

## **Appendix F: Environmental Management Programme**



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# Alleen 2 Opencast Extension, Magdalena Colliery in Dannhauser, KwaZulu-Natal: Environmental Management Programme

## Final Amended Report

Version - 3

08 September 2014

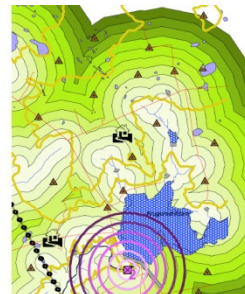
(Version 2 submitted 15 April 2014)

Zinoju Coal (Pty) Ltd

# ZINOJU

DEDTEA Reference Number: DC29/0020/2013

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Environmental Management Programme**




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**08 September 2014**

Zinoju Coal (Pty) Ltd

13-727

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## 1 PROJECT DESCRIPTION

### 1.1 Introduction

Zinoju Coal (Pty) Ltd (hereafter referred to as Zinoju) proposes the extension of open cast mining operations at Magdalena Colliery on the parcel of land referred to as Alleen 2 which is located approximately 25km north-northwest of the town of Dundee in the province of KwaZulu-Natal.

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), the proposed extension is listed as an activity that may be detrimental to the environment and thus, requires authorisation from the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) before operations can commence. The activities associated with the project are listed under Government Notice Regulation (GNR) 544 (Listing Notice 1) and as such require an application for Environmental Authorisation in the form of a Basic Assessment process. Zinoju has appointed GCS as the Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (BA) for the project and submit an application for Environmental Authorisation (EA) to the DEDTEA. As part of this application process, an Environmental Management Programme (EMP) (this document) has been developed in compliance with Section 33 of GN. R543 of the 2010 Environmental Impact Assessment (EIA) Regulations.

The relevant activities in terms of the Environmental Impact Assessment (EIA) Regulations (Dated 2 August 2010) under NEMA are listed in Table 1 below:

**Table 1: Identified Listed Activities in terms of the EIA Regulations to date**

Relevant Notice	Listed Activity	Description of the activity
GNR 544 Activity 11	The construction of <b>(xi) Infrastructure or structures covering 50 square metres or more</b>  Where such construction occurs within a watercourse or within 32 metres of a water course, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	The proposed open cast extension area includes a number of ephemeral watercourses, which are dry for the majority of the year.  Therefore listed activity (xi) is applicable to the project.
GNR 544 Activity 18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from: <b>(i) A watercourse</b>	As the proposed open cast extension involves the clearing and levelling of a number of ephemeral watercourses, it is highly likely that infilling, depositing or excavation of soil, sand, pebbles or rock (more than 5 m <sup>3</sup> ) from the watercourses will occur in order for mining activities to progress.

		Accordingly, this activity is applicable to the project.
GNR 544 Activity 22	The construction of a road, outside urban area,  <b>(ii) where no reserve exists where the road is wider than 8 metres.</b>	The proposed open cast extension will most likely require the construction of access roads for mining machinery and vehicles. These access roads may have a width of 8 metres or more.  Accordingly, this activity is applicable to the project.

## 1.2 Project Location

Magdalena Colliery is an existing coal mine located approximately 22km north of the town of Dundee and approximately 325km east-northeast of the City of Durban, in the province of KwaZulu-Natal. The Colliery is located in the magisterial district of Amajuba and the local municipality of Dannhauser, GPS Co-ordinates: 27° 56' 55.64"S; 30° 10' 39.28"E.

Prior to mining of coal in this area, the middle and upper mid-slopes were used for grazing, while the more productive land in the valley was used for the cultivation of maize and other market related products. Due to the topography, and the highly sensitive nature of the soils, intense farming has not taken place on large portions of the area in question. The physical and chemical nature of the soils and erratic climate render these areas agriculturally poor. The mine is surrounded by moderate to low density rural settlements consisting of traditional homesteads (imzi) and more formalised houses.

The proposed site for the open cast extension at Alleen 2 is previously disturbed, and consists of rural settlements (Anville). Large portions of the land have evidence of misuse in terms of large erosion gullies and overgrazing. Some subsistence farming (maize) and grazing occurs on site. Local access roads are present throughout the site. Please refer to Figure 1 below for the Locality Map.

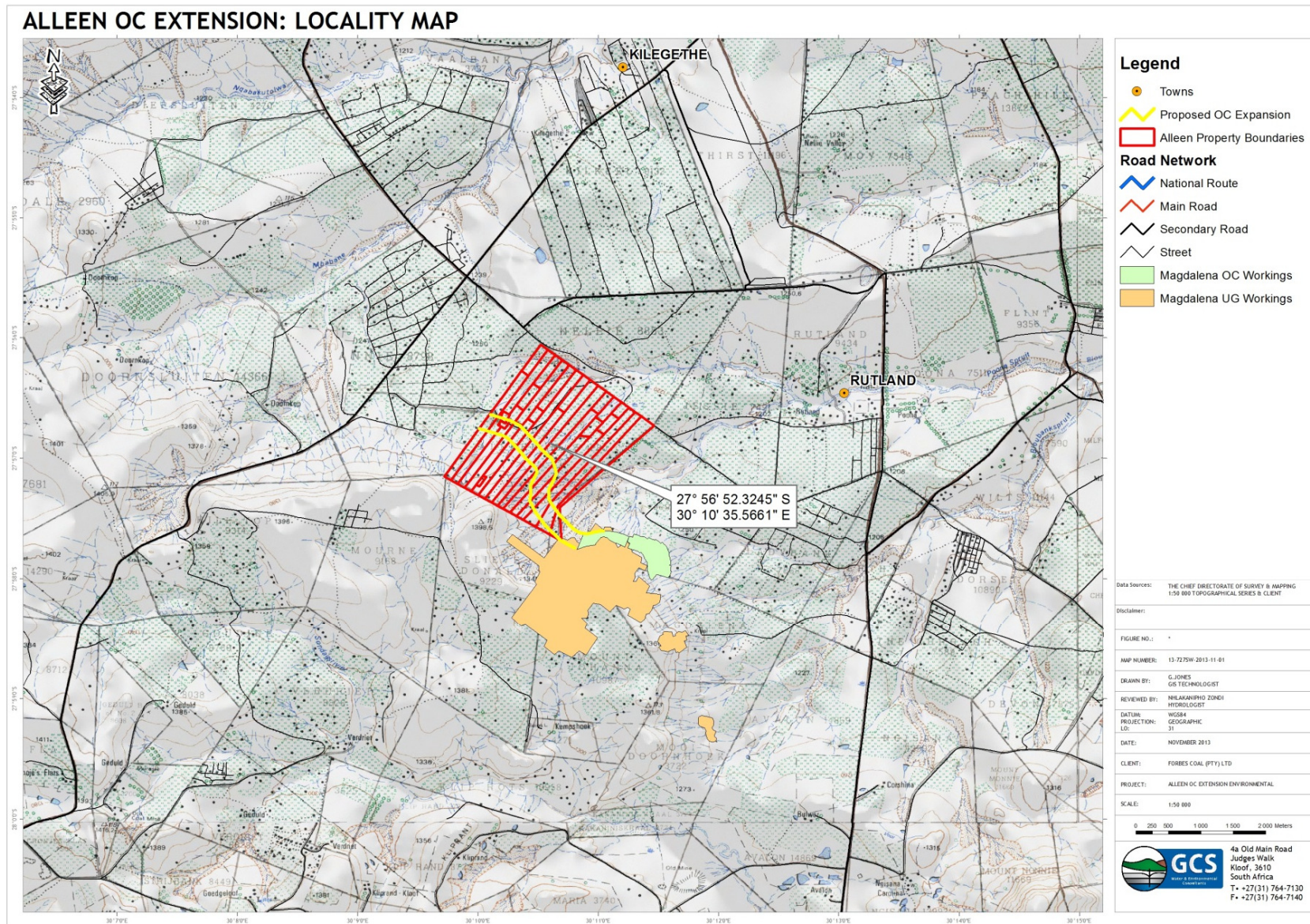


Figure 1: Locality Map of the Proposed Alleen 2 Open cast Extension

### 1.3 Project History

The Magdalena Colliery is an existing coal mine that has been operational since 2003. The existing mining area is operational under a number of Mining Rights with corresponding approved Environmental Management Programmes (EMPR's) in accordance with the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). Table 2 below outlines the various mining phases and associated mining rights. In addition, an Integrated Water Use License Application (IWULA) process for all exiting water uses was completed in 2007.

**Table 2: Magdalena Mining Rights**

Phase Reference / Farm Portion	Approval Status	Approval References	Associated Documents
<u>Phase 1:</u> <ul style="list-style-type: none"> <li>• Portions 1, 2 and of Magdalena No. 7574</li> <li>• Rem. of Magdalena No. 7574</li> </ul>	Mining Right	227MR / ML378/03	<ul style="list-style-type: none"> <li>• Approved EMP (dated August 2002)</li> <li>• Approved Water Use Licence (07N32D/AGJ/986)</li> </ul>
<u>Phase 2:</u> <ul style="list-style-type: none"> <li>• Portions 1, 23, 24, 25 and 26 of Alleen 1 No. 15592</li> <li>• Portions 1, 2, 3, 4, 7, 8, 9, 10, 21 and 22 of Mount Johanna No. 10987</li> <li>• Rem. of Mount Johanna No. 10987</li> </ul>	Mining Right	213MR	<ul style="list-style-type: none"> <li>• Approved EMP (dated April 2008)</li> <li>• Approved Water Use Licence (07N32D/AGJ/986)</li> </ul>
<u>Phase 3:</u> <ul style="list-style-type: none"> <li>• Portions 5, 6, 11, 12, 13, 14, 15, 16, 17, 18, 19 and 20 of Mount Johanna No. 10987</li> <li>• Rem. of Mount Johanna No. 10987</li> <li>• Portion 1 of Mooidoorn Hoek No. 3722</li> <li>• Rem. of Kemps Hoek No. 4271</li> <li>• Slieve Donald No. 9229</li> <li>• Mourné No. 9168</li> </ul>	Mining Right	198MR	<ul style="list-style-type: none"> <li>• Approved EMP (dated May 2008)</li> <li>• Approved Water Use Licence (07N32D/AGJ/986)</li> </ul>

### 1.4 Project Description

It is the intention of Zinoju to extend the site's open cast mining area in order to extend the operational life of the company's mining operations at the Magdalena Colliery. The open cast strip extension will be approximately 55 ha in extent, with 24 ha for the open cast access area. The properties included in the open cast extension are 18 portions of Alleen 2 No. 4280.

As the mine is currently operational, there is no intention to construct additional infrastructure to accommodate the open cast extension. All mineral processing will be



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undertaken in line with existing operations.

## 2 OBJECTIVES AND PRINCIPLES

### 2.1 Objectives of the EMP

The purpose of the EMP is to manage the impacts associated with the construction, operational and closure activities within the Magdalena Alleen 2 Open cast Extension project. Environmental impacts and associated mitigation measures and recommendations identified during the course of the BA are included to ensure they are adopted and implemented. In addition, the EMP is designed to assist Zinoju and their contractor/s to plan and implement effective site-specific strategies that will minimise the potential environmental impacts associated with their activities and maintain compliance with environmental legislative requirements. This EMP serves as a stand-alone document to be disseminated to, and used by, the contractor/s and project managers during all phases of the project. By its very nature, the EMP is a dynamic document and updating may be required (with written approval from the DEDTEA).

Note that should the authorisation from the DEDTEA be granted for the project, this document is to be updated with any specific conditions contained therein.

The purpose of the EMP is to:

- Promote understanding of the common environmental impacts associated with the construction and possible mitigation measures.
- Ensure that the construction activities associated with the project are undertaken in a controlled and organised manner, thereby managing and minimising potential environmental and social impacts.
- Encourage good management practices through planning and commitment to environmental issues.
- Outline the developer's environmental management commitments for the site.
- Recognise health and safety issues related to the project.
- Act as a performance standard that activities can be audited against.
- Provide rational and practical environmental guidelines to:
  - Minimise disturbance of the natural environment.
  - Prevent or minimise all forms of pollution.
  - Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment.
  - Adopt the best practicable means available to prevent or minimise adverse environmental impacts.

- Develop waste management practices based on prevention, minimisation, recycling, treatment or disposal of waste.
- Describe all monitoring procedures required to identify impacts on the environment.

## 2.2 Environmental Principles and Best Practice Guidelines

- The environment is considered to be composed of both biophysical and social components.
- Construction is a disruptive activity and all due consideration must be given to the environment, including the social environment during the execution of the project to minimise the impact on affected parties.
- Minimisation of areas disturbed by construction activities (i.e. the 'footprint' of the construction area) should minimise many of the construction related environmental impacts of the project and reduce rehabilitation requirements and costs.
- All relevant standards relating to international, national, provincial and local legislation, as applicable, should be adhered to. This includes requirements relating to waste generation and emissions, waste disposal practices, noise regulations, road traffic ordinances, etc.
- Every effort should be made to minimise, reclaim and/or recycle waste materials.

## 3 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Table 3 below provides details of the Environmental Assessment Practitioner (EAP) who prepared this report.

**Table 3: Details of Environmental Practitioner**

Business name of EAP:	GCS Water and Environmental Consultants (Pty) Ltd		
Contact:	Kelly Taylor		
Qualifications	MSc: Environmental Science, University of the Witwatersrand, 2011 BSc (Hons): Geography, University of Pretoria, 2005 Bsc: Environmental Science, University of Pretoria, 2004		
Physical address:	4a Old Main Road, Judges Walk, Kloof, 3610		
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## 4 IDENTIFICATION OF ENVIRONMENTAL IMPACTS

The negative environmental impacts and issues identified to date have been summarised into the following categories:

### 4.1 Construction Phase

- Visual Intrusion
- Noise and Vibration Disturbance
- Health and Safety Impacts
- Loss of Cultural and Heritage Resources
- Loss of Agricultural and Community Land
- Soil Erosion and Nutrient Loss
- Groundwater Contamination and Quantity Reduction
- Surface Water Contamination
- Air Pollution
- Disturbance of Freshwater Ecosystems and Habitats
- Disturbance of Terrestrial Ecosystems and Habitats

### 4.2 Operational Phase

- Visual Intrusion
- Noise and Vibration Disturbance
- Health and Safety Impacts
- Loss of Cultural and Heritage Resources
- Loss of Agricultural and Community Land
- Groundwater Contamination and Quantity Reduction
- Surface Water Contamination and Change in Peak Flows and Volumes
- Air Pollution
- Disturbance of Freshwater Ecosystems and Habitats
- Disturbance of Terrestrial Ecosystems and Habitats

### 4.3 Closure Phase

- Noise and Vibration Disturbance
- Health and Safety Impacts
- Loss of Cultural and Heritage Resources
- Reshaping of Topography
- Groundwater Contamination and Quantity Reduction
- Surface Water Contamination
- Disturbance of Freshwater Ecosystems and Habitats

- Disturbance of Terrestrial Ecosystems and Habitats

#### 4.4 No-Go Alternative

- Loss of Local Employment
- Soil Erosion and Habitat Degradation

#### 4.5 Positive Impacts

A number of positive impacts have been identified in terms of beneficial environmental changes resulting from mining activities on site. These are as follows:

- Local Employment
- Community Housing
- Increase in Land Capability
- Soil Replacement
- Rehabilitation of Watercourses

## 5 IMPLEMENTATION INSTRUCTIONS

### 5.1 Duty of Care and Remediation of Damage

Zinoju, as the developer, is responsible for compliance with the provisions of duty of care and remediation of damage in accordance with Section 28 of NEMA and its obligations regarding the control of emergency incidents in terms of Section 30. Failure to comply with this EMP will constitute an offence and Zinoju and/or their Contractor/s may be liable to penalties and/or legal action. Therefore, it is important for all the responsible parties to understand their duties and undertake them with duty and care.

### 5.2 Compliance with Other Policies and Legislation

The EMP has been developed in line with South Africa's environmental legislation so as to ensure that reasonable measures are taken to warrant environmental protection and to promote sustainable development. The adherence of the contractors to the stipulations outlined in this EMP will ensure compliance with the applicable legislation outlined below:

- The Constitution of the Republic of South Africa Act (No.108 of 1996).
- Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).
- National Environmental Management Act (NEMA) (No.107 of 1998).
- National Environmental Management Waste Act (No. 59 of 2008).
- National Environmental Management Protected Areas Act (No. 57 of 2003).

- National Environmental Management: Biodiversity Act (No. 10 of 2004).
- Occupational Health and Safety Act (No. 85 of 1993) and regulations.
- National Water Act (No.36 of 1998).
- South African National Standards (SANS 10103:2008).
- The National Heritage Resources Act 25 of 1999.
- KwaZulu-Natal Heritage Act No. 10 of 1997.
- Animal Protection Act (No. 71 of 1962).
- Atmospheric Pollution Prevention Act (No. 45 of 1965).
- Conservation of Agricultural Resources Act (No. 43 of 1983).
- Hazardous Substances Act (No. 15 of 1973).
- National Veld and Forest Fire Act (No. 101 of 1998).

### **5.3 Approvals**

A water use license from the Department of Water Affairs is required to mine within watercourses as per Section 21 (c) and (i) of the National Water Act. This license or approval is required prior to construction commencing.

### **5.4 Environmental Awareness and Compliance**

The philosophy adopted in this EMP is derived from the principles of the National Environmental Management Act (No. 107 of 1998) (NEMA) which states that development must be socially, economically and environmentally sustainable. Sustainable development requires that:

- The disturbance of ecosystems and loss of biodiversity are avoided (minimised or remedied).
- Pollution and degradation of the environment are avoided or minimised and remedied.
- Waste is avoided or minimised and re-used or re-cycled where possible and otherwise disposed of in a responsible manner.
- A risk averse and cautious approach is applied.
- Negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot altogether be prevented, are minimised and remedied.

NEMA makes provision that anyone who causes pollution or degradation of the environment is responsible for preventing impacts occurring, continuing or recurring and for the costs of repair of the environment.

## 5.5 Proposed Mechanisms for Monitoring Compliance and Performance Assessment

Appropriate monitoring and review of the EMP is required to ensure effective implementation of the EMP and to identify and implement corrective measures in a timely manner. In the event where discrepancies are identified, the problem must be investigated and attended to. All the results obtained during environmental monitoring must be documented for audit purposes.

Compliance with the approved EMPR and EMPR Amendment has to be audited in terms of the Mineral and Petroleum Resources Development Act (MPDRA), 2002 (R527 r55). Specifically, the regulation requires that monitoring of the EMPR is undertaken on an ongoing basis and performance assessments (audits) are undertaken every two years. The continued appropriateness and adequacy of the EMPR needs to be evaluated during the audits. The specifications contained within this EMP are included in the EMPR Amendment to be submitted to the DMR, and will be audited against during the EMPR audits.

## 5.6 Amendments to the EMP

Amendments to the EMP may be required as the project proceeds. Any proposed amendments to the EMP will be confirmed with Zinoju and the EAP prior to being issued as a formal amendment to the DEDTEA. Copies of the amendments will be issued to all relevant parties.

## 5.7 Roles and Responsibilities

The project applicant, Zinoju Coal (Pty) Ltd, will be ultimately responsible for environmental management on site during all phases of the project. Contact details for parties involved in the application and relevant authorities are outlined in Table 4 below.

**Table 4: Contact Details of Responsible Parties**

Organisation / Company	Roles / Responsibilities	Contact Person
Zinoju Coal (Pty) Ltd Reg. No.: 2001/011130/07	Project Applicant / Developer	Frank Talbot Tel:(034) 212 1455 Fax:(034) 212 1232 Address: Commercial Road, Dundee 3000
Magdalena Colliery	Mine Manager	R. Govender Tel: 034 366 7188 Fax: 034 212 1232 Address: P.O. Box 684, Dundee 3000

Magdalena Colliery	Open cast Manager	Shaughn Lake Tel: 082 804 9474
Magdalena Colliery	Safety Officer	Ronnie Naidoo Tel: 082 588 9156
GCS Water and Environmental Consultants (Pty) Ltd	Environmental Assessment Practitioner (EAP)	Kelly Taylor Tel: 031 764 7130
Department of Water Affairs	Water Resources Management - Contact in case of water pollution incidents	Strini Govender Tel: 031 336 2742
Department of Agriculture and Environmental Affairs	Assessing Officer - Environmental Application	Poovl Moodley Tel: 0343153936

## 5.8 Planning and Design

The following section details the minimum range of constraints, controls, procedures and standards that are required during the planning and design phase of the proposed Alleen 2 Open Cast Extension. The key activities undertaken during this phase involve:

- Additional specialist studies and/or investigations (as required).
- Final planning and layout design of open cast mining and associated infrastructure.
- Development of a set of site management master plans, e.g. for stormwater, water supply, facilities, waste, remediation, etc.
- Ensure that all graves, buildings, assets and structures within the servitude are identified and recorded.
- Determining and documenting the road conditions for all identified haul roads.
- Undertake negotiations and confirm arrangements with individual landowners and/or land users regarding:
  - Possible loss of access.
  - Possible loss of agricultural areas.
  - Access to livestock drinking points.
  - Security.
  - Relocation of homes.
  - Exhumation and relocation of graves.

### 5.8.1 Project Layout and Access Plan

A project layout and access plan must be developed, indicating and/or describing the location and details of the following, including the method of establishment:

- Areas and routes to be reworked, including the size (dimensions) of the stripped areas.

- Temporary on-site waste disposal areas.
- Vehicle and plant storage areas, including wash areas.
- Surface water management infrastructure (i.e. pollution control dams, diversion channels, berms).
- Designated areas for portable latrines (beyond 100m from the watercourses).
- Sources for water provision on site.
- Existing roads and tracks to be used as transportation routes.
- The footprint area of the open cast extension.

## 6 ENVIRONMENTAL MANAGEMENT PROGRAMME

The management of Magdalena Colliery is committed to managing and rehabilitating the mine area in a responsible manner. Magdalena Colliery will use cost effective Best Available Technology (BAT) to adequately manage the mine so as to limit the negative environmental impacts. These impacts may arise from normal mine operation or the expansion and addition of mining infrastructure.

Where pertinent negative issues have been identified (impacts with a medium to high significance), specific measures are presented to address the issue. For impacts not of a significant nature, measures have been presented for the prevention of impacts as well as the overall mitigation of impacts on specific biophysical and social aspects. Management measures that the mine intends to implement are defined in terms of objectives. The recommended management measures for each of the impacts are described in this section.

### 6.1 Visual Intrusion

#### Potential Impact:

- Visual intrusion and nuisance resulting from dust pollution.
- Visual intrusion resulting from the presence of machinery and earth moving vehicles on site.
- Change in sense of place from removal of vegetation.
- Visual intrusion resulting from creation of stockpiles.
- Visual intrusion resulting from creation of open cast workings.

#### Management Objective:

- To prevent an unsightly appearance of the area during construction and site clearing.
- To prevent an unsightly appearance of the area during operations.



- To prevent dust creating a visual impact for surrounding properties and road users.

Mitigation Measures:

- Dust will be controlled and managed by using dust suppression methods, such as regular dampening of the coal stockpiles and other dusty areas with sprayers, water car etc.
- Keep vegetation removal to a minimum, clear areas only within the open cast strip, and not all at one time (i.e. clearing with roll over method).
- Keep stockpile height to a minimum.
- Maintain good housekeeping on site to avoid litter and minimise waste.

## 6.2 Noise and Vibration Disturbance

Potential Impact:

- Noise pollution from earth moving activities on site and transportation of coal and materials.
- Noise from blasting affecting nearby residents, livestock and wildlife.
- Structural damage to nearby buildings from blasting.

Management Objective:

- To minimise the on-site and off-site noise impacts.
- To implement measures to limit the impact of noise in the workplace.

Mitigation Measures:

- Equipment on site to be properly muffled and maintained so as to reduce noise generation to the minimum.
- Reverse hooters of heavy earthmoving vehicles must be set at such a level that the beeping sound does not create a nuisance to residents of nearby houses.
- The use of all plant and machinery shall be appropriate to the task required in order to reduce noise levels and/or environmental damage.
- Investigate all instances of excessive noise and assess possibilities for mitigation.
- Utilise the minimum possible explosives to achieve maximum affect. All Interested and Affected Parties to be notified within one hour prior to blasting.
- The blasting area must be checked for livestock (500m radius of blast recommended) and farmers asked to move livestock off site until the area is safe. It is recommended that the working area be fenced off to ensure that livestock do not grazing in areas where blasting may occur, and that specific grazing areas are set aside.
- Ensure that breeding and nesting sites are not disturbed by blasting or mining activities.
- All such structures to be inspected on a 6-monthly basis (or at the residents request) for signs of vibration or blasting damage. Any damage, which arises as a

result of blasting or activities at the mine, to be repaired by the mine, at the mine's expense.

### 6.3 Health and Safety Impacts

#### Potential Impact:

- Health impacts to labourers and residents from particulate matter entering lungs
- Safety impacts to pedestrians or residents from movement of vehicles.

#### Management Objective:

- Ensure the safety of workers and local residents / pedestrians in the vicinity of the site and ensure that no mining related activities result in safety or health risks.

#### Mitigation Measures:

- Ensure that dust suppression measures are implemented.
- Ensure that warning signs and road safety measures are implemented.
- Access to the site must be restricted, and the site must be fenced off and suitably screened.
- Ensure that all earth moving / mining vehicles use only dedicated access routes to mining areas.
- Ensure that landowners / land users and their employees have reasonable access to the land during construction.
- Adhere to agreements made with individual landowners and/or land users regarding access.
- The transport of machinery or materials onto the site should be done at off peak hours, so as to prevent unnecessary interruption of traffic flow and access along roads within the project vicinity.
- Mining activities and storage facilities must not obstruct roads or traffic flow as far as possible.
- Ensure that mining and coal transport vehicles keep to the speed limits on public roads.
- Safety precautions must be taken to ensure that residents in the area do not come to harm. The site shall be off limits to the general public at all times during all phases of the project.
- Ensure that all staff are compliant with the relevant safety regulations on site and wear appropriate safety clothing and gear at all times while on site.

## 6.4 Loss of Cultural and Heritage Resources

### Potential Impact:

- Loss of or damage to archaeological resources located in the vicinity of the site (i.e. graves and iron age sites).

### Management Objective:

- Prevent the loss of or damage to any cultural / heritage resources as a result of construction activities.

### Mitigation Measures:

- The process of exhumation and relocation of graves within the mining footprint must be undertaken following receipt of a permit from Amafa KwaZulu Natal and in consultation with the relevant families in terms of the ceremonial processes for grave relocation.
- **Strictly maintain a 15m buffer zone around the graves and 50m around the iron age sites. No disturbance is allowed within the buffer zone.**
- A second phase HIA will be required should the developer decide to expand the mining development towards the north and within the buffer zones of the identified sites.
- Attention is drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

## 6.5 Loss of Agricultural and Community Land

### Potential Impact:

- Reduction in the amount of available land for agricultural and residential purposes.

### Management Objective:

- To minimise land degradation as far as possible.
- To limit land use changes.

### Mitigation Measures:

- Keep vegetation removal to a minimum, clear areas only within the open cast strip, and not all at one time (i.e. clearing with roll over method).

## 6.6 Soil Erosion and Nutrient Loss

### Potential Impact:

- Poor management of soil and soil stockpiles resulting in a loss of soil resources and valuable nutrients for regrowth of vegetation and agricultural potential.
- Potential soil erosion as a result of reshaping of topography and backfilling of pits.

### Management Objective:

- The objective is to conserve the soil resource and to maintain the viability of topsoil disturbed by the open cast extension and to ensure that pre-mining land capability can be restored.
- To prevent erosion from occurring.

### Mitigation Measures:

- Disturbed areas will be kept to a minimum.
- Stockpile height and length of stockpiling time to be kept to a minimum.
- Backfilling and reshaping of topography to allow for drainage off backfilled areas and include soil erosion prevention measures.

## 6.7 Groundwater Contamination and Quantity Reduction

### Potential Impact:

- Impact on groundwater quantity.
- Impact on groundwater quality.

### Management Objective:

- To prevent contamination of surface water runoff from the open cast pit and infrastructure development.
- To restrict the impact of polluted groundwater to the mining area and mitigate the loss of groundwater from the catchment.

### Mitigation Measures:

- Separate clean and dirty runoff and contain dirty water in adequately sized pollution control dams (PCDs). Ensure that PCDs are adequately sized according to the specifications in DWAF's GN704 or other applicable regulations.
- Keep dirty areas like the PCDs and coal stockpiles, workshops and oil and diesel storage areas as small as possible.
- Re-use groundwater seepage collected in the open pits to adequately sized pollution control facilities in the mining process.
- Compact the base of dirty areas, like the ROM coal stockpile, workshops and oil and diesel storage areas to minimise infiltration of poor quality water to the underlying aquifers.

- Contain poor quality runoff from dirty areas and divert this water to PCDs for re-use.
- Have oil/diesel spill kits on site (Spill Tech House, 604/608/610 Umbilo Road, Congella, KwaZulu-Natal, 4001, Tel: 0861 000 366, Tel: +27 (0)31 206 0919).
- Confirm groundwater and surface water monitoring protocol and plans. It is recommended that groundwater monitoring be conducted on a quarterly basis. **Any detected impacts to groundwater quality must be reported to the Department of Water Affairs (DWA) immediately.**
- Groundwater monitoring down gradient of the pit to monitor plume development. Mitigation measures should be implemented during the operational phase.

## 6.8 Surface Water Contamination

### Potential Impact:

#### Construction Phase:

- Vegetation and topsoil clearance could abstract drainage, cause water logging and pollute water resources.
- Clean runoff could flow into the dirty area and become polluted.

#### Operational Phase:

- Fuel and toxic materials could spill and pollute water resources.
- Seepage to surface water resources from water disposal.
- Slope could contribute to erosion.
- Soil disturbance during soil turning.

#### Closure Phase:

- Pollution of water resources.
- Runoff and drainage from discard dump and stockpiles continue to yield polluted water.
- Siltation of watercourses.
- Reduction in pollution of water resources.

### Management Objective:

- Prevent pollution of surface water resources as a result of open cast mining activities and clean / dirty water management.

### Mitigation Measures:

#### Construction Phase:

- Ensure that measures recommended in the SWMP are adhered to and that detailed SWMP designs are signed off by a registered engineer. **This is to be included in the IWULA Amendment to be submitted to the Department of Water Affairs (DWA).**

- Identify dirty water footprint area and ensure that clean and dirty water separation infrastructure is in place prior to the commencement of construction.
- No waste material may be burned / buried on site aside from discard material. Construction rubble, domestic and hazardous waste must be disposed of at facilities registered to accept such waste in terms of section 20(b) of the National Environmental Management: Waste Act (Act No. 59 of 2008), unless it can be responsibly re-used on site or off-site.

Operational Phase:

- Appropriate design criteria for the 1:50 year storm event to be contained and re-used.
- Measures should put in place to prevent and contain spills and enable safe collection and disposal of waste.
- Sloping areas to allow free runoff and management of runoff velocity.
- Overburden should be spread and rehabilitated with drainage plans in place. Ensure that clean and dirty water separation infrastructure is in place prior to the commencement of construction.
- The northern and southern-most watercourses are to be excluded from the mining footprint as per Appendix C2 of the Final BAR.
- During mining, ensure that stormwater runoff is directed around the working area to maintain clean and dirty water separation.
- Any detected impacts to surface water quality must be reported to the Department of Water Affairs (DWA) immediately.

Closure Phase:

- Manage waste effectively to prevent pollution of water resources.
- Maintain dirty water separation systems until the site is rehabilitated and free draining.
- Rehabilitate as soon as possible, maintain erosion control for the duration of rehabilitation.
- Continue water monitoring to determine possible impacts.

## 6.9 Air Pollution

Potential Impact:

- Dust generated by wind blowing over exposed soils and unprotected stockpiles.
- Vehicular emissions from earth moving machinery and transport vehicles.

Management Objective:

- To reduce air quality impacts.
- To maintain a healthy environment by preventing air pollution.
- To comply with all legislation applicable to air quality.

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Mitigation Measures:

- Ensure that preventative measures are taken to minimise dust nuisances (e.g. screening, dust control, timing, pre-notification of affected parties).
- Appropriate dust suppression measures or temporary stabilising mechanisms to be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather.
- Regular spraying of working/exposed areas with water at an application rate that will not result in soil erosion or runoff. The frequency of spraying will be agreed with the PM.
- A dedicated source of water for dust suppression purposes must be determined during site establishment, and may not be extracted from the river or groundwater sources without prior approval from the Department of Water Affairs.
- Speed limits to be strictly adhered to.
- Seed topsoil stockpiles and exposed areas of the site as soon as practicably possible.
- Soil stockpiles shall be wetted and/or sheltered from the wind, as required.
- Avoid the excavation, handling and transport of erodible materials under high wind conditions.
- All machinery employed on site to be maintained in good running order and fitted with specified correct exhaust systems.
- **A dust monitoring plan is to be submitted to the DEDTEA and Amajuba District Municipality prior to commencement of mining activities.**

## 6.10 Disturbance of Freshwater Ecosystems and Habitats

Potential Impact:Construction Phase:

- Direct Disturbance Impacts: Clearing, infilling, flooding or levelling of watercourses and freshwater habitat.
- Indirect Disturbance Impacts: Disturbance of neighbouring freshwater habitats as a result of noise and dust pollution, blasting vibrations, increased human presence. Onsite alien plant proliferation.
- Erosion and Sedimentation Impacts: Construction disturbances to watercourses and freshwater habitat from clearing and earthworks, erosion of bare slopes and surfaces, increased discharge velocities, river crossings and stormwater discharge.
- Flow Reduction Impacts: Reduction in water inputs and throughflow discharges

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as a result of capture and containment of subsurface and surface flows from clean and dirty water areas, and from abstraction of water from onsite dams.

- Water Quality Impacts: Reduction in water quality from contamination of clean water areas from spillage and leakages of hazardous materials, and from road runoff draining into watercourses.
- Cumulative Impacts: Degeneration and degradation of local and regional ecosystem services and degradation of Buffels River hydrogeomorphic and ecological integrity and water quality.

Operational Phase:

- Indirect Disturbance Impacts: Disturbance of neighbouring freshwater habitats as a result of noise and dust pollution, blasting vibrations, increased human presence. Onsite alien plant proliferation.
- Erosion and Sedimentation Impacts: Disturbances to watercourses and freshwater habitat from erosion of bare slopes and surfaces, sedimentation of drainage channels, increased discharge velocities, river crossings, stormwater discharge and increased floodpeaks from overtopping or breaching of PCDs in floods.
- Flow Reduction Impacts: Reduction in water inputs and throughflow discharges as a result of capture and containment of subsurface and surface flows from clean and dirty water areas, and from abstraction of water from onsite dams.
- Water Quality Impacts: Reduction in water quality of watercourses from overtopping or breaching of PCDs, leakages or seepages from PCDs, groundwater contamination from exposed rock, and contamination of clean water areas from spillages and leakages of hazardous materials.
- Cumulative Impacts: Degeneration and degradation of local and regional ecosystem services and degradation of Buffels River hydrogeomorphic and ecological integrity and water quality.

Closure Phase:

- Direct Disturbance Impacts: Disturbances to watercourses and freshwater habitats during decommissioning of road watercourse crossings, PCDs and upgrading of PCDs to be retained.
- Erosion and Sedimentation Impacts: Disturbances to watercourses and freshwater habitat from erosion of bare slopes and surfaces, decommissioning of clean and dirty water management systems and re-instatement of natural watercourses. Impacts may also arise during post-closure from unsuccessful rehabilitation, mine decant water discharges and overtopping or breaching of PCDs.
- Water Quality Impacts: Reduction in water quality of watercourses from decommissioning of dirty PCDs. Post closure reduction in water quality of



watercourses from acid mine drainage, decant water, overtopping or breaching of PCDs, and seepage or leakage from PCDs.

- Cumulative Impacts: Degeneration and degradation of local and regional ecosystem services and degradation of Buffels River hydrogeomorphic and ecological integrity and water quality.

Management Objective:

- Prevent disturbance of freshwater ecosystems and habitats as a result of site preparation, clearing, operational and decommissioning activities for the open cast extension at Alleen 2.

Mitigation Measures:

- The northern and southern-most watercourses are to be excluded from the mining footprint as per Appendix C2 of the Final BAR.
- During mining, ensure that stormwater runoff is directed around the working area to maintain clean and dirty water separation.
- Environmental authorisation and Section 21(c) and (i) water use licenses will be required to disturb/destroy the watercourses.
- The approved dust and noise management and suppression measures for the mine must be adopted for the open cast extension.
- No hunting of any fauna onsite or in the surrounding area is allowed.
- All alien vegetation that starts to re-colonise the open cast mining footprint must be removed immediately. The plants should be hand-pulled and stacked in rows for use in erosion/runoff control.
- Implement surface water runoff and erosion control for the bare slopes and working areas within the dirty and clean water areas.
- For new watercourse crossings, flow must not be canalised and constricted through/under road crossings. Pipe culverts must be established side to side across the width of the watercourse being crossed.
- Stormwater generated by the roads must be discharged back into the environment in a controlled manner to ensure that erosion at these discharge points does not occur. In this regard, many/small outlets must be favoured over few/large and erosion control measures must be established at these outlets e.g. rip-rap or Reno-mattresses.
- Wherever possible, upstream channelled flow should be diverted back into the watercourse from which it was diverted.
- The discharge of diverted flow back into the watercourses must be done in a controlled manner to ensure that erosion at these discharge/inlet points are minimised. In this regard, energy dissipation measures and/or attenuation measures must be installed.
- The size of the dirty water areas should be minimised as far as practically

possible.

- The exposure of mined rock to air must be minimised to reduce rock decomposition and oxidation during the open cast operation. In this regard, a geo-hydrologist should be appointed to provide recommendations and mitigation measures.
- A dirty and clean water management plan and a stormwater management plan must be compiled for the project according to the best management practices.
- All PCDs must be:
  - Lined to minimise contaminant seepage.
  - Designed to handle (not breach during) 1:50 and 1:100 year flood events.
  - Regularly checked, maintained and serviced.
- Good housekeeping in terms of spillage and runoff contamination minimisation within the dirty water areas must be strictly implemented to reduce the levels of water contamination.

## 6.11 Disturbance of Terrestrial Ecosystems and Habitats

### Potential Impact:

#### Construction Phase:

- Direct Disturbance Impacts: Clearing and destruction of terrestrial habitat for construction of clean and dirty water dams, within the mining footprint and for access roads. Faunal fatalities during habitat clearing and levelling.
- Indirect Disturbance Impacts: Disturbance of neighbouring terrestrial habitats as a result of noise and dust pollution, blasting vibrations, increased human presence. Onsite alien plant proliferation.
- Erosion and Sedimentation Impacts: Erosion and sedimentation of terrestrial habitat from erosion of bare slopes and surfaces and uncontrolled stormwater discharges.
- Habitat Reduction and Fragmentation Impacts: Reduction and fragmentation of local habitats from habitat loss and transformation during clearing and levelling.
- Population Impacts: Faunal population reduction from fatalities and loss of habitat.
- Cumulative Impacts: Cumulative loss of habitat in the region, province and country, impacts on conservation targets and increase in local and regional habitat fragmentation.

#### Operational Phase:

- Indirect Disturbance Impacts: Disturbance of neighbouring terrestrial habitats as a result of noise and dust pollution, blasting vibrations, increased human presence. Onsite alien plant proliferation.

- Erosion and Sedimentation Impacts: Erosion and sedimentation of terrestrial habitat from erosion of bare slopes and surfaces and uncontrolled stormwater discharges.
- Cumulative Impacts: Cumulative loss of habitat in the region, province and country, impacts on conservation targets and increase in local and regional habitat fragmentation.

Closure Phase:

- Erosion and Sedimentation Impacts: Disturbances to terrestrial habitat from erosion of bare slopes and surfaces during dismantling and rehabilitation. Impacts may also arise during post-closure from unsuccessful rehabilitation and mine decant water discharges.

Management Objective:

- Prevent disturbance of terrestrial ecosystems and habitats as a result of site preparation, clearing, operational and decommissioning activities for the open cast extension at Alleen 2.

Mitigation Measures:

- The intact secondary grassland and dense wooded areas outside of the proposed mining footprint must not be cleared and/or disturbed by the mining expansion. In this regard, it is important that the mining footprint be clearly demarcated and marked out by a professional surveyor using bard wire fencing and danger tape prior to the commencement of the mining operation.
- A 'search and rescue' for individual *Cochlitoma simplex* snails that may occur within the mining strip must be undertaken by a qualified mollusc specialist prior to mining in order to relocate individuals to an appropriate habitat outside of the mining footprint.
- The establishment of new haulage roads must be avoided and existing dirt roads must be utilised as haulage roads.
- The approved dust management and suppression measures for the mine must be adopted for the open cast extension.
- The approved noise management and suppression measures for the mine must be adopted for the open cast extension.
- No hunting of any fauna onsite or in the surrounding area is allowed.
- All alien vegetation that starts to re-colonise the open cast mining footprint must be removed immediately. The plants should be hand-pulled and stacked in rows for use in erosion/runoff control.
- Implement surface water runoff and erosion control for the bare slopes and working areas within the dirty and clean water areas.
- Stormwater generated by the roads must be discharged back into the environment in a controlled manner to ensure that erosion at these discharge

points does not occur. In this regard, many/small outlets must be favoured over few/large and erosion control measures must be established at these outlets e.g. rip-rap or Reno-mattresses.

## 7 REHABILITATION PLAN

The following has been extracted from the approved EMPR for the Magdalena Colliery (April 2008), which contains full details of the method of rehabilitation currently used for open cast mining at Magdalena. No changes to the method of rehabilitation will occur, therefore the EMPR must be followed as a reference for rehabilitation of the Alleen 2 section:

### 7.1 Site Rehabilitation

The requirements for site rehabilitation as a whole are addressed in this section i.e. soil amelioration, re-vegetation and erosion control.

Ideally site rehabilitation should be ongoing and progress with the roll-over method. However, because rehabilitation of the 50 m x 50 m blocks is not economical and practical, a system is devised whereby the rehabilitation of entire mining strips is undertaken instead. To ensure that the previously backfilled areas are not exposed to erosion, leaching and weed infestation in the delay period between backfilling and rehabilitation, a two phased approach is to be followed i.e.:

- Immediately after the backfilling of a mining block, the temporary rehabilitation procedures will be followed.
- Once an entire mining strip has been mined and backfilled, final rehabilitation procedures will be implemented.

#### 7.1.1 Temporary Rehabilitation

##### Management Objective:

To establish a cover of vegetation to protect the surface against erosion, to limit the extent of weed infestation and to avoid excessive leaching of the soils.

##### Mitigation Measures:

- Hand broadcast the following seed mix over the backfilled area:
  - *Eragrostis tef*                      *Tef*                      8 kg/ha
  - *Melilotus alba*                      *Sweet clover*                      8 kg/ha
- Add 2:3:2 (30) NPK fertiliser (slow release) at a rate of 30 g/m<sup>2</sup>. Water the area.

*Eragrostis tef*, as an annual species, will germinate quickly to serve as a nurse crop and will

rapidly establish a cover of vegetation to protect the soil surface. *Melilotus alba*, a leguminous plant, will assist in raising soil nitrogen levels by fixing nitrogen from the air. To do this, inoculated *Melilotus alba* seed must be used (i.e. seed inoculated with mycorrhizal fungi). The plant cover formed by these two species will be sufficient to protect the soil surface until such time as final rehabilitation can be implemented.

### **7.1.2 Final Rehabilitation**

#### Management Objective:

- To ameliorate the physical and chemical problems that have arisen during soil stripping, handling and stockpiling.
- To improve the soil nutrient status so as to boost vegetation growth.
- To recreate the pre-mining natural vegetation cover in terms of cover and species diversity.
- To establish a cover of vegetation that will protect the soil from erosion.
- To re-establish the pre-mining land capability.

#### Mitigation Measures:

##### *Contouring and Shaping*

- All backfilled areas will be contoured and shaped to be consistent with the surrounding landscape.
- The backfilled opencast areas will be backfilled and shaped to emulate the pre-mining topography as far as possible. The backfilled areas will be slightly convex so as to encourage runoff and minimise infiltration. The convex shape must not be visually obtrusive.
- Slopes will not exceed a gradient of 1 in 5.
- Mounds and hollows will be evened out during the final contouring and shaping process to prevent the ponding of water.
- The backfilled areas will slope towards the north-eastern boundary where the final evaporation dam will be located. Contaminated seepage and runoff will be captured in the dam and evaporated to maintain the water balance.

##### *Physical Amelioration*

Physical amelioration of the substrates will be required to mitigate long-term compaction impacts. The following will be required in order to prepare the substrate, improve drainage and aeration, enable plant root penetration:

- Rip all areas with a bulldozer to a depth of 0.5 m to produce deep fracturing and loosen compacted areas.
- Till the surface with a disk-harrow (or similar) to a depth of 20 cm to break and crush surface clods.

During physical preparation of the soil, the temporary plant cover will be ploughed into the

soil to serve as a source of organic matter.

#### *Chemical Amelioration*

Chemical amelioration of the substrates will be required to mitigate long-term contamination impacts. In particular, the following problems will need to be ameliorated: high salt concentrations, possibly saline and sodic conditions, altered (acidic) pH, poor nutrient status and sterile conditions. The exact requirements for chemical amelioration can only be defined after sample collection and analysis to verify the extent of pollution and leaching that has occurred (refer to Section 6.17.2.8). However, it is expected that the following will be required to meet the known deficiencies and potential pollution problems:

- Application of organic mulch at a rate of 0.5 ton/ha.
- Application of limestone ammonium nitrate (LAN) (28) at a rate of 250 kg/ha.
- Application of 2:3:2 (30) NPK + Zn at a rate of 400 kg/ha.

Organic mulch applications will assist in stabilising the substrate, reducing erosion and surface crusting, and increasing nutrient content of the substrate and will aid the establishment of vegetation. During physical amelioration procedures, the temporary plant cover will be ploughed to the substrate as a source of organic matter. This will be supplemented by an additional 0.5 ton/ha straw mulch (or similar).

LAN applications will assist with neutralising pH in addition to boosting levels of nitrogen. The NPK fertiliser will raise essential plant nutrients to the required concentrations.

It is recommended that the organic matter (straw mulch) and LAN/2:3:2 applications be applied using a process of vertical mulching. The purpose of vertical mulching is to incorporate an organic ameliorant through a vertical slot into the soil about 10 to 20 cm deep. The vertical mulching will:

- Improve the drainage characteristics of the soils so that leaching of the salts can be facilitated.
- Improve the structure and organic matter content of the soils.

The organic matter and LAN/2:3:2 should be applied simultaneously through the vertical mulching in a criss-cross pattern using a ripper tine or similar.

#### *Species and Rates of Application*

No improved pastures are to be planted as this will result in selective grazing. In keeping with this requirement, and in attempting to restore the area to grazing land status, the following species mix is recommended. Rates of application of each species are also given:

<i>Cynodon dactylon</i>	Kweek	4kg/ha
<i>Digitaria eriantha</i>	Finger grass	3kg/ha
<i>Eragrostis tef</i>	Tef	8kg/ha
<i>Chloris gayana</i>	Rhodes grass	4kg/ha
<i>Eragrostis curvula</i>	Love grass	4 kg/ha
Harvested seed		3 kg/ha

The basis for the species selected is as follows:

- *Eragrostis tef*: Annual species and ‘nurse crop’ which will establish rapidly and form a cover of vegetation that will encourage the establishment of perennial species.
- *Eragrostis curvula*: Tufted perennial pioneer species that is common in the area and adapts well to poor soil conditions.
- *Digitaria eriantha*: Tufted perennial climax grass that is highly palatable.
- *Cynodon dactylon*: Stoloniferous, mat-forming, tolerant perennial that will protect the surface against erosion.
- *Chloris gayana*: Stoloniferous perennial.
- Harvested seed: Adds a ‘local’ flavour. The genetic properties of the surrounding veld will be represented in the rehabilitated community.

The grass seed must be sourced from a reputable seed supplier. All seed types recommended are commercially available. The viability of the seed must be proven.

Harvested seed can be obtained from the surrounding veld using a mini harvester or manual methods.

#### *Application*

The following application methodology should be followed:

- Calculate the proportional volume/weight of each seed type relative to the area to be revegetated and measure out the required amount.
- Apply the seed via hand broadcast method.
- Ensure that seed is evenly distributed to prevent over-seeding of some areas and under-seeding of others. To overcome this, divide the target seeding area into smaller portions (e.g. fifths) and do the same for the total volume of seed.
- Thoroughly mix the seed in the bucket before each broadcast (this will ensure even mixing of the various seed types with differential weights).
- Lightly rake the seeded areas to bury the seed slightly.
- Roll the area once with a light roller.
- All seeded areas must be thoroughly watered.

### *Timing and Areas*

Final rehabilitation should take place within 6 to 8 months of the temporary rehabilitation. By delaying final rehabilitation procedures slightly it will be possible to implement final rehabilitation over a larger area at one time thus making it more economical in terms of equipment hire, labour and materials purchase. A buffer zone between the active mining area and the target rehabilitation area should be maintained so as to reduce the risk of mining activities disrupting the completed rehabilitation.

The ideal seeding time is October as this coincides with the start of the Spring/Summer rains, lower surface temperatures (as opposed to high January/February temperatures which could potentially result in germination failure) and the approximate timing of the natural seeding process. However, since rehabilitation will be conducted on a continuous basis as mining progresses, the rehabilitation timing requirement cannot always be achieved. It is, however, recommended that no seeding take place during the period May to July as there is strong chance that low surface temperatures, frost and a lack of precipitation will result in germination failure. Seeding should be limited to the period beginning August to end April.

### *Monitoring and Maintenance*

Regular monitoring and maintenance of the rehabilitated areas should be undertaken, in accordance with requirements of the approved EMPR (April 2008).

## **8 CONCLUSION**

The implementation of this EMP will ensure that negative environmental impacts resulting from the proposed project are minimised or prevented. It is the responsibility of the applicant (Zinoju) to enforce the implementation of the EMP in conjunction with the approved EMPR and current EMPR Amendment which forms part of the Alleen 2 Open cast Extension.