrounding community of approximately 80 000 people. A sharp increase in the community of the Town is expected with the development that is taking place, the business opportunities that are being created and the regional and municipal government jobs. The surface area of Omuthiya townlands covers 12,497 hectares (including part of the Etosha National Park). The Town Council Office lies a few hundred meters away from the Oshikoto Regional Council head offices.

3.1.2 Social and Economic Development

Having been declared the capital town of Oshikoto region, several government and public institutions as well as Namibian Police (NAMPOL) have opened their regional office headquarters in town. There are two primary schools, two combined schools, one secondary school and a school circuit inspectorate office. The town is also served with a district hospital, a clinic, NIP laboratory, a pharmacy and General Practitioner (Private Doctors). Additionally, the town has a modern State Veterinary office and National Food Reserves (NFR).

Agriculture serves as the main economic activity with tourism becoming increasingly important with direct access from the Etosha National Park via the King Nehale Gate. The town is well served with all kind of businesses from small-scale dealers to large scale retailers. The Town is also served by most known retail brands operating within town, such as Shoprite U-Save, Style, Choppies etc. There are also many other local brands operating, offering a good shopping ambiance, especially craft, baskets unique to the town and surrounding villages.

The town of Omuthiya is located about 10 kilometers from the King Nehale Gate of the Etosha National Park. The town serves as a gateway to and from the northern part of the country and thus tourists and passersby contribute to the business prosperity in town. There is a main road and railway line crosses the town, resulting in ribbon type urban settlement along the road. The town is also home to a few fountains which currently have no activities for the residents or visitors. Additionally, the water from the fountains is currently not used for much except as a water resource for livestock and wildlife. These present numerous opportunities for the town related to the Tourism industry such as hosting/accommodating tourist for day trips into the park, offer cultural experiences to tourists staying within the park or fun and recreational activities at or around the fountains. Activities such as these would lead to employment and income generating opportunities for the residents. Another potential for income and employment opportunities is the agricultural sector. The Omuthiya town is known to be an agricultural hub for the surrounding

villages and neighboring towns like Ondangwa. The town currently hosts AMTA silos for the Mahangu crop, a staple in most northern Namibia regions. The town has an opportunity to supply Mahangu on a large scale to a wider market to the rest of Namibia.

Apart from the tourism and recreational potential it also holds possibilities for agricultural development, such as irrigation crops. It has also been established that the area is conducive to producing citrus crops. This can be realized through smart partnerships and cooperation with public enterprises such as Agribusdev (Agricultural Business Development), AMTA (Agricultural Marketing and Trading Agency), NAB (Namibia Agricultural Board), Ministry of Agriculture, Water and Land Reform and educational institution.

The Town Council was also sponsored an artificial soccer pitch by the Fédération Internationale de Football Association (FIFA) through the Namibia Football Association (NFA) development programme, that will bring much-needed football development to the region.

3.2 Description of the surrounding biophysical environment

3.2.1 Climate

The Oshikoto Region is described as a semi-arid savannah with a rainfall average ranging from 400-500 mm per year. The climate is classified as a local steppe clima with a subtropical thorn woodland bio zone. The summer season of the region is described as hot with a maximum temperature between 32 °C and 38 °C during the hottest months and coldest winter temperatures are around 10 °C to 16 °C (Mendelsohn, 2003).

In this region, December is known as the hottest month of the year, while July is known as the coldest month of the year in the region. The mean evaporation figure for the region lies from 3000 mm to 3200 mm per annum.

Omuthiya is mostly cloudy but generally clear and hot all year around. The average temperature for the year in Omuthiya is ± 20 °C. The warmest month, on average, is November with an average temperature of ± 26.4°C. The coolest month on average is July, with an average temperature of ± 17.2°C. The wind experienced at any given location is highly dependent on local topography and other factors.

The average hourly wind speed in Omuthiya experiences mild seasonal variation over the course of the year. Omuthiya experience the highest winds speed in the months of May to October, with average wind speeds of more than ± 8.2 km per hour while October to May experience the lowest winds. The calmest day of the year is February, with an average hourly wind speed of ± 6.8 km per hour.

3.2.2 Topography and Drainage

Oshikoto Region is mostly flat with pockets of higher ground at the Otavi Mountain Range and the mountain at Halali. The elevation is between 1 090 and 1 150 meters above sea level. The topography of the study area is flat terrain.

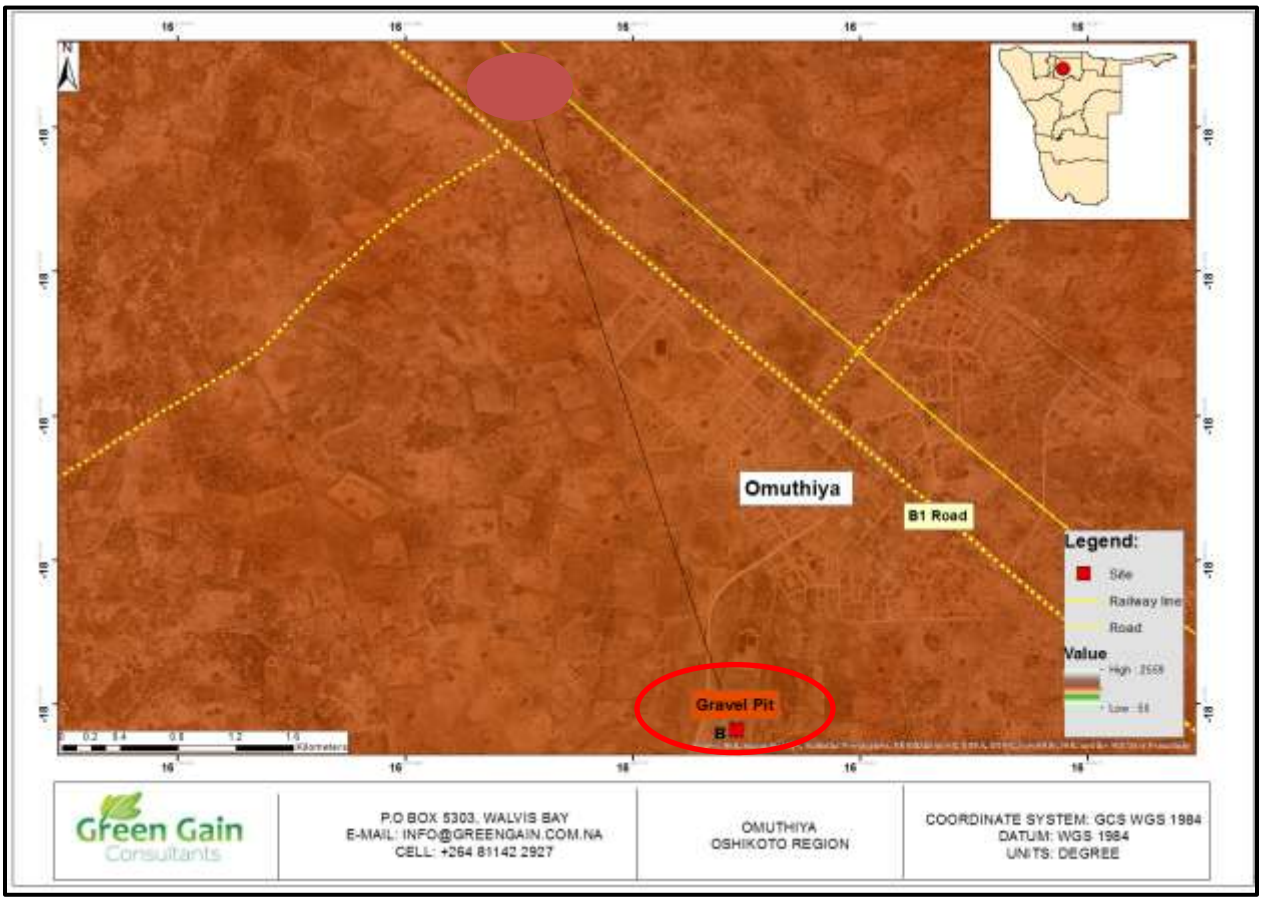

Figure 7: Map depicting the elevation of the gravel pit.

3.2.3 Local geology

Namibia has a unique and ancient geological history with great rock formation. The region lies on old continental base of graphite, gniesses, and volcanic rock however most of this rock lies thousands of meters below the current land scape (Mendelsohn, Obeid, & Roberts, 2000). The predominant rock types in Oshikoto region are Damara sandstone, Otavi dolomites and Nosib quartzite. The Otavi Mountains have rich ore bearing deposits, costly to exploit, while copper is mined. Saltpans occur in northern parts as well as in the Etosha Pan.

Figure 8: Map depicting the rock type of the gravel pit

3.2.4 Local soils

Northern Kalahari Sandveld covers the eastern part, Aeolian Sands cover the northern area with parches of Soloneze Soils which are medium textured, bleached or even white. It covers all plains and drainage depressions and has a very low clay content. Areas bordering Etosha have non-soloneeze soils that are fertile. These medium-textured soils are often considered ideal for agriculture as they are easily cultivated by farmers and can be highly productive for crop growth. No hard-geological rocks are exposed at the site. The surrounding area is covered with fine sandy soils. The soils are of relatively low soil fertility, with low plant yields.

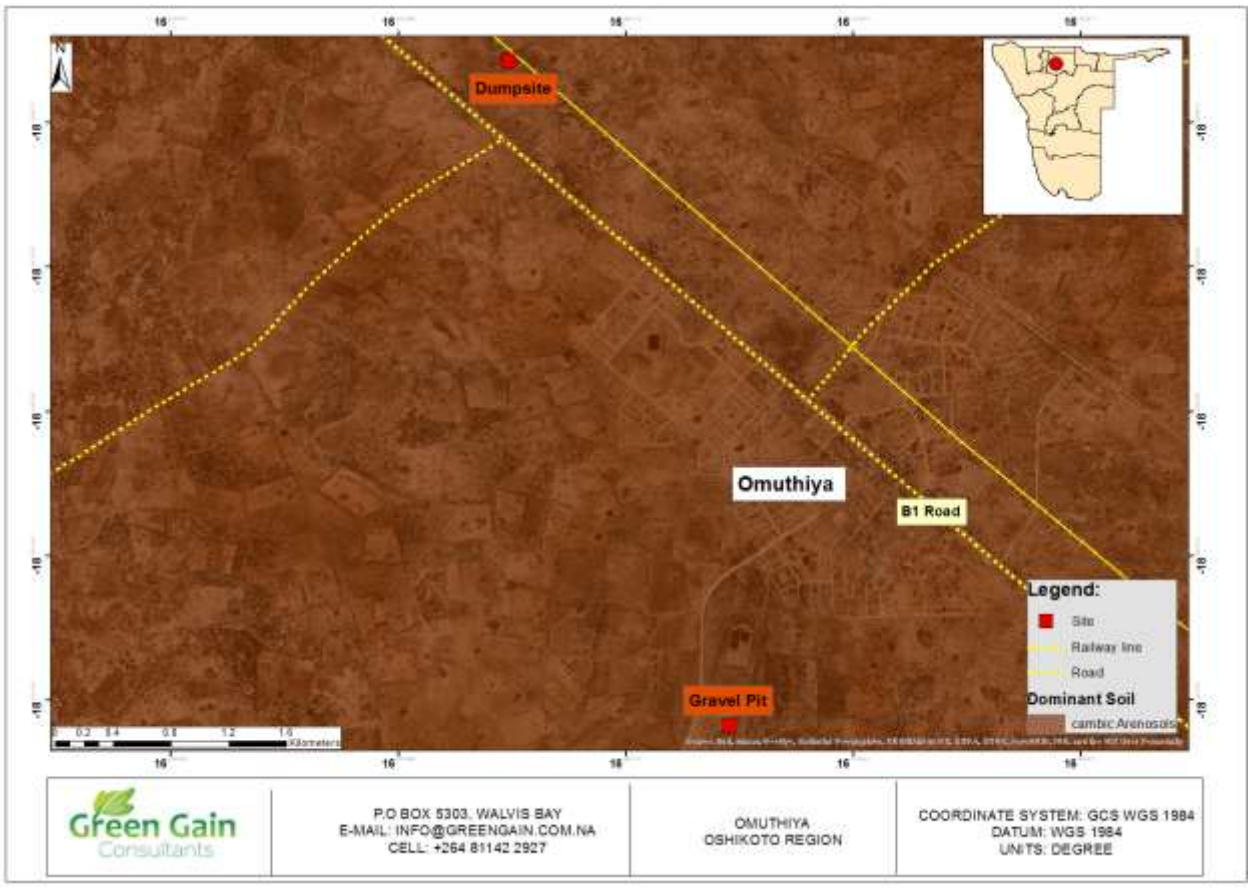

Figure 9: Map depicting the soil type of the gravel pit.

3.2.5 Vegetation

The vegetation in the Oshikoto Region varies greatly from the north to the south and from the east to the west. According to (Strohbach, 2014) the north and north-east, this *Colophospermum mopane* shrubveld is gradually replaced by broad-leafed savannas, whilst to the south-west, the vegetation is replaced by the *Terminalia pruinoides* woodlands. This transition is very patchy in nature. To the south, some *Odyssea paucinervis* occurs, whilst to the east *Terminalia pruinoides* and *Albizia anthelmintica* become prominent. Vegetation around the study area can be described as sparse dominated with thorn trees and shrubs. Domestic animals like goats and cattle can also be found around the study area.

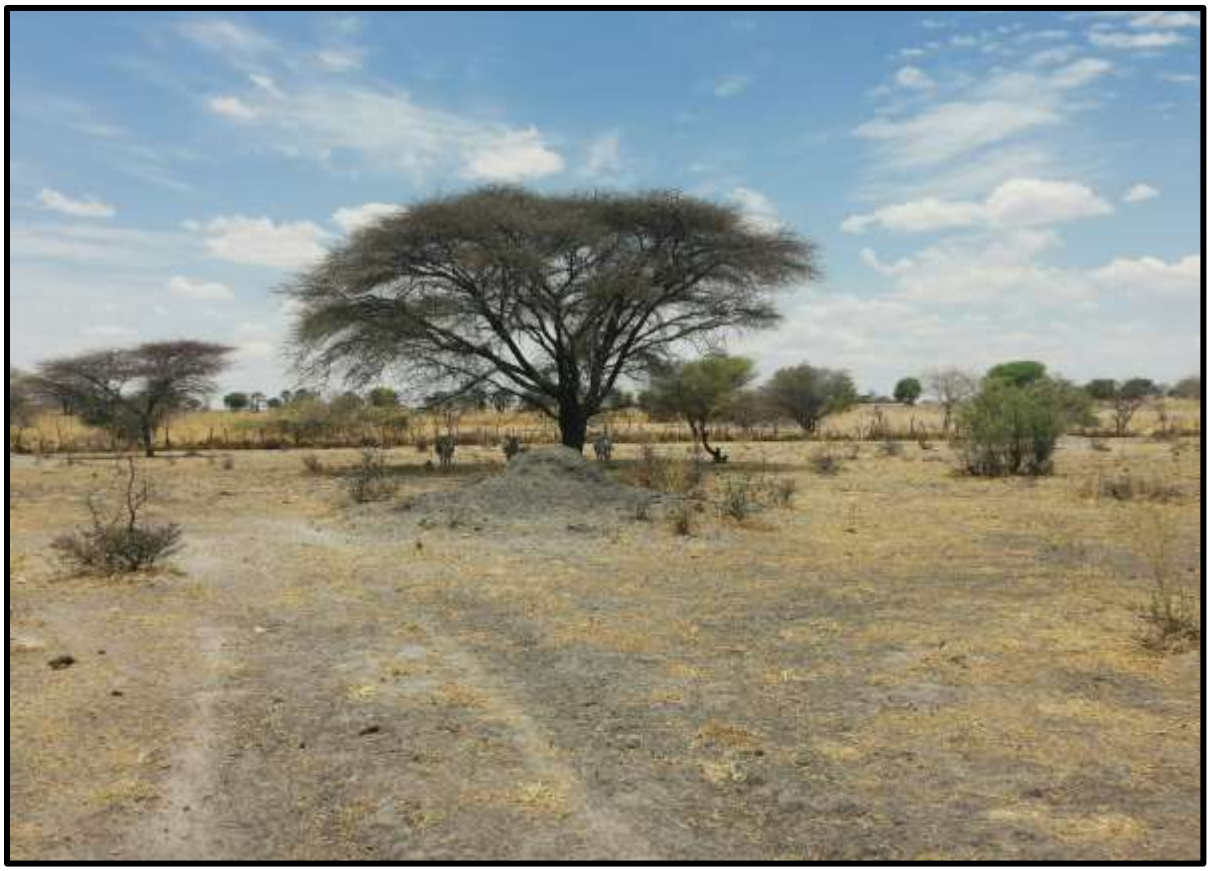

Figure 10: Vegetation onsite

3.2.6 Groundwater potential

Numerous underground caverns, with high-quality groundwater, are found in limestone. The drainage system is defined by three river systems flowing from east to west and two systems originating in Central Angola draining into the Etosha Pan. Oshanas, local flood areas, are found in the northern area and become flooded during rainy seasons. After rain, fresh surface water in pans and oshanas is available until June-July.

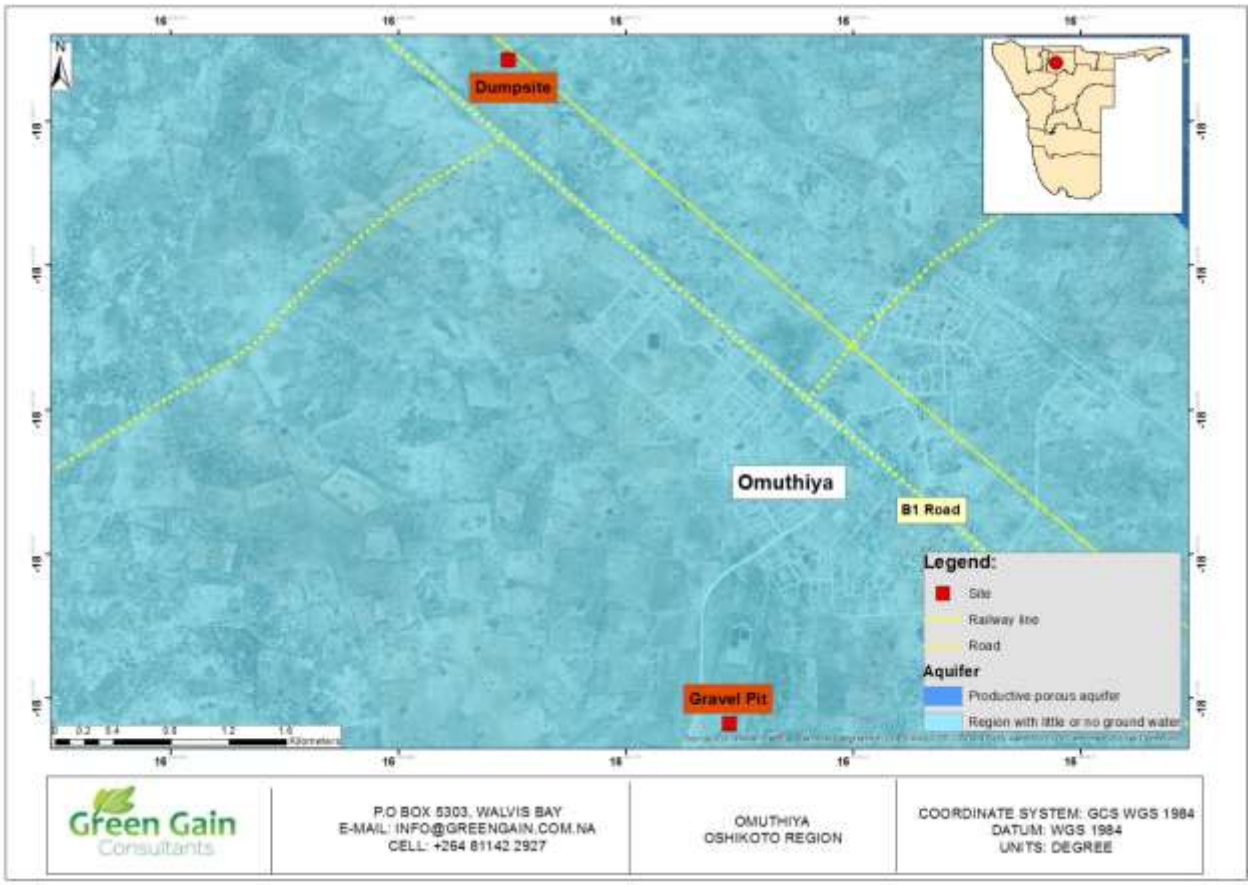

Figure 11: Map depicting the groundwater potential of the area.

The quality of the groundwater within the region is variable since some boreholes provide a good yield at the depths of 10m and 50m. The water quality in the region is varying from drinkable to highly saline water. With ephemeral river in the region, the water source in the ephemeral can be accessed even by hand-dug pit. The interconnected ephemeral pans and shallow river courses known as oshanas are the reminders of the proto-Kunene and Cuvelai systems which are emptied into the inland massive lake known as the Etosha lake. Mostly, part of the north/eastbound groundwater flow is shallow, and discharges through numerous springs along the southern margin of the Etosha Pan, where it rapidly evaporates. The potable water in the region is supplied in piped system from the Calueque Dam in Angola, on the Kunene River, to the major urban settlements within the region. This dam does not only provide water to the Oshikoto Region, it also provides water to the Oshana, Omusati and Ohangwena Regions.

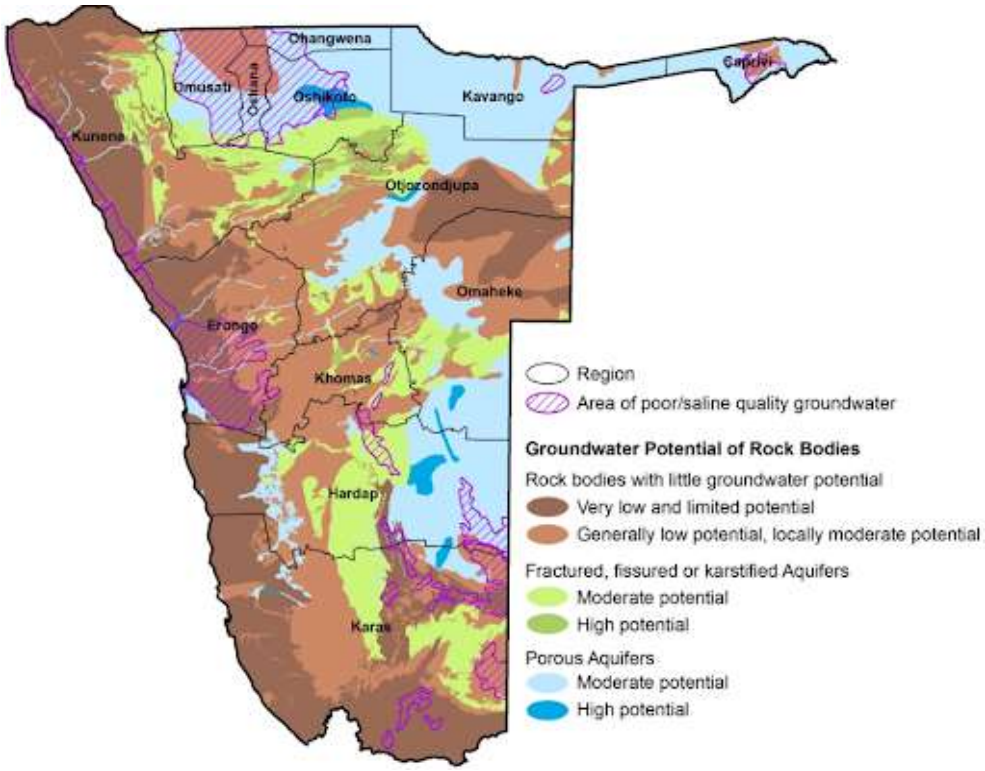

Figure 12: Hydrogeological map of Namibia (Christelis & Struckmeier 2001 (2011)

The quality of the groundwater in the area is mostly saline and not suitable for human consumption. Water Supply to Omuthiya is from the NamWater pipeline scheme. There are no rivers or streams near the site. The nearest rivers are Npele and Oshangula which are approximately 16.8km and 17km respectively from the site.

4. LEGAL FRAMEWORK

4.1 Environmental Management Requirements

The operations and management of the Okankolose Gravel Burrow Pit will trigger activities listed under the Environmental Management Act No. 7 of 2007 as activities which cannot be undertaken without an Environmental Clearance Certificate as noted below.

❖ **MINING AND QUARRYING ACTIVITIES**

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

4.2 Environmental Management Requirements

There are several international, national legislations which provide a broad range of principles that should be used as guiding tools for the gravel mining activities operations and management. These are tabled below.

Table 1: Applicable national legislations

LEGISLATION	PROVISION AND REQUIREMENTS
Local Authorities Act, No. 23 of 1992 as amended	Provide for the determination, for purposes of local government, of local authority councils; the establishment of such local authority councils; and to define the powers, duties and functions of local authority councils; and to provide for incidental matters. **The Act also gives power to the Local Authorities to establish by-laws to safeguard waste management within their jurisdictions.**
Pollution Control and Waste Management Bill	This policy serves to regulate and prevent the discharge of pollutants to air, land and water as well as providing for general waste management procedure. **The bill provide framework for a multitude administration on pollution control and waste management in the country. Waste will be produced during the operational phase in the form of papers, food leftovers, empty containers, plastics and possibly hazardous waste from spillages and leakages from petroleum products (fuel, oils). Each authority identified by the bill shall play its respective roles.**

Environmental Management Act, No.07 of 2007	Ensuring that the significant effects of activities on the environment are considered carefully and in time. To promote the sustainable management of the environment and the use of natural resources by establishing principles for decision making on matters affecting the environment. **Further it states that; all activities of mining and quarrying activities require an Environmental Clearance Certificate. Once granted, the ECC for this project should be renewed after three years.**
Water Act 54 of 1956	Prohibits the pollution of underground and surface water bodies. **Heavy trucks and machinery used onsite might cause spillages or leakages which could lead to soil and underground water contamination hence the need to implement the suggested mitigation measures. Depth of excavation shall be restricted to above water level.**
Public Health and Environmental Act, 2015	The objectives of the PHE Act are to; • Promote public health and wellbeing. • Prevent injuries, diseases and disabilities. • Protect individuals and communities from public health risks. • Encourage community participation to create a healthy environment. • Provide for early detection of diseases and public health risks. • Promotes proper waste management.t **Section 2 requires that a) "Every local authority must take necessary reasonably and applicably measures to maintain its local authority area at all times in a hygienic and clean condition" b) Prevent occurrence of a health nuisance, unhygienic condition, an offensive condition or any condition which could be harmful or dangerous to the health of a person within its local authority or the local authority area of another local authority"**
Heritage Act, 2004	Makes provision for the developer to identify and assess any archaeological and historical sites of significance. The existence of any such sites should be reported to the National Heritage Council. The Council may serve notice that prohibits any activities as prescribed within a specified distance of an identified heritage/archaeology site. **No known archaeological or historical sites have been identified from the mining activities conducted on the site. However, any archaeological objects/sites of significance found within the area of study, the proponent should immediately report it to the Heritage Council of Namibia.**

Atmospheric Pollution Prevention Ordinance, no. 11 of 1976	To provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto. The Ordinance deals with administrative appointments and their functions; the control of noxious or offensive gases; atmospheric pollution by smoke, dust control, motor vehicle emissions; and general provisions. **According to the Ordinance, the Local Authority shall control and prevent atmospheric air pollution or emission of noxious or offensive gases by smoke.**
Hazardous Substances Ordinance 14 of 1974	This Ordinance provides for the control of toxic substance and thus also relevant for pollution control. It covers for the manufacturing, sale, use, disposal, dumping, importing, and exporting of hazardous waste. **OTC shall control the manufacturing, use or disposal of hazardous waste as per this Ordinance**
The Soil Conservation Act No.76 of 1969	This Act provides for the prevention and combating soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of water sources,
Labour Act (No 11 of 2007)	To establish a comprehensive labour law for all employers and employees; to entrench fundamental labour rights and protections. Regulate basic terms and conditions of employment; ensure the health, safety and welfare of employees; to protect employees from unfair labour practices; to regulate the registration of trade unions and employers' organisations; to regulate collective labour relations; to provide or the systematic prevention and resolution of labour disputes. **Adhere to all applicable provisions of the Labour Act and the Health and Safety Regulations. The Proponent will be obliged to create a safe working environment.**

5. ROLES AND RESPONSIBILITIES

It is the core responsibility of the Omuthiya Town Council to ensure the successful implementation of this EMP and any conditions to be imposed by the Ministry of Environment, Forestry and Tourism (MEFT). However, the implementation of this EMP also requires the involvement of various role players, each with specific responsibilities to ensure that the project is operated in an environmentally sensible manner.

5.1 Role Players and Responsibilities

5.1.1 Proponent

Responsibilities

a) Implement the final EMP after approval by DEA and ensure the project comply with the EMP and conditions therein.
b) Responsible for the appointment of other personnel responsible for the implementation of this EMP and responsibilities should be shared among several officials as per their respective job descriptions. However, the overall responsibilities should lie with the Environmental Health Practitioner.
c) Provide Environmental training and awareness on the contents of the EMP to all contractors, sub-contractors and employees involved in the gravel mining operations. Environmental awareness training should take place in the language understood by the employees.
d) Ensure the review/update of this EMP as required and renewal of the ECC.
e) Enforce all environmental regulations, EMP compliance, and conduct regular inspections as well as review project environmental and incident reports.

5.1.2 Environmental Control Officer

The Environmental Health Practitioner (EHP) should act as an Environmental Control Officer (ECO) on behalf of the Omuthiya Town Council. She/he will act as an on-site implementing agent and has the responsibility to ensure that the contractors' responsibilities are executed in compliance with the relevant legislations. The ECO will have the following responsibilities:

a) Be fully knowledgeable with the contents of the EMP, and ensure implementation of the EMP.

b) Conduct site visits to check compliance of all operations with the EMP. Any environmental transgressions shall be recorded and the agreed upon disciplinary measures should be taken.
c) Ensure communication of EMP requirements to contractors.
d) Facilitate environmental induction of all project staff and coordinate such training that would be required for the effective implementation of the EMP.
e) Maintain environmental incidents and stakeholder complaints register.
f) Investigate incidents and recommend corrective and preventative actions.
g) Report significant incidents internally and externally as required by law.
h) Assess and inspect rehabilitation areas and provide guidance regarding rehabilitation measures if any.

5.1.3 Contractors and subcontractors

They are ultimately responsible for:

1. Complying with the contents of this EMP and all the laws and regulations pertaining to the gravel mining operations,
2. Ensure that all team members are familiar and understand the environmental management aspects stipulated in this EMP,
3. Submitting a report, in a format decided upon by the ECO, which will document all incidents that occur onsite.

5.1.4 Environmental Assessment Practitioner

The Environmental Assessment Practitioner (EAP) shall be an independent consultant appointed by the Proponent. The responsibility of the EAP are as follows:

a) Conduct renewals of the ECC application,
b) Conduct inspections of the rehabilitation area and give guidance regarding rehabilitation measures.

5.1.5 Competent Authority

The competent authority is the Ministry of Environment, Forestry and Tourism (MEFT) – Department of Environmental Affairs (DEA). They are responsible for reviewing and the approval of this EMP document. DEA is also responsible for conducting environmental compliance monitoring should any instances of non-compliance be found, this must be brought to the attention of the EHP, along with recommended measures for rectifying the non-compliance.

5.2 Awareness and Training

It is important to ensure that all contractors, sub-contractors, and their employees have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimization of environmental harm. This can be achieved through a tailor-made training.

Environmental training should typically include the following aspects:

- Basic understanding of the key environmental features of the site and the surrounding environment.
- The significant environmental impacts, actual or potential, because of their activities.
- The environmental benefits of improved personal performance.
- Their roles and responsibilities as well as importance in achieving conformance with the environmental policy and procedures.
- The potential consequences of deviating from specified operating procedures.
- The mitigation of negative impacts.
- The importance of not littering.
- The need to use water sparingly.
- Waste management strategies.
- Awareness on the importance of archaeological and historical sites that are found in the surrounding and the need to conserve them.
- Awareness on the fauna and flora of special concern.
- The need for environmental rehabilitation and proper decommissioning during and after mining operations.

6. PROPOSED MITIGATION MEASURES DURING OPERATIONAL PHASE

This section will look at the proposed mitigation measures which should be implemented to prevent environmental degradation. The following mitigation measures must be enforced to prevent, avoid, and lessened negative environmental and public health risks that are associated with the gravel mining operations.

Table 2: Proposed mitigation measures during the operational phase

Nature of Environmental Impact/ Aspect/Risk	Mitigation Measures	Monitoring	Responsibility
Visual impacts Existing operations have created an open pit which has negatively affected the landscape of the area. The landscape can be further affected by erosion especially during the rainy season.	• Have a mining plans, so that only a certain area is mined, then rehabilitated before moving to the next one. • Rehabilitate the area once mining has ceased as per the rehabilitation plan. • Erosion control measures must be undertaken in all aspects of pit operations including stockpiles. • Topsoil stockpiles shall be protected from wind and water erosion by reducing slopes, by covering and by spraying with water. • Mining activities shall avoid causing unnecessary disruption and nuisance. • Tidiness should be maintained at the site and take cognition when parking vehicles and placing equipment. • Ensure that existing vegetation within the minimum 25-meter buffer area is not disturbed, as it should provide some visual screening of pit operations from the road and nearby residents.	Regular inspections	ECO/Contractors
Noise Impacts Noise is expected to be generated from frequenting trucks and operating equipment onsite.	• Excavation and transport of gravel and other related activities should only be allowed between 07:00 to 18:00 from Monday to Saturday. • Proper and timely maintenance of machineries and vehicles.	Regular Inspection. Strict operational times and	ECO/Contractors

Noise generated might affect employees working at the site and surrounding areas hence posing health and creating a nuisance respectively.	• Sensitize drivers operating at the site to switch off engines of vehicles or machinery not in use. • Operators working on the site to be equipped with ear protection equipment. • Loud music should not be allowed onsite. • Record all complaints regarding noise and take corrective measures for continuous improvement	record all noise complaints	
Fauna Impacts The gravel pits can be a hazard as it might end up trapping animals. During the rainy season, the pit can collect water which can be difficult for trapped animals to find their way.	• The area must be fenced to prevent domestic animals from entering the gravel pit site. • Any nesting sites of avifauna species must not be disturbed or impacted. • The total depth of pits must remain 4 meters deep maximum to so that the pits do not create a safety hazard to the movement of animals. • Any fauna found onsite needs to be relocated outside the working area without causing any harm.	Regular site inspections	ECO/Contractors
Air Quality & Dust Impacts Air quality might be affected by dust and emissions from vehicles and equipment. Dust might be generated during excavations, loading, transportation and offloading at the destination. The impact can be worsened during strong winds. Dust can affect human health, reduce visibility and retards plant growth. The impact is expected to be site specific and may pose a slight nuisance to the neighbors. Fugitive dust emitted might end up causing deterioration of air quality if emitted in large quantities or the frequency of emission is high.	• It is recommended that regular dust suppression measures should be undertaken to minimise dust emission (water sprinklers, covering stockpiles, introducing speed limit). • Personnel are to be issued with respirators when deemed necessary. • Avoid overloading of trucks and consequent spillage on the roads. • Ensure that trucks transporting gravel are covered by canvas sheet to prevent dust emission. • Develop a green belt by leaving trees around the perimeter of the burrow pit. • Excavation, handling and transport activities must be avoided during high windy conditions. • Ensure that all vehicles and machinery entering the site are in good working condition to prevent unnecessary emissions.	Regular visual inspection	ECO/Contractors

Excessive vehicular emissions produce significant amounts of nitrogen oxides, carbon monoxide, and other pollutants which can cause deterioration of air quality.	• Vehicles shall not be allowed to idle for long periods onsite.		
Waste Management Solid and liquid waste might be produced during the operational phase. Waste which includes papers, plastics, food leftovers, empty containers etc, will be produced during the operational phase. Hazardous waste like oils, fuel, greases etc might be produced in instances of spillages/leakages.	• Operators are to remove any personal waste on the end of each working day and dispose it at the disposal site or in the bins at their home. • The sand mining contractor must adhere to all the relevant laws and regulations applicable to the disposal of waste. • Strictly, no burying, dumping or burning of waste onsite is allowed as it is an environmental and public health hazard. • Place weather and vermin proof bins/containers around the site for disposal of solid waste. • Waste must be appropriately collected and disposed off at an approved waste disposal site. • The site is to be kept clean at all times. • Portable toilet with adequate containment structures should be available onsite. Waste should be properly contained to avoid any leakages and spillages and should be regularly disposed off at the sewage disposal site. • Contaminated soil wastes must be disposed off at an approved hazardous waste disposal site. • Separate hazardous waste from general waste, clearly marked and stored in appropriate containers. • Awareness of the hazardous nature of the various types of waste should be enforced. • Fuel shall not be stored onsite. • Regular servicing and maintenance of vehicles and machinery to avoid leakages of oil and lubricates.	Regular inspections	ECO/Contractors
Loss of biodiversity	• Limit the excavations and access roads to within the boundaries of the project site if possible.	Monitor the site regularly and record	ECO/Contractors

Biodiversity loss as result of striping the topsoil and vegetation which houses insects and small mammals. The site was already disturbed from previous sand mining operations where vegetation was cleared to pave way for the activity. The density of vegetation can be described as sparse.	• Vegetation and topsoil clearance must be carried out piecemeal. • Extension of the excavation area should be done in stages so that old areas are rehabilitated concurrently. • Topsoil removed for vegetation clearance must be stripped and stockpiled alongside the excavated areas. • Topsoil is replaced on the surface of the leveled area that is no longer to be excavated. • Selection of access routes should consider minimum disturbance to vegetation.	sightings of important plants not to be cleared.	
Traffic Impacts Movement and presence of vehicles on and from the B1 and CBD access roads presents risks of accidents. This poses a risk to personal safety and asset security.	• Coordinate movement of vehicles. • Maintain the vehicles. • Obey traffic rules. • Strictly no overloading to prevent spillage during transportation. • Speed limits and warning signs for burrow pit operations must be erected to minimize accidents. All users of access roads shall not exceed 20km/h. • Transport trucks must be tagged with reflective signs or tape to maximize visibility and avoid accidents. • Damage to the existing access roads because of gravel mining activities shall be repaired and maintained by OTC. • The responsible contractor must ensure that all drivers employed have valid driver's licenses of vehicle types they drive, and that they have experience in driving those vehicles. • Ensure that no driver under the influence of alcohol or narcotics is driving onsite. • Proper parking area should be available onsite.	Observation of traffic along the B1 road and access road which leads to the site.	ECO/Contractors
Community Impact An open burrow pit created from mining operations can be a hazard to the community. The open pit can trap	• Fencing of the burrow pit site. • Ensure controlled access to the burrow pit site, to restrict unauthorized personnel from entering the site.	Keep constant updated records of all	ECO/Security Personnel

animals (goats, cattle) and people, especially children. The burrow pit can also be a breeding ground for mosquito especially during rainy season. Unfortunately, the area is not fenced which makes it difficult for security personnel to monitor access of animals and the public to the site. Relocation and compensation of the mahangu fields in proximity will be done by OTC.	• Stagnant water in the burrow pit is not permitted and shall be removed either through drainage structures and/or pumping. • Community members are not permitted to use water at an active burrow pit for any purpose (e.g. for animal drinking, washing clothes, etc.) • Efforts shall be made to reduce the amount of runoff into the burrow pit. • The Proponent should establish effective communication channel with the community. • The relocation and compensation of the owners of the mahangu fields should be finalized as soon as possible.	concerns and issues logged. Monitor the speed and effectiveness of remedial actions taken upon concerns and issues raised by the public.	
Surface and Groundwater Impacts There are no surface water bodies in proximity to the site. Groundwater and soil contamination might happen in an event that, there are leakages and spillages of petroleum products from vehicles and equipment.	• Spillages of hazardous substance including oils, hydrocarbon fuel and lubricants must be cleaned up and disposed off at the designated disposal facility. • Servicing and maintenance of vehicles and machinery at the burrow pit site shall not be allowed. • Drip trays should be used to contain any leaks emanating from vehicles and equipment used onsite. • Washing of vehicles and equipment and discharge of contaminated wastewater onsite shall not be allowed. • Fuel shall not be stored onsite and refuelling of vehicles onsite shall not be allowed. • Equipment and materials to deal with spill clean-up must be readily available onsite and staff must be trained as to how to use the equipment and briefed about reporting procedures. Spillage control procedures must be in place according to relevant SANS standards. • Place a portable ablution facility with suitable containment systems for use onsite. • Excavation below the water table shall not be permitted.	Regular visual inspection	ECO/Contractors

	• Proper environmental awareness and remedial response training of contractors must be conducted on a regular basis.		
Health and Safety Risks to the health and safety of employees during operations.	• Ensure that all operators and maintenance crews onsite-are familiar with the organization's emergency response procedure. • Conduct safety training on the use the protective clothing and the correct handling of material and the safe use of all equipment. • First aid treatment and emergency medical assistance must be available. • A register for all the training offered and of all the incidents must be kept. • Comply with all Health and Safety standards as specified in the Labour Act. • Ensure that all personnel onsite have protective equipment and clothing (helmets, gloves, respirators, work suits, earplugs, goggles and safety shoes where applicable). • Use of dust suppression measures. • Reduce noise exposure by isolating noisy equipment. • Safety Posters and slogans should be exhibited at conspicuous places. • No go and sensitive areas must be clearly marked and avoided.	Site inspection, Conducting Hazard and Risk Assessments and Conduct Health and safety incident monitoring	ECO/Contactor/Ministry of Labor
Heritage Impacts There are no known heritage sites at the site.	• All heritage site or archaeological site to be discovered during the mining operations should be reported to the National Heritage Council. **Contact person at National Heritage Council: Ms Erica 061 301 903**	Regular inspections	ECO
Decommissioning and Site Rehabilitation Sand mining activities will disturb the landscape of the site and access road.	• Filing of all reports (including photographic documentation of successful rehabilitation initiatives);	Inspection of all gravel mining operational	OTC/ECO/EAP

Constant movement of heavy trucks and machinery cause soil compaction, hence reducing infiltration rate and increasing surface water runoff.	• A final site inspection to be conducted and documented 3 months after all activities associated with the gravel mining initiative have been completed; • Allocate appropriate budgetary allowances for all possible rehabilitation activities and initiatives; • On completion of gravel mining operations, the Town Council must rehabilitate and stabilize cleared areas as best as possible to prevent and control surface erosion. • Rehabilitation of the gravel mining site shall be completed within a specific period and to the satisfaction of the public, ECO and EAP. • All topsoil removed during the mining phase must be conserved and used in the rehabilitation and close out phase. No topsoil may be sold. This soil must be kept safe from erosion.	locations and access routes.	
Employment opportunities Positive impact of short- and long-term employment for locals	• Local labour (male and female, skilled and unskilled) should be employed as a priority		Proponent
Access Points	• Clearly mark the site access points and routes onsite to be used by the vehicles, workers and pedestrian.		Proponent

7. COMPLIANCE MONITORING

To ensure continual improvement in environmental performance and reduce adversity of potential negative impacts, it is advisable to keep monitoring the identified environmental receptors. The compliance monitoring is the ultimate responsibility of the respective regulatory authorities. Monitoring activities should be done at different intervals as indicated in the table below and should be done throughout the mining life span.

Table 3: Compliance Monitoring Procedures

Issue to be monitored	Monitoring objectives	What needs to be monitored	Frequency and Monitoring	Responsibility
Pollution	-Avoid littering, pollution etc.	-litter, spillage and leakages	Daily	ECO
Soil	-Ensure soil conservation and prevent erosion	-Soil exposure, pollution, contamination, and soil erosion by windy conditions and water	Monthly	ECO-
Vegetation	-Avoid land degradation and encroachment	-Monitor the presence of any new plant species at the mined area and removal of any invading species i.e., *prosopis*	Annually (after rainy season)	MEFT-DoF
Air quality	-Ensure air quality	-Dust emission	Daily	ECO
Noise level	-Ensure noise level is at the required standard (85dB)	-Ambient noise level at mining site	Daily	ECO
Implementation of the EMP	-Ensure compliance to this EMP and adherence to the regulative measures	-Adherence to the EMP and legal requirements	Quarterly reports	ECO

8. MITIGATION MEASURES AT THE DECOMMSSIONING

The main concern of gravel mining activities is great environmental disturbance of the mined area. The destruction of the natural vegetation and creation of open trenches leaves the area prone to soil erosion. This may result in further degradation of the environment if left un-rehabilitated. Thus, it is important for the proponent to rehabilitate the disturbed area to its natural or nearly its natural state.

8.1 Recommended Rehabilitation Actions

According to the Environmental Management Act 7 of 2007 proponent must take the responsibility to reclaim and rehabilitate the disturbed land at the end of the mining operations. The site closure in terms of gravel mining operations will occur whenever the ECC is denied, cancelled, lapsed or the site has been abandoned and/or the holder does not wish to renew the right. The objective of rehabilitation with respect to the area where gravel mining has taken place is to leave the area levelled and even, and in a natural state containing no foreign debris or other materials. The following actions should be implemented.

- Where possible, trenches shall be filled and levelled properly as far as possible.
- The levelled area can be re-vegetated with local vegetation. Where re-vegetation is not possible, the area shall be re-seeded with local adapting species under the supervision of the DoF within the MEFT.
- All structures constructed by the miners and that will no longer be required shall be removed and the area should be rehabilitated to the satisfaction of the ECO.
- The areas shall be cleared of any contaminated soil, which must be disposed of properly at a designated disposal site.
- All erosion gullies should be properly filled to prevent further erosion of topsoil.

8.2 Post Closure

The main aim of post closure rehabilitation is to establish an acceptable and sustainable post-mining land use. Given the nature of the affected environment and the adjacent land uses, the most suitable post-mining land use will be water conservation. The second objective will be to restore the natural attractiveness and aesthetic views of the area for tourist attraction.

To achieve the above objectives, the Omuthiya Town Council should conduct an assessment to determine the suitability of post-mining activities in line with the Urban Structure Plan. The Town Council should also appoint an independent environmental consultant to prepare a Decommissioning and Rehabilitation Plan (DRP) prior to the decommissioning and abandoning of the site. The DRP should be submitted to MEFT for approval.

9. CONCLUSION AND RECOMMENDATION

9.1 Conclusion

The consultant concludes that the project, as described in this EMP Report, is environmentally acceptable and recommends. If all mitigation measures are implemented according to the recommendations given in the Environmental Management Plan, it is anticipated that the consequences and/or probability of the predicted negative impacts will be managed/reduced. The EMP should be used as an on-site reference document for the operations of the gravel burrow pit. Parties responsible for transgressing of the EMP should be held responsible for any rehabilitation that may need to be undertaken. Monitoring reports must be kept available for possible submissions to the Ministry of Environment, Forestry and Tourism for future ECC renewal application.

9.2 EAP Recommendations

It is recommended for the proponent (Omuthiya Town Council) to consider the following:

- Provide training to all gravel mining contractors and sub-contractors.
- Assign the responsibility of overseeing the implementation of this EMP to a senior official and ensure regular monitoring and provide quarterly reports (or as required) to MEFT.
- Issue Gravel Mining Permits to all contractors and sub-contractors onsite, as a way of curbing illegal activities.
- Provide ablution facilities and refuse collection bins onsite.
- Apply all mitigations measures as outlined on Table 2.
- Ensure proper decommissioning of the site at the end of site's lifespan.

Given the existing situation and the proposed mitigation and management measures in this EMP, the EAP hereby recommends the issuance of the ECC for the existing Okankololose Gravel Burrow Pit in Omuthiya.

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