



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).



PROJECT: Application to mine Silica Sand over an approximate 2.301 ha section of the Mzumbe River, over ERF 9231 Golden Gate, situated within the Ugu District Municipality, KwaZulu-Natal.

NAME OF APPLICANT: Dlulwa Trading (Pty) Ltd

CONSULTANT:



Tel: +27 31 566 2856 • Mobile: +27 83 700 8669 • Fax: +27 86 649 8450 • Email: envpro@iafrica.com
P.O. Box 918, Umhlanga Rocks, KwaZulu Natal 4320 • Suite 3D Royal Palms, 6 Palm Boulevard, Umhlanga Ridge, KwaZulu Natal

DMR Reference number: Pending

August 2017

STANDARD DIRECTIVE

Applicants for prospecting rights or mining permits, are herewith, in terms of the provisions of Section 29 (a) and in terms of section 39 (5) of the Mineral and Petroleum Resources Development Act, directed to submit an Environmental Management Plan strictly in accordance with the subject headings herein, and to compile the content according to all the sub items to the said subject headings referred to in the guideline published on the Departments website, within 60 days of notification by the Regional Manager of the acceptance of such application. This document comprises the standard format provided by the Department in terms of Regulation 52 (2), and the standard environmental management plan which was in use prior to the year 2011, will no longer be accepted.

**IDENTIFICATION OF THE APPLICATION IN RESPECT OF WHICH THE
ENVIRONMENTAL MANAGEMENT PLAN IS SUBMITTED**

ITEM	COMPANY CONTACT DETAILS
Company	IDM Environmental
Director	Karl Wiggishoff
EAP/s	Preanna Naicker and Justin Ellero
Tel no.	031 566 2856
Fax no.	086 649 8450
Cell no.	083 700 8669
E-mail address	info@idmconsultants.co.za
Postal Address	PO Box 918, Umhlanga Rocks, 4320

ITEM	CLIENT CONTACT DETAILS
Company	Dlulwa Trading (Pty) Ltd
Name	Siphiso Mpisane Blessing
Tel no.	c/o 031 566 2856
Cell no.	073 1754 298
E-mail address	mpisaneblessing@gmail.com
PO Box	c/o PO Box 918, Umhlanga Rocks, 4320

Contents

1 BACKGROUND INFORMATION	3
1.1 INTRODUCTION.....	3
1.2 LEGAL FRAMEWORK	3
1.2.1 Mineral & Petroleum Resources Development Act, 2002.....	3
1.2.2 National Environmental Management Act, 1998.....	4
1.2.3 National Water Act, 1998.....	5
1.2.4 Other Legislature	5
1.3 PURPOSE OF THE EMP	7
1.3.1 Objectives of the EMP	7
1.3.2 Structure of the EMP.....	7
1.3.3 Key Role Players.....	8
1.3.4 Environmental Awareness	8
2 PROJECT DESCRIPTION AND LOCATION.....	10
2.1 ACTIVITY LOCATION.....	10
2.2 DESCRIPTION OF THE ENVIRONMENT LIKELY TO BE AFFECTED BY THE PROPOSED PROSPECTING OR MINING OPERATION	10
2.3 DESCRIPTION OF THE PROPOSED PROSPECTING OR MINING OPERATION.....	11
2.4 PLANNED PRODUCTION RATE	12
2.5 PLANNED LIFE OF THE MINE	13
2.6 HEALTH AND SAFETY	13
3 POTENTIAL ENVIRONMENTAL IMPACTS OF SAND MINING	14
3.1 CRITERIA OF ASSIGNING SIGNIFICANCE TO POTENTIAL IMPACTS	14
3.2 POTENTIAL IMPACT OF EACH MAIN ACTIVITY IN EACH PHASE, AND CORRESPONDING SIGNIFICANCE ASSESSMENT.....	14
3.3 POTENTIAL IMPACTS PER ACTIVITY AND LISTED ACTIVITIES.....	14
3.4 POTENTIAL CUMULATIVE IMPACTS	14
3.5 POTENTIAL IMPACT ON HERITAGE RESOURCES.....	14
3.6 POTENTIAL IMPACTS ON COMMUNITIES, INDIVIDUALS OR COMPETING LAND USES IN CLOSE PROXIMITY	15
3.7 PROPOSED MITIGATION MEASURES TO MINIMISE ADVERSE IMPACTS.....	15
4 FINANCIAL PROVISION	16
4.1 PLANS FOR QUANTUM CALCULATION PURPOSES	16
4.2 ALIGNMENT OF REHABILITATION WITH THE CLOSURE OBJECTIVES.....	16
4.3 QUANTUM CALCULATIONS.....	16
4.4 UNDERTAKING TO PROVIDE FINANCIAL PROVISION	16

5 PLANNED MONITORING AND PERFORMANCE ASSESSMENT OF THE ENVIRONMENTAL MANAGEMENT PLAN	17
5.1 LIST OF IDENTIFIED IMPACTS REQUIRING MONITORING PROGRAMMES	17
5.2 FUNCTIONAL REQUIREMENTS FOR MONITORING PROGRAMMES.....	17
5.3 ROLES AND RESPONSIBILITIES FOR THE EXECUTION OF MONITORING PROGRAMMES	17
5.4 COMMITTED TIME FRAMES FOR MONITORING AND REPORTING	18
6 CLOSURE AND ENVIRONMENTAL OBJECTIVES	19
6.1 REHABILITATION PLAN	19
6.2 CLOSURE OBJECTIVES AND THEIR EXTENT OF ALIGNMENT TO THE PREMINING ENVIRONMENT	19
7 UNDERTAKING TO EXECUTE THE ENVIRONMENTAL MANAGEMENT PLAN	20
REFERENCES	21
ANNEXURE 1: IMPACT ASSESSMENT	22
ANNEXURE 2: ENVIRONMENTAL MANAGEMENT PROGRAMME	33

LIST OF TABLES

Table 1.1. Triggered Activity	4
Table 1.2. Additional Legislation applicable to sand mining operations	6

LIST OF FIGURES

Figure 2.1. Locality of the proposed mine	10
--	----

LIST OF APPENDICES

Appendix 1: Environmental Management Programme

Appendix 2: Public Participation Process

Appendix 3: Botanical and Freshwater Assessment

Appendix 4: Rehabilitation and Close-Out Plan

Appendix 5: Mining Operational/Works Process and Stormwater Management Plan

1 BACKGROUND INFORMATION

1.1 INTRODUCTION

IDM Environmental has undertaken, on behalf of Ddulwa Trading (Pty) Ltd, to secure a sand mining permit from the Department of Mineral Resources (DMR), under the Mineral and Petroleum Resources Development Act 2002, for a proposed 2.67 hectare area in and around a section of the Mzumbe River over ERF 9231 Golden Gate, situated within the Ugu District Municipality, Kwa-Zulu Natal.

The sand on the Mzumbe River is a quartz-rich silica sand that will provide high quality sand to the local building industry for cement and concrete work. The mining operation will have **minimal impacts** on the natural environment if **all mitigation measures** proposed in this Environmental Management Plan (EMP) **are implemented and strictly adhered to**. The sand in the river will be replenished every rainy season and production will ultimately exceed the replenishment rate in a short period of time.

As part of this legal permit process an EMP has been drafted as part of the Environmental Impact Assessment process. This serves as a legal document that must be complied with by the mine owner and operator at all times.

1.2 LEGAL FRAMEWORK

There exists various legislation that relates to the mining industry in South Africa. The legislation governing the mining industry continues to evolve, resulting in both legislative and regulatory changes that have a material impact on any mining company and its operations, especially in South Africa. Environmental legislation in South Africa was promulgated because environmental degradation must at the very least be minimised and at the most prevented. The South African Constitution gives the people of South Africa the right 'to an environment that is not harmful to their health or well-being' (Bill of Rights, Chapter 24). The National Environmental Management Act (NEMA), 1998, the Mineral, Petroleum Resource Development Act (MPRDA), 2002 and the National Water Act, 1998 are the three main Acts that relate to mining.

1.2.1 Mineral & Petroleum Resources Development Act, 2002

The MPRDA contains certain transitional measures with regard to mineral rights, prospecting permits, and mining authorizations. This Act is primarily concerned with the allocation of mining rights and expansion of opportunities for historically disadvantaged persons. It has a significant effect on environmental management and its associated responsibilities (Section 38, Chapter 4) due to the fact that it encompasses the principles contained in Chapter 1 of the NEMA.

Furthermore, this act states that any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations.

In terms of the MPRDA, mining operations on any mineral resources can only commence once authorisation from the DMR has been received. Various documentation is required to be submitted for the proposed mining operation as part of the application for a Mining Permit (<5 ha area). This EMP has been compiled in accordance with such pre-requisite documentation requirements.

1.2.2 National Environmental Management Act, 1998

The Environmental Impact Assessment Regulations of 2017 promulgated in terms of Section 24(5) of the National Environmental Management Act, (Act No. 107 of 1998) as amended, requires Environmental Authorisation from the competent authority (KwaZulu-Natal DMR) for activities listed in Government Notices R 983, R 984 and R 985 which pertain to mining. Table 1.1 contains the triggered activity.

Table 1.1. Triggered Activity

Activity Number	Description	Impact on the proposed project
Activity 21 GN R327	Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including — (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource[.] ; or [including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)]	The proposed activity will require a mining permit from DMR as it involves the mining of silica sand from a portion of the Mzumbe River.

	<p><u>(b) the primary processing of a mineral resource including mining, extraction, classifying, concentrating, crushing, screening or washing;</u></p> <p><u>but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies.</u></p>	
--	--	--

NEMA is the overarching and enforceable body of environmental legislation in South Africa. This body of legislation echoes Section 24 of the Constitution, in stressing that environmental management must make the community (and its needs) its first priority. This Act paves the way for an EIA process to assess developments that may have a harmful impact on the environment.

1.2.3 National Water Act, 1998

The provision of water in South Africa is divided into public water and private water, and its use is regulated by the National Water Act (NWA) (under the directorship of the Department of Water and Sanitation (DWS)). Various other acts also make provision for the management of water: the MPRDA regulations have general requirements for water management, the Conservation of Agricultural Resources Act (CARA) contains water management guidelines, and the Health Act is concerned with effective water management (Barnard, 1999).

It must be noted that, in terms of the NWA, it is an offence to pollute public and/or private water to render it unfit for the propagation of fish and aquatic life, including rainwater, seawater, and subterranean water. All water in South Africa is under the trusteeship of the national government (Baillie, 2006). Furthermore, development within a watercourse requires a water use licence application, before a developer can proceed to construction.

1.2.4 Other Legislation

Additional legislation that is applicable to this process includes, but is not limited to, the following:

Table 1.2. Additional Legislation applicable to sand mining operations

Legislature	Relevance to the Development
The Constitution of the Republic of South Africa, Section 24 (Environmental Right)	The Constitution stipulates that everyone has the right to an environment that is not harmful to their health or well-being; and the right to have the environment protected, for the benefit of the present and future generations, through reasonable legislative and other measures. The Constitution paved the way for environmental legislation in South Africa.
National Water Act (No. 36 of 1998)	A Water Use License Application will need to be applied for from the Department of Water and Sanitation as the sand mining activity will take place within the Mzumbi River.
National Environmental Management Act (No. 107 of 1998)	This development requires a Basic Assessment to be conducted in terms of the EIA Regulations of 2014.
National Environmental Management: Biodiversity Act (No. 10 of 2004)	There is a possibility that flora and fauna found on site may be impacted upon. If Protected species are found on site (None found as of yet), the Developer will be required to apply for a permit. Alien species will also be required to be removed as recommended in the specialist report and EMP.
National Environmental Management: Waste Act, 2008 (Act no. 59 of 2008)	All waste generated on site will need to be dealt with according to the EMP.
National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004)	Mitigation measures to control air pollution and dust must be implemented to ensure compliance with this Act.
Occupational Health and Safety Act (No. 85 of 1993)	The employer needs to manage his/her staff and crew in strict accordance with the Occupational Health and Safety Act in order to prevent injuries to the staff.

Provincial Growth and Development Plan	The proposed development is aligned with the PGDP, as it addresses the first goal of the PGDP which is that of job creation.
KwaZulu-Natal Heritage Act (No. 4 of 1998)	This Act has been put into place to conserve, protect and conserve heritage resources.

1.3 PURPOSE OF THE EMP

The EMP contains the necessary mitigation and recommended actions as well as the timeframe and person responsible for the actions. The ultimate responsibility of the implementation of the EMP rests on the mine owner/operator. The EMP is a legally binding document that is an important part of the Environmental Assessment process and needs to be strictly adhered to. Workers and contractors working on this sand mining operation must be made aware of the EMP, their responsibilities and sensitive/no go areas. Any transgressions must be treated as serious, with remedial action taken. The EMP is divided into two parts, the operational and rehabilitation phase, with each containing its own set of mitigation measures. It is important to note that the province of KwaZulu-Natal is currently experiencing a major drought and thus every effort must be made to conserve water and ensure water is not wasted during the mining operation.

1.3.1 Objectives of the EMP

This EMP has the following objectives:

- To outline functions and responsibilities of the responsible persons involved in the sand mining operation;
- To state standards and guidelines which are required to be achieved in terms of environmental legislation;
- To outline mitigation measures and environmental specifications which must be implemented to ensure environmental and social protection of the surrounding environment; and
- To prevent long-term or permanent environmental degradation

1.3.2 Structure of the EMP

The EMP provides mitigation and management measures for the following phases of the project:

- Planning Phase

This section of the EMP provides management principles for the planning of the site establishment, mine commencement and mine closure and rehabilitation.

- Site Establishment

This section of the EMP provides management principles for site establishment prior to mining operation.

- Mine Commencement

This section of the EMP provides management principles for mine commencement. Environmental actions, procedures and responsibilities as required for this phase of sand mining operations, are specified.

- Mine Closure and Rehabilitation Phase

This section of the EMP provides management principles for the decommissioning and rehabilitation phase of the project.

1.3.3 Key Role Players

- **Mine Owner/Operator**

The applicant (Dlulwa Trading) is ultimately accountable for ensuring compliance with the EMP and the conditions contained in the Environmental Authorisation (EA). The ECO must be contracted by the applicant as an independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of EA's, and the EMP for the project. The applicant is further responsible for providing and giving a mandate to enable the ECO to perform his/her responsibilities. The developer must ensure that the ECO is integrated as part of the project team.

- **Mine Manager**

The Mine Manager has over-all responsibility for managing the project, contractors, and consultants and for ensuring that the environmental management requirements are met. All decisions regarding environmental procedures must be approved by the Mine Manager. The Mine Manager has the authority to stop any operational activity in contravention of the EMP.

- **Environmental Control Officer (ECO)**

An independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of EA, and the EMP for the project. The ECO must be on site prior to any site establishment and must endeavour to form an integral part of the project team.

1.3.4 Environmental Awareness

Environmental awareness training will take place monthly. Issues that pose a risk will be discussed and an understanding of the issues generated. As per **Table 1** in **Annexure 1** of this report).

Any emergency situations will require immediate action by the Mine Manager. Therefore, the discussions will focus on situations which may arise to which the Mine Manager must be alerted. It is of importance that workers are informed of 'no-go' areas and strictly abide by the EMP, Health and Safety Regulations, as well as conditions of the Environmental Authorisation, if granted by the Competent Authority. The ECO shall conduct the initial Environmental induction training with the Applicant and mine workers prior to mining commencement. Thereafter, the Mining Manger is required to conduct monthly environmental awareness briefings, in consultation with the ECO

Some issues that should form part of the training include:

- Demarcation of the mining and access road footprint;
- Sensitive no go areas, such as wetlands and fauna habitats;
- Interpretation of Signage on site;
- Vegetation that must be avoided;
- Fauna species that may not be harmed or poached;
- Identification of alien species;
- Erosion control measures;
- Storage of fuels and chemicals on site and refuelling areas;
- The repairing of equipment and machinery on site;
- The use of toilets;
- Proper waste disposal and management;
- Spill and emergency plans (including fire);
- Stormwater management;
- Safety and health on the mine;
- Noise, dust and light management; and
- The implementation of water saving techniques.

2 PROJECT DESCRIPTION AND LOCATION

2.1 ACTIVITY LOCATION

The proposed mining site is situated in and around a section of the Mzumbe River (**Figure 2.1**) on the KwaZulu-Natal south coast, 16 km inland of the town on Hibberdene. The sand mining operation is located within the Umzumbe Local and the Ugu District Municipalities respectively. The property where mining will take place, ERF 9231 Golden Gate, is owned by the applicant.

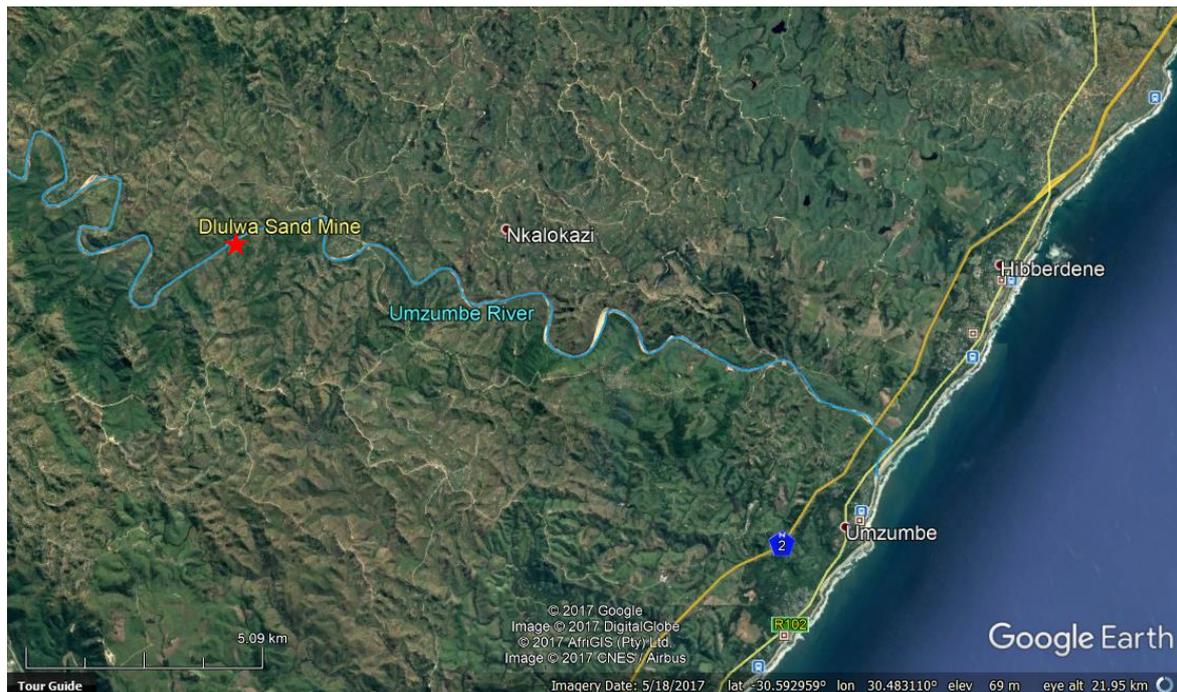


Figure 2.1. Locality of the proposed mine

2.2 DESCRIPTION OF THE ENVIRONMENT LIKELY TO BE AFFECTED BY THE PROPOSED PROSPECTING OR MINING OPERATION

The majority of the land comprises rural settlements and subsequent subsistence farming nearby. Some riparian vegetation can be found along the river. Most of the watercourse systems on site have been invaded by invasive alien plants. The terrain, as identified through both a desktop analysis and site assessment is characterized by gentle sloping banks. Agricultural farming occurs downstream. Furthermore, commercial sand mining, illegal sand mining and dumping are present.

The project area falls within the North Eastern Coastal Belt Ecoregion, within the Mvoti to Umzimkulu Water Management Area (WMA) and within the Coastal Mvoti sub-Water Management Area (sub-WMA) as defined by NFEPA (2011). Furthermore, area is located within the KwaZulu Natal Coastal Belt Thornveld vegetation type which is indicated as Vulnerable within

the region (Shaw and Escott, 2011). The KwaZulu Natal Coastal Belt Thornveld is characterised by bushed grassland, bushland and bushland thicket and open woodland on steep valley sides and hilly landscapes mainly associated with drier larger river valleys in the rain shadow of the rain bearing frontal weather systems from the east coast (Shaw and Escott, 2011).

2.3 DESCRIPTION OF THE PROPOSED PROSPECTING OR MINING OPERATION

2.3.1 Site Planning

Before mine site establishment, operation and closure can commence, careful planning must take place which will lay the foundations for the abovementioned phases. This will ensure that impacts can be identified at the earliest possible stage and appropriate mitigation measures employed. This in order to prevent/ minimise impacts to acceptable/low levels. The Basic Assessment Report and associated Appendices, forms one part of this planning process. Before site establishment and operation can occur, it is of the utmost importance that the Applicant and Mine Manager must ensure plans are in place to implement mitigation measures in the EMP and that rehabilitation is an on-going process, which is not solely defined to the Closure phase. An important part of the planning phase for the Dlulwa sand mine was the designing of the mine to ensure the Mzambe River is protected in every manner possible.

2.3.2 Site Establishment

Construction Phase: Not Applicable, no construction is required. Site will however be prepared for mining commencement. These activities will include:

- Environmental training and awareness for workers;
- The removal and storage of topsoil that will be kept for the rehabilitation and closure phase (Please refer to **Appendix 5 – The Mining Operation Plan** for more information on the stockpiling process);
- The demarcation of the mining site and ‘no-go’ areas;
- The erecting of signage;
- The placement of portable toilets, bins, spill kits and first aid kits;
- Preparing the access road to the sand mine site on the river (Proposed mine will use existing dirt road to mine site. An access point/path from the district road onto site will need to be prepared);
- Preparing equipment and vehicles for operation;
- Ensuring that there are no protected trees or fauna on site; and

- Implementing erosion and stormwater control on site (the installing of silt traps and trenches to divert water runoff and sediment away from the surrounding riparian vegetation.)

Mine Commencement: The Project involves the mining of silica sand from the sandbars and river bed of a 2.67 ha section of the Mzumbe River, where access and stockpiling area is situated on land owned by the applicant. A summary of the mining process is elaborated on in the next section, as well as in **Appendix 5** hereto entitled 'Mining Operations Plan'.

2.3.3 Mine Commencement

The material proposed to be mined is Silica Sand. Extraction of sand will be facilitated by the one mining method, which will run continuously due to the extent of operations. (Note: Further operational details are explained per **Appendix 5** hereto). The use of an excavator to skim the sandbars, and stack the sand on the river bed is proposed. An excavator will move the sand from the river bed to the stockpile area, from where it will be deatched.

The Riparian zone will be avoided to ensure that the river and riverbanks will not be disturbed or diverted. The loading, stockpile and drainage pad area shall be located on fallow lands, as indicated in the sketch plan located in **Appendix 5** hereto. The water drains out on the drainage pad and is then gravitated back into the river through a filter berm system. The sand placed on the stockpile area will be loaded onto transport trucks with the same excavator for sale to the local market. It is the intention that sand would be mined during low flow conditions, to allow for replenishment during the rainy season.

Waste management mitigation measures has been specified in the EMP. Due to the small scale of the mining operation, large amounts of waste will not be generated. As per the EMP all waste will be disposed of in a sustainable manner. No waste will be disposed of through burning or be buried on site. Furthermore, waste bins will be available on site. There will be a separation of general and hazardous waste and all waste will be disposed of at a registered landfill site.

2.3.4 Decommissioning Phase

The river section of the permit area will be rehabilitated by the following rainy season with flood waters depositing more sand across the mined area. The stockpile pad surface will be ripped, have topsoil spread across the area and replanting and re-establishment of vegetative cover, as require regular monitoring and evaluation. Further details may be found in the Closure and Rehabilitation Plan contained in **Appendix 4**.

2.4 PLANNED PRODUCTION RATE

Per calculations set out in the Financial and Technical Competence Report in **Appendix**.

2.5 PLANNED LIFE OF THE MINE

The mine will operate for a two year permit period and will be renewable for a further three consecutive one year periods thereafter. It is the intention that sand would be mined during low flow conditions from the channel and large sand bars along the river bed and bank; it would be stockpiled on the southern bank per demarcated stockpile area ([Appendix 5](#) hereto). The sand deposits and sand banks are replenished during the summer rainy season. **The mining volume would be based on measured annual replenishment of sand (details per [Appendix 5](#) hereto).**

2.6 HEALTH AND SAFETY

The applicant must further adhere to the Health and Safety Act, 29 of 1996. This includes, but is not limited to the following:

- Workers must be provided with dust masks when working in conditions that require protective measures;
- All workers on site must be medically tested annually to ensure fitness to work in a mining operation;
- Operators of equipment and vehicles must be licenced and trained;
- Vehicles must be properly maintained. Hooters and lights must be in working order;
- Clean water must be provided to workers in a suitable container;
- There must be a registered first aider and medical equipment, should the need arise;
- Mining operations should be limited to day light hours between 07h00 to 17h00. Mining should not occur in adverse weather conditions;
- The mining area must be restricted to the public and signs clearly visible;
- The site must be clearly demarcated, with no-go areas identified and avoided;
- Accidents on site must be immediately reported and suitable action taken;
- Spill kits must be available if the need arises;
- Acceptable sanitation must be provided to workers; and
- Rehabilitation must ensure the site is left in safe condition.

3 POTENTIAL ENVIRONMENTAL IMPACTS OF SAND MINING

3.1 CRITERIA OF ASSIGNING SIGNIFICANCE TO POTENTIAL IMPACTS

Impacts are scored in terms of probability (likelihood of occurrence), extent (spatial scale), intensity (severity/magnitude) and duration. Impact significance is determined by summing the numerical value for the impact rating scales for each impact and multiplying by the probability of that impact occurring. See [Annexure 1](#) for method.

3.2 POTENTIAL IMPACT OF EACH MAIN ACTIVITY IN EACH PHASE, AND CORRESPONDING SIGNIFICANCE ASSESSMENT

See [Table 1](#), of [Annexure 1](#) for impacts before and after mitigation measures have been implemented.

3.3 POTENTIAL IMPACTS PER ACTIVITY AND LISTED ACTIVITIES

The impacts that have been identified per activity are listed in the EMP Report [Annexure 1](#).

3.4 POTENTIAL CUMULATIVE IMPACTS

Provided that the sand deposit to be mined and the stockpile/loading area is satisfactorily rehabilitated there should be no cumulative impacts arising from this activity. Mitigation measures implemented will help to prevent/and or reduce the significance of impacts to acceptable levels.

3.5 POTENTIAL IMPACT ON HERITAGE RESOURCES

It is the professional opinion of the EAP in consultation with the Applicant, project team and site visit **that no**

- Archaeological (material remains older than 100 years or rock art)
- Palaeontology and Meteorites (including fossils)
- Built Environment (Historical buildings, buildings over 60 years)
- Burial Grounds and Graves

were located on or near the proposed mining site. Therefore, no Heritage study was conducted. The proposed site has been farmed for a lengthy period and thus the uncovering of anything of heritage importance is low to zero. Should anything of archaeological significance be uncovered a suitably qualified professional will be contacted to conduct an assessment.

3.6 POTENTIAL IMPACTS ON COMMUNITIES, INDIVIDUALS OR COMPETING LAND USES IN CLOSE PROXIMITY

Because the area is remote and the proposed activity located far away from any neighbouring dwellings it is not anticipated to have any negative impacts on any communities or individuals in close proximity. The sand mining operation occurs on land owned by the applicant. There are also no impacts of this activity on any competing land use, this is because the activity will in no way compromise any of the existing activities taking place any adjacent properties. The mining operation will however, have positive impacts on local communities in terms of employment and local economic development.

3.7 PROPOSED MITIGATION MEASURES TO MINIMISE ADVERSE IMPACTS

Refer to **Table 2A** and **2B**, of **Annexure 2**.

3.8 SPILL CONTAINMENT

In the unlikely event of a spill, immediate action must take place to prevent any further damage to the environment. If a spill does take place, the following actions must occur:

- Isolate and demarcate the spill area;
- Identify the nature and source of the spill;
- Stop the source of the spill;
- Contain the spill;
- Remove the spilled product for treatment or authorized disposal;
- Determine if there is any soil, groundwater or other potential environmental impact;
- If necessary, contact a suitably qualified Specialist;
- If necessary, remedial action must be taken in consultation with the Department of Environmental Affairs, Department of Mineral Resources, Department of Water and Sanitation, the local Municipality, and any other relevant party; and
- Incident must be documented.

Mitigation measures proposed to limit the likelihood of a spill occurring have been proposed in the following EMP. These deal with mining equipment and the storing of chemicals on site. A spill kit must be stored on site to deal with spills. Furthermore, it must be ensured that no contaminants enter the Mzumbe River or into neighbouring properties.

4 FINANCIAL PROVISION

In the event of environmental damage, an amount must be made available for premature closure, as facilitated through the DMR and its own internal policy and permit application processing procedures. The financial provision is to be updated on an annual basis.

4.1 PLANS FOR QUANTUM CALCULATION PURPOSES

See financial undertaking previously prepared for application purposes and already submitted on-line. The Financial and Technical Competency is contained in **Appendix** hereto. It includes costs of managing the mining operation and for rehabilitation.

4.2 ALIGNMENT OF REHABILITATION WITH THE CLOSURE OBJECTIVES

The closure objectives are to re-instate the current existing conditions and agricultural potential of the land, while ensuring that environmental impacts from the mining operation are mitigated and rehabilitation occurs. The Rehabilitation Plan is compatible with the closure objectives and aims to meet these objectives. A Closure and Rehabilitation Plan was prepared and is contained in **Appendix 4** hereto. As part of this process closure objectives were formulated and plans to meet these objectives specified in the Report. These closure objectives were agreed on with the Applicant and that the Applicant will implement the rehabilitation plan to ensure closure objectives are achieved.

4.3 QUANTUM CALCULATIONS

See financial undertaking previously prepared for application purposes and already submitted on-line. The Financial and Technical Competency is contained in **Appendix 4**. The Applicant is required to make the prescribed financial provision for the rehabilitation or management of negative environmental impacts. Based on the 2005 Master Rate Guideline (provided by the DMR) as well as taking into consideration CPI, P & G, Contingencies and Vat, the financial provision for rehabilitation will be calculated.

If the Applicant fails to rehabilitate or manage any negative impact on the environment, the DMR may, upon written notice to the Applicant, use all or part of the financial provision to rehabilitate or manage the negative environmental impact in question.

4.4 UNDERTAKING TO PROVIDE FINANCIAL PROVISION

See financial undertaking previously prepared for application purposes and already submitted on-line. The Financial and Technical Competency is contained in **Appendix**. The Applicant furthermore confirms that the funds indicated in the Financial and Technical Competency are readily available should the need arise through a Bank Guarantee.

5 PLANNED MONITORING AND PERFORMANCE ASSESSMENT OF THE ENVIRONMENTAL MANAGEMENT PLAN

Regular monitoring of the mining commencement and rehabilitation phases are of vital importance to ensure mitigation measures are being implemented. Ongoing and regular reporting of this must be implemented. An environmental monitoring checklist should be developed and must be in line with the EMP. A list of identified impacts requiring monitoring programmes is contained below.

5.1 LIST OF IDENTIFIED IMPACTS REQUIRING MONITORING PROGRAMMES

Surface	Alteration of streamflow
	Regulation and Runoff
	Pollution/Sedimentation
Soil	Erosion
Vegetation	Destruction
Wildlife	Disturbance/Harm
	Barrier to movement/Hazard
Climate	Atmospheric Emissions
Air Quality	Dust Generation
	CO and CO ₂ Emissions
Traffic	Increased Traffic and Safety
Noise	Noise Disturbance
Domestic Waste	Litter

Rehabilitation will also require monitoring on a monthly basis for the first 6 months, thereafter every 6 months for two years.

5.2 FUNCTIONAL REQUIREMENTS FOR MONITORING PROGRAMMES

Ongoing inspection by the Mine Manager (and/or Landowner) and monthly Inspections by the Environmental Control Officer (ECO) for the life of mine.

5.3 ROLES AND RESPONSIBILITIES FOR THE EXECUTION OF MONITORING PROGRAMMES

Whilst the Mine Manager must undertake to monitor activities on a daily basis, and the ultimate responsibility for satisfying the monitoring requirements is the role of the Mine Manager, the ECO is responsible for ensuring compliance with all aspects of monitoring. **Table 2A** and **2B** in **Annexure 2** contains the roles and responsibilities for the different mitigation measures.

5.4 COMMITTED TIME FRAMES FOR MONITORING AND REPORTING

The appointed ECO will submit monthly reports to the DMR on all of the above-mentioned impacts requiring monitoring.

6 CLOSURE AND ENVIRONMENTAL OBJECTIVES

6.1 REHABILITATION PLAN

A Mine Closure and Rehabilitation Plan (**Appendix 4**) has been formulated as part of the environment assessment process. The Closure and Rehabilitation Plan should be used to guide the construction, operation and decommissioning phases of this sand mining operation and guide the final rehabilitation of the permit site. Mine rehabilitation of the project area must be viewed as an ongoing process aimed at restoring the mining permit site to a pre-mining state. The aim of the mining Closure and Rehabilitation Plan is to ensure activities associated with mine construction, operation and closure will be designed to prevent, minimise or mitigate adverse long-term environmental and social impacts. The report must be updated with the mine plan as often as needed to ensure that it is fully applicable to the activities associated with the proposed operations.

6.2 CLOSURE OBJECTIVES AND THEIR EXTENT OF ALIGNMENT TO THE PREMINING ENVIRONMENT

The river sandbars will be replenished the following summer rainy season. The stockpile area will be deep ripped with a tractor drawn ripper and topsoil replaced and the entire area re-grassed.

7 UNDERTAKING TO EXECUTE THE ENVIRONMENTAL MANAGEMENT PLAN

Herewith I, the person whose name and identity number is stated below, confirm that I am the person authorised to act as representative of the applicant in terms of the resolution submitted with the application, and confirm that the above report comprises EIA and EMP compiled in accordance with the guideline on the Departments official website and the directive in terms of sections 29 and 39 (5) in that regard, and the applicant undertakes to execute the Environmental management plan as proposed.

Full names and Surname	Preanna Naicker
Identity Number	9309250186083

REFERENCES

Scott-Shaw, R. and Escott, B.J. (Eds) (2011) KwaZulu-Natal Provincial Pre-Transformation Vegetation Type Map – 2011. Unpublished GIS Coverage [kznveg05v2_011_wll.zip], Biodiversity Conservation Planning Division, Ezemvelo KZN Wildlife, P. O. Box 13053, Cascades, Pietermaritzburg, 3202.

ANNEXURE 1: IMPACT ASSESSMENT

Impact Assessment

To ensure uniformity, the impacts are addressed in a standard manner so that their significance can be compared. Each impact is identified in terms of probability (likelihood of occurring), extent (spatial scale), intensity (severity) and duration (temporal scale). Each rating scale is assigned a numerical value and the sum of the numerical rating is multiplied by the probability of that impact occurring to give the resulting significance of the impact. The numerical values used for each rating scale are presented in the tables below.

Nature of impact

A brief description of the type of impact the proposed development will have on the affected environment.

Extent/Scale

The physical extent of the impact.

- Footprint
The impacted area extends only as far as the actual footprint of the activity.
- Site
The impact will affect the entire or substantial portion of the site/property.
- Local
The impact could affect the area including neighbouring properties and transport routes.
- Regional
Impact could be widespread with regional implication.
- National
Impact could have a widespread national level implication.

Duration

The duration of the impact.

- Short term
The impact is quickly reversible within a period of one year, or limited to the construction phase, or immediate upon the commencement of floods.

- Medium term
The impact will have a short-term lifespan (project lifespan 1 – 10 years).
- Long term
The impact will have a long-term lifespan (project lifespan > 10 years).
- Permanent
The impact will be permanent beyond the lifespan of the development.

Intensity

This criterion evaluates intensity of the impact and are rated as follows:

- Minor
The activity will only have a minor impact on the affected environment in such a way that the natural processes or functions are not affected.
- Low
The activity will have a low impact on the affected environment
- Medium
The activity will have a medium impact on the affected environment, but function and process continue, albeit in a modified way.
- High
The activity will have a high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.
- Very high
The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

Probability

This describes the likelihood of the impacts actually occurring.

- Improbable
The possibility of the impact occurring is highly improbable (less than 5 % of impact occurring).
- Low
The possibility of the impact occurring is very low, due either to the circumstances, design or experience (between 5 % to 20 % of impact occurring).
- Medium

There is a possibility that the impact will occur to the extent that provision must be made therefore (between 20 % to 80 % of impact occurring).

- High

There is a high possibility that the impact will occur to the extent that provision must be made therefore (between 80 % to 95 % of impact occurring).

- Definite

The impact will definitely take place regardless of any prevention plans, and there can only be relied on migratory actions or contingency plans to contain the effect (between 95 % to 100 % of impact occurring).

Determination of significance

Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the extent, duration, intensity and probability of the impacts.

- No significance

The impact is not substantial and does not require any mitigatory action.

- Low

The impact is of little importance, but may require limited mitigation.

- Medium

The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

- High

The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation and management is essential.

The following assessment scale is used to determine the significance of the identified potential impacts on the environment.

$$\text{Significance} = (\text{probability} + \text{duration} + \text{scale}) \times \text{intensity}$$

Probability: 1 – 5

Extent: 1 – 5

Duration: 1 – 4

Intensity: 1 – 10

Significance rating criteria

> 75	High environmental significance
50 – 75	Medium environmental significance
< 50	Low environmental significance

The potential impacts of sand mining activity are tabulated below. The impacts are assessed in **Table 1**.

Table 1: Impact Assessment

1. SOIL CHARACTERISTICS, TOPOGRAPHY AND GEOLOGY

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1) Soil pollution and contamination	Site Preparation and Operation	Negative	Local	Short	Medium	Medium	High	<ol style="list-style-type: none"> 1. Should diesel be stored on site, it will need to be stored on a hard surface and 50 m away from any drainage lines. 2. Store fuel, chemicals and other hazardous substances in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding or storm damage. 3. Repairs to vehicles and equipment on site should be avoided. If absolutely necessary repairs must be undertaken on hardened surfaces. 4. Under no circumstances should oil or diesel to be disposed of at the site. 5. Ensure that the excavator and front-end loader are properly maintained. Equipment must be regularly serviced and inspected to make sure there are no leaks of oil, diesel, fuel, detergents or hydraulic fluids. 6. Drip trays (where appropriate) must be emptied regularly and secured 7. The ceasing of mining activities and immediate remedial action must take place in the event of spillages of pollutants. 8. Under no circumstances should oil or diesel to be disposed of at the site. 9. If necessary a suitably qualified specialist must be contacted and rehabilitation measures implemented in the event of a spill. Furthermore, the relevant Department Officials must be informed of such an event. 	Low
2) Dust pollution due to exposure to loose soils	Site Preparation, Operation and Closure	Negative	Local	Short	Medium	Medium	High	<ol style="list-style-type: none"> 1. Handling must minimise the creation of dust and handling must be reduced during windy conditions. 	Low

									<ol style="list-style-type: none"> 2. Due to the mining taking place in the river, the sand stockpile will be characteristically wet, therefore eliminating the need for dust suppression through common methods such as sprinklers. 3. Wetting of construction area must occur during very dry or windy conditions or if dust becomes a major problem. 4. Rehabilitation of the stockpile area will ensure good vegetative cover which will reduce dust creation. 	
3)	Compaction of soils by use of site vehicles and operation of access road	Site Preparation, Operation and Closure	Negative	Local	Short	Low	Medium	Medium	<ol style="list-style-type: none"> 1. Where roads have become compacted, they shall be ploughed, ripped and re-vegetated. 	Low
4)	Extraction of bed material in excess of natural replenishment from the strip mining	Operation	Negative	Site	Medium	Low	Medium	Medium	<ol style="list-style-type: none"> 1. Adequate monitoring levels of how much material is removed from the river beds and pumped onto the surface shall be implemented. 	Low
5)	Siltation/Sedimentation of watercourses increased turbulence from the excavator	Operation	Negative	Local	Medium	Medium	Medium	Medium	<ol style="list-style-type: none"> 1. Control levelling and compaction during mining activities so to reduce the sedimentation. 2. During flooding, siltation of the river will take place due to increased incidence of erosion of alluvial sand into the river from disturbed areas devoid of vegetation. Mitigation will involve ripping the soil in these areas and planting obligate and facultative wetland species to bind the soil, prevent erosion and consequent siltation (once mining activities have ceased in those areas). 	Low
6)	Erosion of River Banks	Operation	Negative	Site	Short	Medium	High	High	<ol style="list-style-type: none"> 1. Keep surrounding vegetation, especially larger trees and shrubs, to create a screen that reduces flood impacts 2. Restrict river access to only one corridor through the Riparian buffer. Ensure water course is not altered to the extent that the integrity of the river banks is compromised and eroded. 3. During the mining activities, there shall be the protection of areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking measures to prevent the surface water 	Low

									from being concentrated in streams and from scouring slopes, banks or other areas.	
7) Topography	Site Preparation, Operation and Closure	Negative	Site	Short	Medium	High	High		1. Implementation of a Closure and Rehabilitation Plan. 2. Re-planting of indigenous vegetation.	Low

1.2 FLORA AND FAUNA

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1) Impact on functional contribution of the larger ecosystem (e.g. terrestrial bird breeding and feeding, insect breeding and habitat for migrating small game)	Site Preparation, Operation and Closure	Negative	Local	Medium	Medium	Medium	High	<ol style="list-style-type: none"> Before mining operations can commence, the Mining Manager in consultation with the ECO must clearly demarcate the mining footprint and the access road footprint. No go and sensitive areas (Various vegetation) must be clearly marked and avoided. Disturbance of indigenous fauna and flora, and the natural ecology in the surrounding areas must be avoided. Disturbance of mammals, birds, reptiles, other animals and their habitats must be prevented. Invasive alien plants must be removed from site. A rehabilitation plan must be implemented once mining operations cease. 	Medium
1) Impact on faunal activity on surrounding properties during activity <ul style="list-style-type: none"> Impact from workers, construction vehicles etc; Disturbing/fragmenting of fauna habitat; and Illegal trapping of wildlife. 	Site Preparation, Operation and Closure	Negative	Local	Medium	Medium	Medium	High	<ol style="list-style-type: none"> The total depth of mining must be minimized so that the extended depth does not create a safety hazard or barrier / obstruction to the movement of marine life. Any fauna found on the stockpile site needs to be relocated away from the mining site without causing any damage or harm. Any nesting sites of avifauna species must not be disturbed or 	Low

								<p>impacted on and a buffer implemented.</p> <ol style="list-style-type: none"> 4. Workers may not bring pets onto sand mine site. 5. Any malicious damage to any fauna species present on site will be considered a punishable offence, and the appropriate measures will be followed. 6. Invasive alien plants must be removed from site 7. No-go and sensitive areas must be clearly marked and avoided. 8. A rehabilitation plan must be implemented once mining operations cease. 	
<ol style="list-style-type: none"> 2) Impact on vegetation <ul style="list-style-type: none"> • Removal of vegetation; and • The spread of invasive alien plants 	Site Preparation, Operation and Closure	Negative	Local	Short	Medium	Medium	High	<ol style="list-style-type: none"> 1. Limit the removal of vegetation to the sand mining footprint. 2. Prevent illegal removal of protected vegetation. 3. Minimise disturbance and loss of topsoil. 4. Keep surrounding vegetation, especially larger trees and shrubs, to create a screen that reduces flooding impacts. 	Low

1.3 SURFACE WATER AND GROUNDWATER

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
<ol style="list-style-type: none"> 1. Pollution of groundwater/ surface water with typical construction related pollutants such as oil and diesel, and enterobacteria/viruses and plant nutrients if sanitation for mine operators is not properly managed. 	Operation	Negative	Local	Short	Medium	Medium	High	<ol style="list-style-type: none"> 1. No disposal of sewage should occur on or near the site. 2. Chemical toilets must be provided by the contractor in accordance with DWS requirements. 	Low
<ol style="list-style-type: none"> 2. Bed degradation and morphology caused by strip mining and dredging the river bed 	Operation	Negative	Site	Medium	Medium	High	Medium	<ol style="list-style-type: none"> 1. Ensure that the mining operation operates within the limits so not to exceed the threshold limit thus in turn degrading the morphology of the river. 	Low

3. Altering channel hydraulics caused by dredging the river for sand and by strip mining	Operation	Negative	Local	Medium	Medium	High	Medium	<ol style="list-style-type: none"> Operate within the thresholds so there is no excess of stockpiles, thus causing less resistance by the river channels causing undercutting causing the bank to collapse. Cause the morphology of the channels to change as less resistance in place. 	Low
--	-----------	----------	-------	--------	--------	------	--------	---	-----

1.4 ARCHAEOLOGICAL, HISTORICAL AND CULTURAL SIGNIFICANCE

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Impact on sites with valuable archaeological, history and cultural significance	Operation	Negative	Site	Short	Minor	Low	Low	<ol style="list-style-type: none"> Should any archaeological artefacts be exposed during excavation, work on the area where the artefacts were found, shall cease immediately and the ECO and Amafa KZN Heritage should be notified as soon as possible. 	Low

1.5 SOCIO-ECONOMIC IMPACTS

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Direct employment creation.	Operation	Positive	Local	Short	Minor	High	Medium	No mitigation required	Medium (Positive)
2. Training of Workers	Operation	Positive	Local	Short	Minor	High	Medium	No mitigation required	Medium (Positive)
3. Local economic Development	Operation	Positive	Local	Short	Minor	High	Medium	No mitigation required	Medium (Positive)
4. Impact on surrounding Homesteads	Operation	Negative	Local	Long	Medium	High	High	<ol style="list-style-type: none"> Noise levels should be reduced as far as possible. Operations may only occur during daylight hours between 07h00 to 17h00. No alterations of surrounding homesteads may occur. 	Low

								4. Access to the rest of the Umzambe River must not be restricted.	
--	--	--	--	--	--	--	--	--	--

1.6 SAFETY AND SECURITY

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. The operation may result in an increased security risk to adjacent properties and the residents thereof.	Operation	Negative	Local	Short	Medium	Low	Low	5. Staff should be informed that access to adjacent properties is strictly off-limits and that it will be deemed a serious offence (i.e. no fences should be jumped at any time and no gates are to be opened without permission from the relevant landowner).	Low
2. Similarly, operational activities on site may pose various risks to workers safety.	Operation	Negative	Local	Short	Medium	Medium	Medium	1. The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) and the National Building Regulations.	Low
3. Traffic and spills transporting silica sand to the market along the main roads	Operation	Negative	Local	Short	Medium	Low	Low	1. When transporting silica sand on public roads, these should be kept clear of spills, leaks, mud and sand. Should any mud and sand deposited onto public roads by the mining activities, it will need to be cleared immediately.	Low

1.7 POTENTIAL ENVIRONMENTAL IMPACTS

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
<ol style="list-style-type: none"> 1. Increase in air pollution (dust) 2. Impact on the ambient air quality due to vehicle tailpipe emissions from increased traffic volumes 	Operation	Negative	Local	Short	Medium	High	Medium	<ol style="list-style-type: none"> 1. Air filters on all mechanized equipment must be properly designed and maintained. 2. Onsite burning of waste is not permitted. 3. A dust suppression programme should be implemented on the gravel road surfaces of the existing access roads by means of periodic water sprinkling. 	Low
<ol style="list-style-type: none"> 3. Increase in ambient noise level affecting surrounding properties. 	Operation	Negative	Local	Short	Low	Medium	Medium	<ol style="list-style-type: none"> 1. Silencers on diesel-powered equipment must be properly designed and maintained. 2. Construction activities should be limited to normal office hours. 3. Mining should take place between 07:00- 17:00. Mondays to Fridays. 	Low
<ol style="list-style-type: none"> 4. Impact of lighting on surrounding properties, including light trespass and over-illumination. Apart from being a visual impact, over-illumination is also a waste of energy. 	Operation	Negative	Local	Long	Medium	High	Medium	<ol style="list-style-type: none"> 1. Avoid shiny metals in structures. If possible, shiny metal structures should be darkened or screened to prevent glare. 2. Night-time light sources must be directed away from nearby communities and farms. 3. Avoid activities outside of normal working hours. 	Low

ANNEXURE 2: ENVIRONMENTAL MANAGEMENT PROGRAMME

The Environmental Management Programme is presented in **Table 2A** and **2B**, below. It includes the necessary mitigation and recommended actions as well as the timeframe and person responsible for the actions.

Table 2A: Environmental Management Plan

ENVIRONMENTAL MANAGEMENT PROGRAMME			
Objective	Action/ Description	Timeframe	Responsibility
Minimise the potential for ground and surface water pollution	A Spill Management Plan which addresses measures to prevent and mitigate the spillage of hazardous materials in the mining permit site (oil, petrol, diesel, detergents, etc.) must be implemented as even small spills and leakages can have major impacts when incorporated with water.	Once off – To be implemented when needed	Mine Manager & Environmental Control Officer
	Ensure that the excavator is properly maintained. Equipment must be regularly serviced and inspected to make sure there are no leaks of oil, diesel, fuel, detergents or hydraulic fluids.	Continuous/monthly	Mine Manager
	Servicing and maintenance of vehicles as far as possible must occur outside of the boundaries of mining permit area. If maintenance does occur on site due to breakdown, all steps must be undertaken to avoid hydrocarbon spills/leakages.	Continuous	Mine Manager
	Minimise petrol, diesel, and oil leaks by allocating a loading zone, which is protected against such leaks.	Continuous	Mine Manager
	Should diesel be stored on site, it will need to be stored on a hard surface and 100 m from the drainage lines	Continuous	Mine Manager
	Spilled hydrocarbon must be treated as a hazardous waste and needs to be disposed of as it occurs in appropriate hazardous waste containers and removed off site as soon as possible.	Continuous	Mine Manager & Environmental Control Officer
	No washing of equipment or machinery may occur on the permit site or in the watercourse	Continuous	Mine Manager
	Bio-remediation of soils must take place after any accidental spills	Immediate	Mine Manager
	Water quality monitoring of the river and storm water course should be implemented	Monthly	Environmental Control Officer
Maintain the hydrology of the landscape level	The hydrology of the landscape will be maintained by ensuring that mining takes place away from the riparian zone along the north and south river banks and the stockpile area drainage is monitored.	When needed	Environmental Control Officer

	The winning of sand must not exceed the replenishment rate of sand during the rainy season.	Continuous	Environmental Control Officer
	The sand bars must only be skimmed and not excavated below the water level so as to alter the course of the main channel.	Continuous	Environmental Control Officer
	Reduce the turbulence produced from sucking up material from the river bed	Continuous	Environmental Control Officer
	Control levelling and compaction during mining activities so to reduce the sedimentation.	Continuous	Environmental Control Officer
	During flooding, siltation of the river will take place due to increased incidence of erosion of alluvial sand into the river from disturbed areas devoid of vegetation. Mitigation will involve ripping the soil in these areas and planting obligate and facultative wetland species to bind the soil prevent erosion and consequent siltation (once mining activities have ceased in those areas).	Continuous	Mining Manager and Environmental Control Officer
	The surface of the road and loading area is dressed to prevent runoff into the adjacent river system.	Continuous	Environmental Control Officer
	Limit the amount of driving in the river channel	Continuous	Mining Manager
	Operate within the thresholds so there isn't an excess of stockpiles, thus causing less resistance by the river channels and undercutting which could result in the bank to collapsing.	Continuous	Mining Manager
Minimise soil erosion	Restrict river access to only one corridor through the Riparian buffer. Ensure water course is not altered to the extent that the integrity of the river banks are compromised and eroded.	On commencement of rehabilitation	Environmental Control Officer
	All stockpiles and spoil material should be located on even surfaces and more than 100 m from watercourses so as not to cause sediment to wash into the system	Continuous	Mining Manager
	Sediment controls measures (e.g. silt traps, sedimentation ponds, etc) should be put in place should stockpiles show potential to wash away.	Continuous	Mining Manager
	Excavated filled slopes and stockpiles must be kept at a stable angle and capable of accommodating normal expected water flows	Continuous	Mining Manager
	Where roads have become compacted, they shall be ploughed, ripped and re-vegetated.	Continuous	Mining Manager
	During the mining activities, the Mining Manager shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking measures to prevent the surface water from being concentrated in streams and from scouring slopes, banks or other areas	Continuous	Mining Manager
	On any areas where the risk of erosion (due to sand mining operations) is evident, special measures may be necessary to stabilise the areas and prevent erosion. These may include, but not be restricted to: • Using mechanical cover or packing structures such as geofabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls • Straw stabilising • Brushcut packing • Mulch or chip cover • Hydroseeding • Sprigging or sodding • Constructing anti-erosion berms	Continuous	Mining Manager
	Where erosion does occur on any completed work/working areas, these areas shall be reinstated to previous condition.	Continuous	Mining Manager

	Topsoil stripped from the operation footprint must not be spoiled but stockpiled and preserved for use in rehabilitation. Top-soil and sub-soil stockpiles and spoil sites to be placed on opposite sides of the access roads as this is where they will cause the least impact	Continuous	Mining Manager
Limit the disturbance and destruction of vegetation, fauna and habitat	The mining area within the river must be contained and the stockpile area is limited to 0.5 hectares. All mining activity will be contained within the designated permit area. The ECO and Mining Manager must establish working and no-go areas, which need to be strictly adhered to.	Once Off	Mine Manager & Environmental Control Officer
	The “no go” areas where possible must be clearly demarcated. There shall be no unauthorised entry, litter, stockpiling, dumping or storage of equipment or materials within the demarcated “no go” areas. If this does occur the developer shall be liable for rehabilitation.	Continuous	Environmental Control Officer
	Protected trees must be marked, their location recorded and must be avoided as best as possible. If any protected species cannot be avoided a permit must be applied for.	Once Off	Environmental Control Officer
	All effort must be made to minimise the disturbance of wild animals on and within the close vicinity of the mining permit site	Continuous	Environmental Control Officer
	No trapping, snaring, hunting, fishing or killing of any animal may occur on the mining permit site.	Continuous	Mine Manager
	Disturbed areas will be rehabilitated and vegetation planted to resemble the area prior to mining, both in terms of vegetation cover and habitat	Rehabilitation Phase	Environmental Control Officer
	Any alien plants which appear or begin to establish post rehabilitation must be removed	Rehabilitation Phase	Mine Manager
Vehicle access	The access road to the permit area must be established before mining operation commences and existing roads shall be used as far as possible	Continuous	Mine Manager & Environmental Control Officer
	Vehicle access must be strictly contained onsite. Vehicles may only use designated roads and access points as determined by the ECO and Mine Manager before mining operations commence	Continuous	Mine Manager & Environmental Control Officer
	When transporting silica sand on public roads, these should be kept clear of spills, leaks, mud and sand. Should any mud and sand deposited onto public roads by the mining activities, it will need to be cleared immediately	Continuous	Mine Manager & Environmental Control Officer
	Access road and loading area will be properly maintained, and this includes appropriate storm water management and dust control (i.e. wetting)	Continuous	Mine Manager & Environmental Control Officer
Waste Management	Waste generated on site must be disposed of in clearly marked bins. These must be emptied daily	Continuous	Mine Manager
	Domestic/general waste and hazardous waste must be separated and bins clearly marked.	Continuous	Mine Manager
	No waste may be buried or burned	Continuous	Mine Manager
	The use of toilets must be adhered to. The veldt may under no circumstances be used.	Continuous	Mine Manager
	No disposal of sewage should occur on or near the site.	Continuous	Mine Manager

Minimise atmospheric emissions and dust generation	Inspection of vehicles and warning systems will be implemented for vehicles emitting excessive emissions	Continuous	Mine Manager
	Exhaust emission control devices are to be installed on vehicles and/or machinery where practical	When practical	Mine Manager
	Handling must minimise the creation of dust. Handling must be reduced during windy conditions	On windy days	Mine Manager
	Wetting of construction area must occur during very dry or windy conditions or if dust becomes a major problem	On windy days	Mine Manager
	Rehabilitation will ensure good vegetative cover which will reduce dust creation.	Rehabilitation Phase	Mine Manager
	Dust fallout monitoring will be introduced if dust becomes an on-going problem.	Monthly	Mine Manager
Control noise	Operational hours will be restricted from Monday to Friday between 7am and 5pm, and Saturday between 7am and 1pm. No noise producing activities may take place outside of these hours	Continuous	Mine Manager
	Hearing protection will be provided for employees operating heavy or noisy machinery.	Continuous	Mine Manager
	Noise level monitoring will be implemented if necessary.	Monthly	Mine Manager
Reduce the visual impact	Mining and stockpiling site must be kept neat and tidy at all times	Continuous	Mine Manager
	Access to haulage vehicles will be limited to Monday to Friday between 6am and 6pm, and Saturday between 6am and 1pm	Continuous	Mine Manager
	A limit to the number of vehicles permitted access to the site per day must be enforced.	Continuous	Mine Manager
	Avoid shiny metals in structures. If possible shiny metal structures should be darkened or screened to prevent glare	Continuous	Mine Manager
	Night-time light sources must be directed away from nearby communities and farms	Continuous	Mine Manager
Safety	Mine access, including stockpile areas and loading areas should be fenced off to prevent unauthorized access.	Continuous	Mine Manager
	Correct signage must be erected at the main access road and entrance of haul road to mining areas - includes mining authorization, access authorization, warning of mining activity, safety warning signs (protective equipment, fire & medical equipment) and contact numbers	Continuous	Mine Manager
	Speed limits on access roads and in the permit area must be set at 30 km/hr	Continuous	Mine Manager

	No open fires shall be allowed on site under any circumstances	Continuous	Mine Manager
--	--	------------	--------------

Table 2B: Rehabilitation Plan

REHABILITATION PLAN			
Objective	Action	Timeframe	Responsibility
Prevent erosion of site	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.	Continuous	Environmental Control Officer
	Stockpile area will be covered with gravel during mining operations to prevent erosion. Gravel will be removed on completion of mining. The topsoil will be used as a berm for the stockpile pad and ramp, to protect the area from prevailing winds and rain water erosion.	Continuous	Environmental Control Officer
	Topsoil and vegetation from the ramp must be used to create a berm along the perimeter of the ramp and stockpile area. The pile should be used as windbreaks to shield the ramp and stockpile area from the prevailing winds.	Continuous	Environmental Control Officer
	Stockpiles should be stabilised by securing with sheets of hessian or other suitable sheeting material.	Continuous	Environmental Control Officer
	The stockpile pad will be Re-shaped to remove any steep embankments and revegetated during the final rehabilitation and closeure phase.	Rehabilitation Phase	Environmental Control Officer
	After rehabilitation is complete, no topsoil shall be left over.	Rehabilitation Phase	Environmental Control Officer
	The implementation of an invasive alien monitoring and removal plan must be undertaken	Continuous	Environmental Control Officer
Rehabilitation of access roads and surrounding site	Any access road or portions thereof, constructed by the permit holder shall be removed and or rehabilitated to the satisfaction of the ECO. Gravel will be removed.	Rehabilitation Phase	Environmental Control Officer
	Any gate or fence erected by the permit holder which is not required by the landowner, shall be removed and the land restored to the pre-mining state.	Rehabilitation Phase	Environmental Control Officer
	Where roads have become compacted, they shall be ploughed, ripped and re-vegetated.	Continuous	Environmental Control Officer
Removal of infrastructure	There must be a removal of all toilets, bins, machinery and other equipment on site as according to relevant legislation	Rehabilitation Phase	Environmental Control Officer

Rehabilitate access to river	Rehabilitating the access point, the original profile of the river-bank will be re-established by backfilling the access point with the original material excavated or suitable material	Rehabilitation Phase	Environmental Control Officer
	In the event of damage from an occurrence where high flood waters scour and erode access points in the process of rehabilitation over the river-bank or an access point currently in use, repair of such damage shall be the sole responsibility of the holder of the mining permit or prospecting right. Rehabilitation of access to the river must take place	Rehabilitation Phase	Environmental Control Officer
	Ensure the reestablishment of riparian vegetation	Continuous	Environmental Control Officer
Rehabilitate River	The goal of rehabilitation with respect to the area where mining has taken place in the river-bed is to leave the area level and even, and in a natural state containing no foreign debris or other materials and to ensure the hydrological integrity of the river by not attenuating or diverting any of the natural flow.	Rehabilitation Phase	Environmental Control Officer
	All scrap and other foreign materials will be removed from the bed of the river and disposed of as in the case of other refuse, whether these accrue directly from the mining/prospecting operation or are washed on to the site from upstream.	Rehabilitation Phase	Environmental Control Officer
Monitoring	Monthly Environmental Control Officer Inspections will take place during mining and during rehabilitation to ensure that objectives are being met.	Monthly	Environmental Control Officer