

Mining Closure and Rehabilitation Plan

For the Application to mine sand over a 4,85ha section of the Farm Ferns 17024 along the Cedarville flats in the Eastern Cape Province.



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1 BACKGROUND INFORMATION

1.1 INTRODUCTION

An application to mine sand over a 4,85ha section of the Farm Ferns 17024 located along the Cedarville flats has been submitted to the Department of Mineral Resources and Energy (DMRE) under reference (TBD) on behalf of Kotroyi (Pty) Ltd. IDM Environmental (IDME) has been appointed as the independent Environmental Consultancy by Kotroyi (Pty) Ltd (the Applicant) to conduct a Basic Assessment (BA) for the proposed new mining permit referred to henceforth as the Kotroyi Sand Mine Application which will replace an existing mine permit operated on the same property.

As part of the Basic Assessment process, a Mining Closure and Rehabilitation Plan is required to be implemented to ensure that an acceptable plan is in place for the implementation of rehabilitation measures – both before, during and post mining activities - in accordance with the sustainable principals of Integrated Environmental Management as envisioned in the National Environmental Management Act (NEMA). NEMA aims to prevent, minimise and mitigate against potential adverse long term environmental and social impacts caused as a result of mining activities and ensure rehabilitation is an ongoing process which is not confined to one phase of the mine lifecycle.

1.2 LOCATION OF PROJECT

The proposed Kotroyi Sand Mining Permit site is situated on agricultural land currently utilised as pasture on the Cedarville flats in the Eastern Cape Province (**Figure 1**). The Farm is situated approximately 17,1km south west from Swartberg and 17,8km north east from Cedarville located off the road P606.

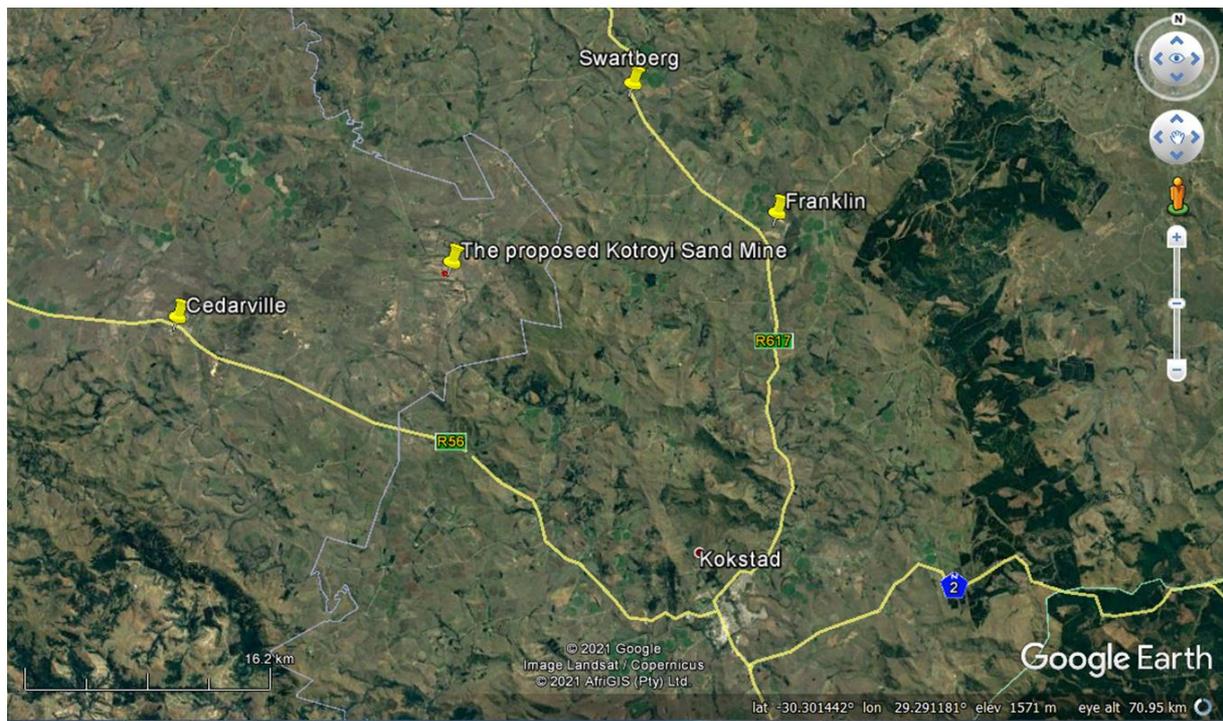


Figure 1: The proposed Kotroyi Sand Mine Locality

1.3 MINE DESCRIPTION

The mineral proposed to be mined is sand. The method to be implemented is a very basic form of Open Cast Mining. Extraction of sand will be facilitated through the use of an excavator and/or front end loader. An area less than 5ha will be demarcated for mining and will not compromise of any infrastructure, watercourses or sensitive vegetation. An excavator and/or front end loader will be used to strip a 30cm layer of topsoil which will be stockpiled along the flanks of the pit for use in later rehabilitation. This berm will create a wind barrier thus preventing wind erosion across the pit and to shield the working equipment and prevent the creation of excessive dust. The excavator and/or front end loader will excavate sand from the pit to a depth of 1m to 3m and stockpile the sand within the designated stockpiling area. The sand will be allowed to settle before being loaded onto tip trucks by the front end loader for transport off the site and for sale to the local market.

1.4 LOCAL ENVIRONMENTAL CONDITIONS

The proposed Kotroyi Sand Mine site is situated at an altitude of 1485m above sea level on relatively flat terrain which gently slopes down towards the freshwater wetland at the southern end of the property. The property has been disturbed and degraded as a result of historical and current agricultural activities and the farm has an existing sand mine on it, as well as being used for cattle pasture. According to the National Vegetation Map (2018), the study area is located within the Grassland Biome, within the Sub-Escarpment Grassland Bioregion, and within the Mabela Sandy Grassland vegetation type. Of the species encountered within the study area only two have been listed as dominant species for the vegetation type i.e. *Abildgaardia ovata* and *Cynodon dactylon*, and both of these species are commonly occurring species in disturbed areas. The findings of the Fauna Assessment indicated the site supported a low animal sensitivity ranking due to the transformed nature of the site as already mentioned. This has impacted on the quality and diversity of the grassland which in turn impacted on the animal sensitivity of the site. However, the wetland on the southern portion of the site will still play an important role as an ecological corridor between different areas of the region and was calculated to contain a high EIS according to the Freshwater Assessment.

1.5 CLOSURE AND REHABILITATION PLAN PURPOSE

This Closure and Rehabilitation Plan must be used to guide the site preparation, operation and decommissioning phases of the mining lifecycle and guide the final rehabilitation and closure of the permit site. Mine rehabilitation must be viewed as an on-going process aimed at restoring the site to a condition that does not impact negatively on the surrounding environment. The aim of the Plan is, therefore, to ensure activities associated with the different mining phases will be designed in a manner to prevent, minimise or mitigate against potential adverse long-term environmental and social impacts. The Closure and Rehabilitation Plan is required to be monitored by the mine's appointed independent Environmental Control Officer (ECO).

2 BASIS OF A CLOSURE PLAN

2.1 LEGAL OBLIGATIONS

South African mining and associated legislation and policy places ultimate responsibility for mitigating environmental and social damage as a result of mining operations on the applicant and mining companies themselves. This liability exists throughout the different phases of the mine, from commencement, during operations, post operations to mine closure. This includes compulsory legislative commitments for remediation and/or rehabilitation and ultimate close out. The key relevant legislation applicable to rehabilitation and closure includes the following:

- The Constitution of the Republic of South Africa (108 of 1996) (Constitution);
- The Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA);
- The National Environmental Management Act (No. 107 of 1998) (NEMA);
- The National Water Act (No. 36 of 1998) (NWA).

The following section provides a brief description of the legislation as it pertains to the closure of a sand mining operation.

2.1.1 THE CONSTITUTION (108 OF 1996)

While the constitution does not address rehabilitation specifically, it does pave the way for environmental legislation in South Africa post-apartheid. The constitution enshrines environmental wellbeing as a fundamental human right that must be protected. In terms of Section 24 of the Constitution, it states:

“Everyone has the right –

- *to an environment that is not harmful to their health or well-being;*
- *to have the environment protected, for the benefit of present and future generations”.*

This must be achieved through reasonable legislative and other measures and ensures that environmental considerations are part of any mining process. The Constitution also provides rights pertaining to administrative justice, capacity or standing to institute legal proceedings and access to information. These all become relevant within the context of protection and management of the environment during all stages of the mine’s lifecycle.

2.1.2 MINERALS AND PETROLEUM RESOURCES DEVELOPMENT (ACT 28 OF 2002)

The legal framework for the regulation of the mining industry underwent transformation with the promulgation of the Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA), which came into effect on the 1st of May 2004. These requirements and a summary of other regulatory considerations are discussed in the following paragraphs.

In Section 37, the MPRDA confirms that the principles set out in the National Environmental Management Act (No. 107 of 1998) (NEMA) apply to all prospecting and mining operations and that these operations must be carried out in accordance with the generally accepted principles of sustainable development. This is further supported by the stated objective of the MPRDA being *“to give effect to Section 24 of the Constitution by ensuring that the nation’s mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development”*.

Section 38 stipulates that the general objectives of integrated environmental management must be applied in accordance with NEMA and this will include the assessment and management of impacts identified as part of the Environmental Management Plan (EMP) process laid out in Section 39.

R527 specifies that the EMP must include environmental objectives and specific goals for mine closure. The applicant of a mining permit/right must make prescribed financial provision for the rehabilitation or management of negative environmental impacts.

R527 provides principles for mine closure which state that the holder of a mining permit/right must ensure:

- **The closure of its mining operation incorporates a process which starts at the commencement of operation and continues throughout the life of mine;**
- **Risks pertaining to environmental impacts are quantified and managed proactively, which includes gathering relevant information throughout the mine’s operations;**
- **Safety and health requirements of the Mine Health and Safety Act (No. 29 of 1996) are complied with;**
- **Residual and possible latent environmental impacts are identified and quantified;**
- **The land is rehabilitated, as far as practical, to its natural state, or to a predetermined and agreed standard or land use which conforms to the concept of sustainable development;**
- **Mining operations are closed efficiently and cost effectively;**
- **Key objectives for mine closure to guide project design development and management of environmental impacts are included in the EMP, which include broad future land use objectives, and proposed closure and rehabilitation costs.**

As with other environmental legislation, there is a provision in the MPRDA (Section 45) for the DMRE to direct an operation to investigate, evaluate, assess and report on the impact of any pollution or environmental degradation and take such measures as may be specified within a specified time period. If the operation fails to carry out such a direction, DMRE can initiate the necessary actions and recover the costs from the Applicant/Mine Company. In addition, Section 38 makes the owners of the mine severally liable for any unacceptable negative impacts or failure to comply with this Plan, read with the EMP.

2.1.3 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NO. 107 OF 1998)

NEMA is the overarching and enforceable body of environmental legislation in South Africa. This act paves the way for an EIA process to assess listed activities that may have a harmful impact on the environment. NEMA aims to establish overarching guidelines and principles to help facilitate environmental management in South Africa.

Sections 28 (1) and (3) of NEMA sets out the duty of care principle, which is applicable to all types of pollution and imposes a duty of care to prevent, or where permitted, to minimize environmental degradation. It also provides examples of steps that must be taken to prevent environmental degradation, including the provision for rehabilitation in Section 28 (3) (f), which states that the measures may include measures to “remedy the effects of pollution and degradation”.

Section 2 of the Act lists a set of principles with which environmental management must comply and to which Section 37 (1) of the MPRDA refers directly as follows: “*The principles set out in Section 2 of the National Environmental Management Act (No.107 of 1998)*

(a) *Apply to **all prospecting and mining operations**, as the case may be, and any matter relating to such operation; and*

(b) *Serve as guidelines for the interpretation, administration and implementation of the environmental requirements of this Act.”*

Section 2 (b) of NEMA states that they “*serve as the general framework within which environmental management and implementation plans must be formulated*”.

The principles of Section 2 of NEMA that are particularly applicable to rehabilitation are:

- The precautionary principle (2 (4) (a) (vii)), which lays the onus on the Applicant or (mine) operator to take a risk averse and cautious approach during decision making, that recognises the “*limits of current knowledge about the consequences of decisions and actions*”. Where uncertainty exists, action must be taken to limit the risk;
- The cradle-to-grave (or lifecycle responsibility) principle (2 (4) (e)) states that “*responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.*”;
- The polluter-pays principle (2 (4) (p)) is generally regarded as an important guiding principle for environmental management; and
- The project must comply with the requirements for sustainable development (2 (3)), which requires consideration of all relevant factors (2 (4) (a)). A holistic, integrated approach must be followed and the “*best practicable environmental option*”, (defined as being “*the option that provides the most benefit or causes the least damage to the environment as a whole*”) must be selected.

2.1.4 NATIONAL WATER ACT (NO. 36 OF 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 authorisation, before a developer can proceed to construction (in this case mining).

Section 19 of the Act sets out the principles for “*an owner of land, a person in control of land or a person who occupies or uses land*” to:

- Cease, modify or control any act or process causing pollution;
- Comply with any prescribed waste standard or management practice;
- Contain or prevent the movement of pollutants;
- Eliminate any source of pollution;
- Remedy the effects of the pollution; and
- Remedy the effects of any disturbance to the bed and banks of a watercourse.

Regulation 9 of GN R704 promulgated in terms of the NWA, which deals with temporary or permanent mine closure, provides that any person in control of a mine or related activity must at the cessation of mining operations and its related activities, ensure that all pollution control measures have been designed, modified, constructed and maintained so as to comply with the regulations contained in GN 704. Furthermore, the in-stream and riparian habitat of any water resource, which may have been affected or altered by the mine or activity, must be rehabilitated in accordance with the regulations contained in GN 704.

2.1.5 OTHER LEGAL OBLIGATIONS

Legal obligations relating to the closure of a mine are contained in the EMP prepared in respect of the activities that occur or are planned within the proposed mine permit area. The EMP mitigation table compiled for this particular mining permit application is included in **Section 3 of the EMP**.

2.2 CLOSURE VISION

It was noted by the Centre for Environmental Rights (2017) that mine closure and rehabilitation in South Africa is often poorly managed and implemented which has resulted in environmental degradation which has had significant environmental consequences for South Africa. Therefore the closure vision of the Kotroyi Sand Mine is to ensure that the mining area is left in a sustainable condition after mining ceases, which is not harmful to the health and safety of the surrounding communities and protects and enhances the local biodiversity and the natural landscape of the mining area and surrounds. It aims to break this trend of neglect.

2.2.1 CLOSURE OBJECTIVES

The following closure objectives are required to be implemented by the mine owner/operator to support the abovementioned closure vision for the proposed Kotroyi Sand Mine:

- **Adhere to all statutory and other legal requirements (National and Local);**
- **Implement progressive rehabilitation measures where possible to ensure protection of the local environment;**
- **To develop land-uses that are stable, sustainable and aesthetically acceptable on closure;**
- **Ensure safety & health of all stakeholders during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.**
- **Ensure that closure supports productive uses considering pre-mining conditions and are in agreement with commitments to stakeholders.**
- **Utilize closure strategies that promote a self-sustaining condition with little or no need for ongoing care and maintenance.**
- **Achieve agreed quality targets set by the Catchment Management Authority (CMA) and the Department of Water and Sanitation (DWS) as far as practical relative to impacts and reasonability to achieve.**

2.2.2 POST CLOSURE AND LAND USE

This Mine Closure and Rehabilitation Plan aims to create a sustainable land use in the long term, under normal land use management practices. The site will continue to be used as cattle pasture. However, as part of this Rehabilitation Plan, the Applicant will be required to remove all alien vegetation from the site and adjacent area and prevent any further degradation of surrounding natural vegetation and the southern wetland.

3 CLOSURE ACTION PLAN

The Closure and Rehabilitation Plan for the proposed Kotroyi Sand Mine aims to create a sustainable environment and the prevention of pollution, erosion and alien species dispersal. In order to gain the best possible rehabilitation outcomes from the resultant mining operation, different actions are required to occur at different phases/times within the lifecycle of the mine. The following actions are required for the implementation of a successful Closure and Rehabilitation Plan:

3.1 SITE PREPARATION FOR MINING ACTIVITIES

Land preparation occurs not during the closure and decommissioning phase, but involves the site establishment and preparation prior to mining activities. It is important to note that actions undertaken in this phase are crucial for the successful closure and rehabilitation of the mine during the end of its lifecycle.

The most important factors to bear in mind when preparing for applicable sand mining operations are:

- To limit the areas that will be impacted by the proposed mining activities (this includes stockpiling areas, location of waste bins, vehicles, vehicle parking, equipment storage, loading areas, access points to the mining area, the storage of toilets and the access road/tracks);
- To minimize potential future contact of toxic or polluting materials with the environment; and
- To maximize the recovery and effective storage of those mining profile materials that could be most useful during the rehabilitation process after mining has been completed (Chamber of Mines, 2007; Department of Minerals and Energy, 2008).

The following measures must be implemented during the site preparation and establishment phase:

- Mine planning must be designed in a way so as to ensure the area to be occupied by mine is minimized. The impacted area must be kept as small as practically possible and will be clearly defined and demarcated appropriately. This must be undertaken to prevent mining creep into surrounding areas;
- Sensitive areas (such as watercourses, buffers and pockets of indigenous vegetation) must be clearly demarcated as no-go areas and must be avoided;
- All temporary infrastructure must be designed with closure in mind (ie: Infrastructure must be designed with ease of deconstruction in mind);
- The erecting of signage. This includes erecting of signage warning the public that mining activities are taking place on the property and the providing of a contactable number on this sign in the event of an emergency situation.
- Access to the mining area must as far as possible be controlled and restricted;

- There must be the placement of a portable toilet, bins (this must be secured and emptied regularly), spill kits and first aid kits on the mining site. The placement of these items must be undertaken so that they facilitate the mine closure phase;
- Preparing the existing track for movement of heavy vehicles. This to prevent erosion, uncontrolled runoff, the spread of alien plants and compaction during the subsequent phases. These impacts if not controlled will make mine closure and rehabilitation significantly more challenging; and
- Preparing equipment and vehicles for operation. This to ensure there are no leaks or breakdowns that may cause pollution.

3.2 SOIL STRIPPING AND STOCKPILING

The stripping of topsoil is an important aspect of rehabilitation as once the fertile topsoil is lost, it takes years to regenerate. The following must be undertaken:

- Soil stripping must remove all materials that are suitable for supporting plant growth;
- Soil stripping must occur to about 4m;
- Strip soils only when moisture content will minimise compaction risk;
- Use shovel and truck in preference to bowlscraper; and
- Fertile topsoil must be stockpiled as per the below points.

The steps that must be taken during sand stockpiling (both of fertile topsoil and mined sand for sale) are as follows:

- Have separate areas for fertile top soil and areas for mined sand for sale;
- Locate stockpile areas in areas where they will not have to be removed prior to replacement for final rehabilitation;
- Minimize the period of exposure of soil surfaces through dedicated planning;
- Limit access to the temporary stockpile areas;
- Limit the number of stockpiles on site;
- Restrict the extent of disturbance within the designated areas of disturbance;
- Ensure that the location is free draining to minimize erosion loss and waterlogging;
- Place silt fences / trenches strategically on the periphery of the temporary stockpile areas in order to trap sediment carried by stormwater runoff before it is conveyed into the nearby wetland;
- Ensure silt fences / trenches are adequately maintained;
- Protect stockpiles, if required, from erosion using tarp or erosion blankets;
- Minimize compaction during stockpile formation;
- Ensure that the stockpiled sand is only used for the intended purposes;
- During stockpiling, preferably the 'end-tipping' method must be adopted to keep the stockpiled soils loose;

- Limit the height of stockpiles to 2m;
- Soil stockpiles must be kept free of weeds; and
- An independent ECO must be appointed to monitor the site preparation and operation phases.

The removal of alien plants from stockpile areas must be undertaken in the following manner (please refer to **section 2.5** for further information on the removal of alien plants):

- Alien species removal is to take place manually, by hand as far as possible. The use of herbicides must be avoided. Should the use of herbicides be required, only herbicides which have been certified safe for use in aquatic environments by an independent testing authority must be considered. The ECO must be consulted in this regard;
- Care must be taken in order to avoid the disturbance of indigenous species during the removal of alien plants;
- Dispose of removed alien plant material at a registered waste disposal facility;
- Remove vegetation before seed is set and released; and
- Cover removed alien plant material properly when transported, to prevent it from being blown from vehicles.

Mining closure measures regarding stockpiles include:

- Remove all stockpiles from site. Sand must be sold or disposed of offsite at a registered facility;
- Utilise topsoil stockpiles for rehabilitation;
- Reshape and reprofile disturbed areas associated with the temporary stockpile areas to resemble pre-disturbance terrain units;
- Loosen disturbed and compacted soils to a depth of 100mm-300mm to assist with the re-establishment of vegetation;
- Stabilise areas at risk of erosion with 'soft' stabilization techniques as determined upon consultation with a suitably qualified specialist (e.g. geotextiles, fibre mats / nets / blankets / bags, brush mattresses, live staking etc.); and
- Monitor the decommissioned areas for erosion. Should erosion be noted, immediate corrective measures must be undertaken.

3.3 EROSION AND STORMWATER CONTROL

Erosion control measures must include:

- Measures must be undertaken to prevent and manage erosion, regardless of the phase of the mine lifecycle;
- Use stockpiled soil as a berm to prevent erosion and uncontrolled runoff.
- Divert stormwater away from areas susceptible to erosion and surrounding wetlands with the use of berms, sandbags and silt trenches etc;

- Stabilising steep/unstable/erosion prone areas with ‘soft’ stabilization techniques (e.g. geotextiles, fibre mats / nets / blankets / bags, brush mattresses, sandbags, live staking etc.); and
- Filling of erosion gullies and rills and the stabilization of gullies.

3.4 INFRASTRUCTURE REMOVAL

Due to the mine’s small scale, the operation will require no permanent infrastructure on site. Temporary toilets located on site will be removed, as well as any mining machinery, waste bins and designation beacons/pegs/tape.

Mine access roads that are not needed for closure and post-closure uses at the site (e.g. security and monitoring) will be closed and gravel removed.

There will also be the removal of all signage.

3.5 ALIEN PLANT CONTROL

Alien species tend to out-compete indigenous vegetation; this is due to the fact that they are vigorous growers that are adaptable and able to invade a wide range of ecological niches (Bromilow, 1995). Therefore, rehabilitation must involve control of alien species. Alien species on site must be identified, categorized and removed, using one or a combination of methods.

Alien plant species are difficult to control. Methods must be used that are appropriate for the species concerned, as well as to the ecosystem in which they occur. When controlling invaders, damage to the environment must be limited to a minimum. There are three basic methods by which encroachers or weeds are controlled:

Physical (mechanical):

- Uprooting (hand pulling);
- Cutting back;
- Chopping, slashing and felling; and
- Ring-barking (girdling)

Chemical:

- Foliar application;
- Stem notching and application;
- Stump treatment; and
- Soil treatment

Biological treatment:

- Which involves the use of host-specific natural enemies of weeds or invaders from the plant's country of origin, to either kill or remove the invasive potential of these plants.

The following additional measures are recommended in order to prevent the future introduction or spread of alien species, and to ensure the rehabilitation of transformed areas:

- There must be no planting of alien plants (e.g. black wattle, eucalyptus and pampas grass) anywhere within the mining area;
- Alien species must be removed from all areas disturbed as a result of mining activities. Alien vegetation which has encroached into watercourses as a result of surrounding disturbance must be removed.
- Alien species removal is to take place manually, by hand as far as possible. The use of herbicides must be avoided. Should the use of herbicides be required, only herbicides which have been certified safe for use in aquatic environments by an independent testing authority must be considered.
- Care must be taken in order to avoid the disturbance of indigenous species during the removal of alien plants.
- Dispose of removed alien plant material at a registered waste disposal site.
- Remove vegetation before seed is set and released.
- Cover removed alien plant material properly when transported, to prevent it from being blown from vehicles.
- Follow up alien vegetation monitoring and clearing must be undertaken in accordance with timeframes specified by the alien and invasive species control program.
- Follow up alien clearing must be undertaken until healthy indigenous vegetation returns to the site after mining operations have ceased.
- Benefits to local communities as a result of the alien plant control programme must be maximized by not only ensuring that local labour is employed, but by also ensuring that cleared alien trees are treated as a valuable wood resource that can be utilized for profit.

4 POST CLOSURE MONITORING AND MAINTENANCE

The objective of the monitoring program will be to document the recovery of the site towards the closure land use goals, in accordance with the overall closure objectives stated in **Section 2.3**.

The monitoring that will be required during the post-closure period is summarized below:

Table 1: List of identified impacts requiring monitoring programmes

<u>Soil</u>	Erosion
	Loss of top soil
	Contamination
	Compaction of soil
<u>Ground and Surface Water</u>	Disturbance of wetland habitat
	Erosion and sedimentation of wetland habitat
	Alteration of the hydrological regime
	Water quality impairment/pollution
<u>Vegetation</u>	Destruction of indigenous vegetation
	Alien Vegetation infestation
<u>Wildlife</u>	Disturbance/Harm
	Barrier to movement/ Hazard
	Habitat Destruction
<u>Climate and Climate Change</u>	Atmospheric Emissions
<u>Air Quality</u>	Dust Generation
	CO and CO2 Emissions
<u>Traffic</u>	Increased Traffic and Safety
<u>Health and Safety</u>	Of all workers on site
<u>Noise</u>	Noise Disturbance
<u>Visual</u>	Visual aesthetics
<u>Lighting</u>	Lightening impacts
<u>Waste</u>	Litter

Whilst the Mine Manager must undertake to monitor activities on a daily basis, the ultimate responsibility for satisfying the monitoring requirements is the role of the Applicant. The Environmental Control Officer (ECO) will be responsible for ensuring compliance of all aspects of monitoring in accordance with the roles and responsibilities designated in terms of the EMP.