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DORSTFONTEIN COAL MINE

EAST MINE EXPANSION PROJECT
ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)

in terms of the Mineral and Petroleum Resource Development Act (Act 28 of 2002)

DME Ref. No: MP 30/5/1/2/2/51MR

April 2008
updated
August 2009

Client Name: Total Coal South Africa
Project Number: TCSA.D.07.100

TOTAL mmakaumining





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Dorstfontein Coal Mine (Pty) Ltd
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EXECUTIVE SUMMARY

Dorstfontein Coal Mines Background

Dorstfontein Coal Mines (DCM) is owned by Total Coal South Africa (TCSA) (74%) and Mmakau Mining (26%), its Black Economic Empowerment Partner.

The mine is an outsourced operation with underground mining and coal processing conducted by contractors and TCSA retaining general management and marketing control.

DCM (comprising the existing West Mine and proposed East Mine), is situated on portions of the farms Dorstfontein 71 IS, Boschkrans 53 IS, Fentonia 54 IS, Rietkuil 58 IS and Welstand 55 IS, located within the Emalahleni Local Council, Mpumalanga. The current operation lies directly north-east of the town of Ga-Nala (Kriel).

DCM is in a joint venture (JV) with Xstrata Coal. The JV has an arrangement with RBCT to supply the terminal with 2 million tonnes per annum (mtpa) of coal for export.

The DCM mining operation has an approved Environmental Management Plan (EMP) 2005, for the underground mining of the No. 2 and No. 4 coal seam and a pending EMP amendment for the establishment of a bulk sample on the existing mine (West Mine), which will serve to determine the quality and grade of the No. 4 Seam.

Project Background

The JV between TCSA and Xstrata will terminate in December 2009, which will make DCM responsible to fulfil the 2 million tonnes per annum (mtpa) RBCT entitlement. The additional coal supply requirement will necessitate the expansion of the current DCM activities in order to provide for the entitlement.

Project Introduction

The required expansion of the current DCM activities will be referred to as the DCM Expansion Project. In order for the Expansion Project to be economically feasible, the following infrastructure will be required:

- New plant and associated infrastructure;
- Two (2) new opencast operations;
- Initiation of the three (3) underground mining blocks;
- Co-disposal Facility, which will accommodate the waste rock from the mining operations and the waste material from the proposed plant;
- Transportation (i.e. roads and conveyors);
- Water supply, which will be obtained from the old defunct TNC mine workings;
- Pipeline transporting water from the old TNC mine to the plant;
- Power supply, which will be provided by Eskom;
- Sewage treatment; and
- Railway line and associated power requirements to transport coal to the RBCT.

All new infrastructure with the exception of the proposed railway line will be situated within the existing mining area. It is planned that the railway line will be established within an existing servitude of the previous TNC railway line with some sections requiring extension and expansion. Coal will be transported from the plant via conveyor to a rapid load out facility from where the train wagons will be loaded to transport the coal to the RBCT. The new rapid load-out facility associated with the new railway line will be required to be in close proximity to the plant to link to the RBCT coal line to the north of the project area. The railway line is proposed to pass through portions of the following farms: Vandyksdrift 19IS, Steenkoolspruit 18IS, Kromfontein 30IS, Middeldrift 42IS, Rietfontein 43IS, Lourens 472IS, Vlaklaagte 45IS, Welstand 55IS, Clydesdale 483IS and Vaalkranz 29IS.

Mining Method Description

DCM is currently mining the No. 2 coal seam (and has approval to mine the No. 4 seam) via underground mining operations on the western portion of the mining rights area.

The expansion project will necessitate the inclusion of the extensive No. 4 coal seam overlying the No. 2 coal seam, which has been identified as the preferred resource to ensure a production profile of 2mtpa. In addition to this the No. 1, 3 and 5 coal seams will be mined. All resources less than 40m deep will be accessed via the opencast operations, whereas the deeper lying coal will be accessed via underground mining operations.

Construction activities are planned to commence during end 2008, while full production will take place in 2010. Initial coal production is planned from opencast operations at the East Mine (PIT 1 and PIT 2). The opencast production rate has been determined at a constant rate of 3mtpa of Run of Mine (RoM) for the first six (6) to seven (7) years of the Expansion Project, which equates to an overall coal extraction of 21 million tonnes RoM.

During year 6 the project will ramp up to 2.94mtpa. Underground production will commence from the opencast high walls on No. 4 and No. 2 seams on the East Mine and is planned at 2.52mtpa RoM. This will be supplemented by 420 000tpa from the remaining reserves of the opencast blocks on the East Mine. RoM from the opencast pits will be transported via conveyors to the plant

Discard will be conveyed from the plant to a new co-disposal facility by conveyor for the coarse fraction and by pipeline for the slurry fraction at a rate of approximately 205 tonnes per hour (tph). The co-disposal facility will be designed to hold 2.9 million tonnes of slurry within an outer wall of 33.1 million tonnes of coarse fraction discard over the life of mine (LoM). The project will ensure a LoM in excess of 25 years.

Environmental Authorisation Process

The DCM Expansion Project's EIA/EMP was undertaken in accordance with the Mineral Petroleum Resource Development Act (Act 28 of 2002) (MPRDA), National Environmental Management Act (Act No. 107 of 1998) (NEMA), and other relevant environmental legislation, including the National Water Act (Act No. 38 of 1998.

This report (Volume 1 and 2) pertains specifically to the MPRDA. A second process in terms of the NEMA is in process for all listed activities in terms of Regulation 385 and 386. This report will be submitted to all stakeholders in the following month.

In terms of Section 39 (1) of the Mineral Petroleum Resource Development Act (Act 28 of 2002) (MPRDA), DCM is required to conduct an environmental assessment and submit an EIA/EMP to the DME, in respect of any new operations and/or expansions of the mine. The EIA ensures that the needs of the environment (biophysical and socio-economic) are identified. The EMP in turn provides a tool for meeting the objective to reduce or avoid negative environmental impacts associated with a project within a certain environment by providing detailed mitigation measures and management commitments.

All of these sections will become legally binding on the approval of this report.

As a prerequisite to the EIA/EMP, in accordance to the MPRDA, a Scoping Report, was submitted to the Department of Minerals and Energy, Mpumalanga and all stakeholders on 12 December 2007. The Scoping Report provided an overview of the project and detailed the issues identified and obtained from Stakeholders to that date, and also listed the recommended specialist investigations that needed to be undertaken.

Parallel to the submission of the Scoping Report in terms of the MPRDA, a Scoping Report in terms of the NEMA was submitted to the Mpumalanga Department of Agriculture and Land Affairs (MDALA) and all Stakeholders for review on 27 March 2008.

This report serves as the final phase of the environmental investigations, in which the detailed specialist investigations are portrayed. It provides a detailed description of the environmental setting and envisaged impacts and recommended management measures to be implemented. The EIA /EMP will be further refined through a consultation process with the identified stakeholders and authorities.

Public Participation Process (Consultation Process)

Background

Public Participation Process (PPP) is a requirement of the EIA and EMP process and ensures that all relevant I&APs are consulted and involved. The process ensures that all stakeholders have an opportunity to raise their comments as part of an open and transparent process, which in turn ensures for a complete comprehensive environmental study.

A comprehensive PPP was initiated at an early stage in both Scoping Phases in order for the concerns of I&APs, authorities and the wider public to be recognised. The PPP has been an ongoing process undertaken throughout the EIA and EMP phases.

Authority Liaison

GCS continuously liaised with the DME, keeping all relevant personnel updated on progress and following their feedback. The project has been outlined to the DME during an introductory meeting at DCM on 3rd of October 2007 and subsequent Scoping Meetings on the 1st of November 2007. On the 6th of December 2007, an authorities meeting was held with MDALA, at DCM.

Notifications

Various site notices were place in the area during two stages of the project to notify all stakeholders of the project and any additional information. The areas included (the entrance to the DCM, TNC Village, Thubelihle Village, Ga-Nala Municipal Offices, and Clinic in Ga-Nala.

Advertisements regarding the project in terms of the required legislated procedures were placed in the Citizen, The Ridge Times and Witbank News on four (4) separate occasions (October 2007, January 2008, February 2008 and April 2008).

Background Information Documents (BIDs) were distributed to all I&APs/Stakeholders via e-mail, fax and/or post by GCS. The BIDs was made available in English. The BIDs included details of the proposed projects as well as the EIA and draft EMP purpose, requirements and process. It also included relevant contact details and a comment/registration sheet. I&APs/Stakeholders were invited to register and send responses by fax, telephone or e-mail to GCS.

Stakeholder/Public Scoping Meeting

The Public Scoping meeting was held on the 1st of November 2007 at Hoërskool Kriel. The Expansion Project was explained in detail and the Environmental Assessment Process in terms of the MPRDA was discussed. Any issues or concerns raised by the members of the public regarding the Expansion Project were noted, and will be commented on the EIA and draft EMP.

A follow up Focus Group Meeting were organised by TCSA at DCM on the 6th of December 2007. The surrounding farmers were invited to the meeting.

A Second Public Scoping meeting was held on the 1st of February 2008 at Hoërskool Kriel in terms of NEMA and the listed activity process. All issues and concerns raised by the members of the public will be commented on in the EIA and draft EMP.

The open day feedback meeting has been held on 18 April 2008 at the Kriel Collieries Golf Club.

Ongoing telephonic consultations have been undertaken throughout the Scoping EIA and EMP Phases.

Issues and Responses Document

Ongoing communication (i.e. telephonic, meetings, emails, fax etc.) has been undertaken to ensure an open and transparent channel of communication. All stakeholders and I&APs were given the opportunity to raise their concerns with regards to the proposed project. All comments and/or concerns received have been noted and were incorporated within the detailed investigations of the EIA and EMP phase. The main concerns in this regard had been, but are not limited to the following:

- Impact on land value;
- Impact on the farms and what the purchasing options are (where applicable);
- Impact on the farms where mining infrastructure is planned over farm portions and/or over existing infrastructure (i.e. railway line);
- Impact on infrastructure as a result of blasting activities;
- Impact on water quality;
- Impact on the surrounding watercourses and wetlands due to the establishment of the co-disposal facility and other mining activities; and
- Impact on the farms due to the scheduling of the opencast operations.

Management Measures

Geology

Main Management Measures

The following management measures were identified, and include but are not limited to the following which should be undertaken:

The mining operations should be limited to the mining area;

Management measures (i.e. stabilising poles) should be incorporated into the underground mining design to limit the potential of subsidence; and

At the TNC defunct workings the abstraction of groundwater should be lower than the recharge of the aquifer (a 25% roof height should be kept).

Topography

Main Management Measures

Management measures identified include but are not limited to the following which should be undertaken:

All activities must remain within the dedicated footprints of the infrastructure within the mining area;

The construction activities will be undertaken in such a way as to ensure that the area after construction is free draining (ensure effective run off from natural precipitation);

Slope angles of stockpiles and dumps are not to exceed 18°;

Where possible the extension and expansion of the railway lines and other linear infrastructure should follow the route of the contours of the area to limit cut and fill; and

The permanent infrastructure such as the co-disposal facility must be designed with the aim on closure ensuring stability and rehabilitation potential.

Soils, Land Use and Capability

Main Management Measures

Management measures identified include but are not limited to the following which should be undertaken:

Topsoil will be stripped to 400mm depth or up until hard rock is reached. This overburden will be stockpiled on designated areas which are clearly identifiable;

Prior to the removal of the soils for stockpiling additional sampling and analysis of the soils must be undertaken, to determine their suitability for use during rehabilitation. This is necessary to ensure that the possible loss of nutrients from the soils during stockpiling is considered;

Effective erosion control measures will be implemented;

The mine will ensure that equipment movement over the stockpiles will be limited to avoid soil compaction and subsequent damage to soil structure or the seed bank; and

Clean and dirty water systems (also the containment of any contaminants) will be implemented to reduce the potential of soil contamination.

Ecology

Main Management Measures

Management measures identified include but are not limited to the following which should be undertaken:

Construction activities should be limited to the designated areas, where possible as little as possible vegetation should be removed;

Main grass species will be reintroduced in disturbed areas after fertilization has been added. Fertilizers are required where grass is to be planted on soils that are leached out or eroded, containing a low organic matter content. Add minimum recommended amounts of fertilizer to get successful establishment and good coverage of the grass to bind soils. The need for fertilizer will be determined by the recommendations of the specialist soil study;

Should any rare or endangered species be found within the Expansion Project area will they be relocated under the guidance of MDALA;

The potential for dust will be kept to a minimum;

Due to the activities during construction the amount of people will increase, this could lead to a potential for poaching and hunting of animals on site. Fines will be implemented for poaching and hunting of animals; and

All employees will be made aware of all environmental issues during induction, and must continuously be updated of all new issues.

Wetlands

Main Management Measures

Management measures identified include but are not limited to the following which should be undertaken:

All wetlands must be clearly demarcated and all construction servitudes should be located outside the wetland areas, where possible;

Where servitudes do intrude into the wetlands these areas will need to be ripped. The area must be re-vegetated by a suitable mix of plant species as determined by a qualified botanist. After construction, all areas devoid of vegetation must be ploughed and re-vegetated with a suitable mix of indigenous plant species as determined by a qualified botanist;

Where possible the railway line should cross all wetland and rivers perpendicular to the direction of flow. Where this is not practically possible, sufficient culverts should be placed along the crossing to ensure flows remain spread across the width of the wetland;

Erosion control measures must be implemented and maintained. Where possible storm water should be conveyed through grassed swales, rather than concrete channels to aid infiltration and reduce run off volumes;

Should storm water be discharged into wetlands, gabions should be constructed to contain erosion (this should be done in consultation with an appropriate wetland and storm water specialist. The gabion structures should include measures to dissipate energy of flows and to disperse flows over a greater area;

Opencast operations should remain within the authorised boundaries of the mining operations;

A low berm, approximately 1m high by 2-3m wide must be established prior to the commencement of opencast operations, between the opencast workings and the valley bottom wetlands, and where possible outside the wetland boundary, to intercept flows containing suspended soils and create a depositional environment;
Water diverted around the opencast mines should be released in such a manner as to aid dispersion across most of the width of the downstream wetlands; and
Well designed and constructed clean and dirty water management systems must be enforced to reduce the potential of erosion, siltation and compaction.

Surface Water
Main Management Measures
Management measures identified include but are not limited to the following which should be undertaken:
Clean and dirty water systems should be implemented prior to the commencement of construction activities and must be designed for a 1 in 50 year storm event;
No activities are to be allowed within the 1 in 100 year flood line without the necessary approval;
Vegetation establishment in disturbed areas will be undertaken as soon as practically possible to reduce to potential of erosion and associated siltation. Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. The mine will ensure that all erosion controls are included in the designs of all linear infrastructure and points of water discharge. Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness;
All activities must remain within the dedicated footprints of the infrastructure within the mining area;
No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area. All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 110% of the volume stored within;
A spill contingency plan should be available and enforced. Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture;
A detailed waste management strategy will be established and implemented; and
All employees will be made aware of all environmental issues during induction, and must continuously be updated of all new issues. Mitigation measures and operational procedures in case of any environmental emergency must be communicated.

Groundwater
Main Management Measures
Management measures identified include but are not limited to the following which should be undertaken:
Ongoing groundwater monitoring in terms of water levels and quality will be undertaken prior to the construction activities and throughout the life of mine;

The pollution control dams will be lined to reduce the potential of dirty water seeping to the groundwater;
Should the mine impact on the groundwater and if this has been determined by an external and independent groundwater specialist, the mine will negotiate with the farmer to provide the farmer with water; and
Studies will be undertaken to determine how the decant will be managed. This could include the utilisation of the existing pollution control dams (depending on the capacity), the implementation of a wetland treatment programme, the establishment of a water treatment plant or the planning of trees which have the capability to withdraw the polluted water.

Noise
Main Management Measures
Management measures identified include but are not limited to the following which should be undertaken:
Equipment with lower sound power levels will be selected and suitable mufflers must be installed on engine exhausts and compressor components;
Acoustic enclosures for equipment causing radiating noise will be installed;
The scheduling of equipment within the opencast pits must take into consideration the noise emissions from the equipment in order to spread tem out over the interface area;
During the design operations make use of the natural topography of the area as a noise buffer where possible. Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding where necessary;
All digging faces on the eastern and western side of the mine must have alternate overburden dumps or other means of attenuating the noise, which can be activated should the noise levels approach unacceptable levels;
Limit the hours of operation for specific equipment and mobile sources with high sound power outputs; and
Open channel of communication should be established by the mine with the surrounding landowners. Develop a mechanism to record and respond to all complaints.

Visual
Main Management Measures
Management measures identified include but are not limited to the following which should be undertaken:
To restore the visual quality of the landscape, it is suggested that a comprehensive rehabilitation plan be developed, based on the principles of ecological restoration;
Light pollution will be seriously and carefully considered and kept to a minimum wherever possible as light at night travels great distances;

Harsh, steep engineered slopes will be avoided as these could impose an additional impact on the landscape by contrasting with existing natural topographic forms and because it is difficult to sustain vegetation on steep slopes in the long term;
Visual barriers (i.e. indigenous trees) could be planted to reduce the visual impact on surrounding areas; and
Avoid construction material with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds.

Archaeological Status
Main Management Measures
Management measures identified include but are not limited to the following which should be undertaken:
If the grave yards can be preserved in situ, they must be demarcated with brick walls or with fences. The mine will remain responsible for their future unaffected existence and maintenance. Controlled access to these graved must exist for any relative or friends; and
If graveyards must be exhumed and relocated permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police. The necessary permits and/or authorisations must be obtained from the SAHRA.

Air Quality
Main Management Measures
Management measures identified include but are not limited to the following which should be undertaken:
Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site;
Effective dust management practices should be employed (dust allaying products, etc.);
A dust management plan must be implemented on the mine; and
When any burning areas within a stockpile or dump or the mining area may develop the area will be excavated and re-compacted immediately.

Vibration
Main Management Measures
Management measures identified include but are not limited to the following which should be undertaken:
Surrounding property owners will be informed of the blasting procedures and schedules;
An exclusion zone of 500m will be in place for the life of mine, it this in not possible the necessary approvals will be applied for;

Scheduled blasting times will be planned in advance and will be clearly indicated on the mining area. Blasting boards, at the access routes to construction areas, will be updated 24 hours prior to the blast, displaying time and date of blast;
The mine will undertake monthly blasting monitoring to determine whether the blasting activities remain under acceptable levels (see Blasting specialist report);
The mine will implement a temporary testing model during initial blasting phase. Should the results indicate it necessary (vibrations above or on impact level), permanent monitoring stations will be implemented in order to establish whether any potential impact could result due to the blasting activities. The areas of most influence as identified by the temporary seismic monitoring stations will be equipped with permanent seismic monitoring stations;
Installation of electronic crack monitors will also be undertaken if it is requested by surrounding property owners. These monitors employ a single sensor that measures both weather-induced micrometer changes in crack width and those produced by habitation and ground motion-induced vibrations; and
The mine will establish an open channel of communication in order to ensure that all issues and concerns are known and are addressed.

Socio-Economic Conditions
Main Management Measures
Management measures identified include but are not limited to the following which should be undertaken:
The use of local labour should be maximised to limit the negative impact on the existing infrastructure, services and resources;
Housing and other infrastructural needs should pro-actively be discussed with the Emalahleni Local Municipality to ensure that the additional requirements for the population increase can be met over time;
Implement education and skills development programmes to ensure an effective skills match between local people and mine requirements;
Focus on also creating employment opportunities for the youth and women;
Ensure safe and secure public transport access points;
Ensure effective safety and security measures;
Maximise the usage of local service providers and use local workforce;
Implement education and skills development programmes to ensure an effective skills match between local people and mine requirements (seeing as the proposed mine is an open cast mine, whilst the labour force has experience on underground mining);
Mining company should strive to achieve best practice Guidelines of EMP should be strictly followed;
Ongoing and transparent communication with community leaders, landowners and spokespersons; and
Possible establishment of a Management and Monitoring Committee consisting of representatives of the mining company (TCSA DCM), Emalahleni Local Municipality, community leaders and landowners to monitor mining activities over the long term.

Main Gaps Identified

The following gaps have been identified as the environmental investigations, and should be addressed by DCM:

1. Railway line site selection (Option 5 vs. Option 1)

Although option 5 was chosen as the preferred site, economic indications have shown that Option 5 will be far less viable than Option 1. Currently further studies are being done in this regard, and could result in a change in the preferred site in the near future. However DCM is committed to follow the required regulatory route with regards to environmental authorisation, and is committed to discuss any potential changes in this regard with the relevant authorities and submit the necessary documentation.

2. Abstraction of groundwater and recharge of the aquifer at old TNC de-funct mine and other management measures.

Once the IGS study into the seepage rates into TNC underground workings is completed the impact from this should be re-assessed. Leach tests should be performed once ore material is available to characterise the long-term groundwater and decant quality. The numerical model should be updated once more monitoring data is available (1 year from now).

3. Dirty water infrastructure design

The feasibility report proposed the lining of pollution control dams with bentonite, from experience in the area of DCM, this option is not accepted by DWAF, and a liner of HDPE (1.5mm) is proposed. Currently the compartmentalisation of pollution control dams have not been allowed for in the conceptual designs. Given the capacity of the pollution control dams for the expansion project and the associated philosophy to reuse water in the processing, it is recommended that the dams will be compartmentalised to manage the potential siltation of the proposed dams. Siltation could lead to a threat ito water supply to the plant and other areas should the current conceptual design dams be silted up and require maintenance.

In addition to the above it is recommended that all dirty water drains and stockpiles be lined as per experience at the DCM mine.

4. Decanting

During the feasibility stage undertaken by the project team, various designs have been proposed. The following has reference to these:

The proposed return and storm water dams have been designed to contain any water during the construction and operational phases; these dams have however not made provision for the volumes of decanting during the decommissioning phase.

The option to utilised these dams to cater for the decant volumes must be investigation, however, further studies need to be undertaken in this regard.

Should this not be possible other options may include wetland treatment, and/or the establishment of a water treatment plant, and/or the planting of Combretum erthrophyllum (River bushwillow), Ficus sp. Salix mucronata (Natal Willow), Ficus sp. Salix subserrata (Safsaf Willow) or any other endemic tree or plant species to withdraw water, and/or the establishment of evaporation ponds. The last option might be viable as the evaporation rates for this area exceeds rainfall and will also exceed the decant volumes.

The decant quality simulation has not been undertaken, it is recommended that once the information is available this be assessed and documented

As the above has not been finalised this area has not been included within the financial provision for the Expansion Project.

5. Surface Right Ownership

The agreements between TCSA and the farmes owning surface rights within the proposed project area has not been finalised. The applicant are aware that these need to be undertaken as a matter of urgency.

6. Further studies

During the open day held on 18 April 2008, further investigations into the migratory routes of birds in the area, as well as the status of amphibians in the wetlands were brought up. These studies will be discussed and should it be required will be undertaken and included into the final EIA and EMP.

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1 BACKGROUND AND INTRODUCTION

1.1 Introduction

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The Expansion Project will consist of the following:

- New plant and associated infrastructure;
- Opencast operations;
- Expansion of the underground operations;
- Co-disposal facility;
- Transportation (i.e. roads and conveyors);
- Water supply;
- Power supply;
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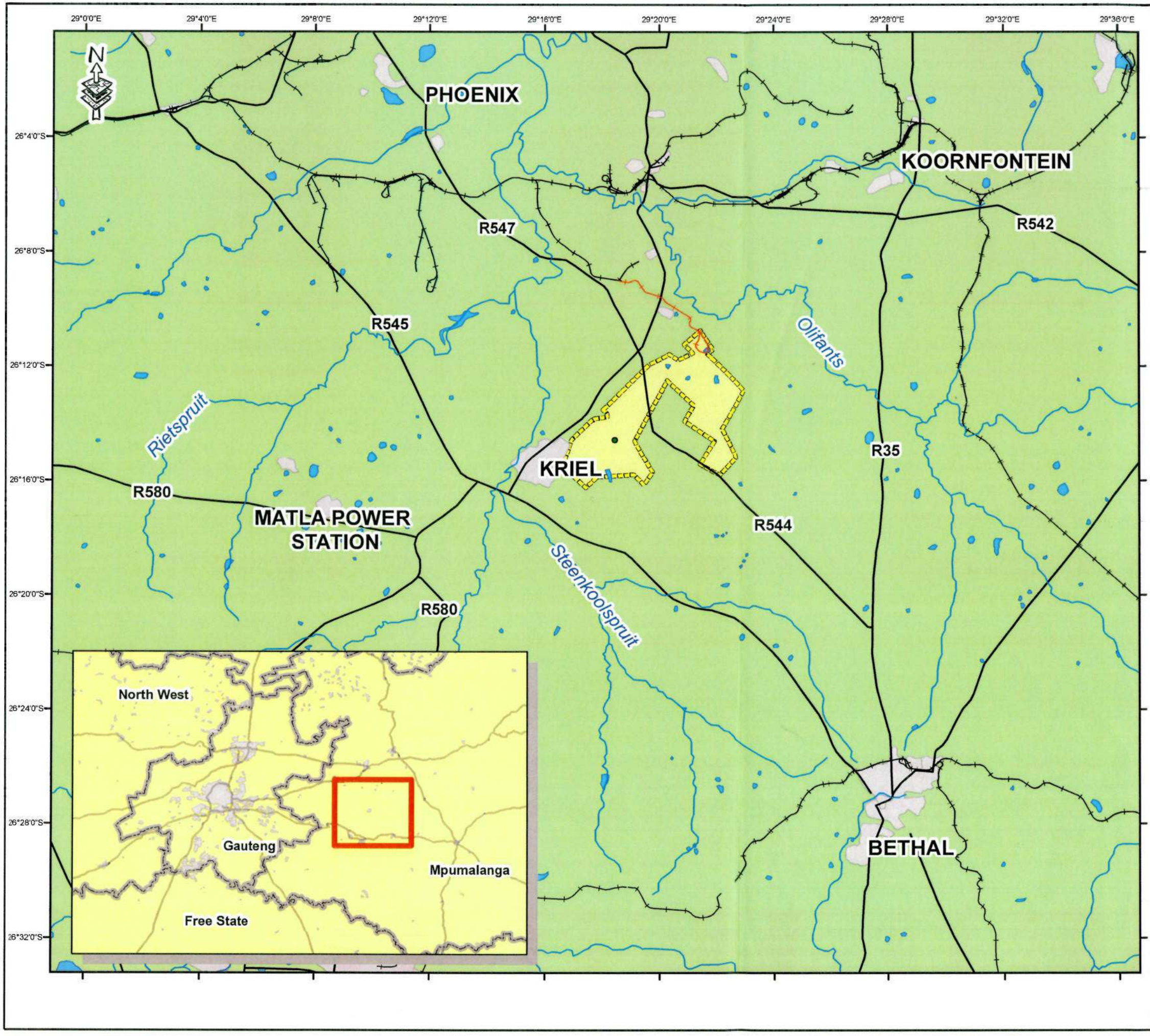
Discard will be conveyed from the plant to a new co-disposal facility by conveyor for the coarse fraction and by pipeline for the slurry fraction at a rate of approximately 205 tons per hour (tph). The co-disposal facility will be designed to hold 2.9 million tons of slurry within an outer wall of 33.1 million tons of coarse discard over the life of mine (LoM). The project will ensure a LoM in excess of 25 years.

All new infrastructure with the exception of the proposed railway line will be situated within the existing mining area. It is planned that the railway line will be established within an existing servitude of the previous TNC railway line with some sections requiring extension and expansion. Coal will be transported from the plant via conveyor to a rapid load out facility from where the train wagons will be loaded to transport the coal to the RBCT. The new rapid load-out facility associated with the new railway line will be required to be in close proximity to the plant to link to the RBCT coal line to the north of the project area. The railway line is proposed to pass through portions of the following farms: Vandyksdrift 19IS, Steenkoolspruit 18IS, Kromfontein 30IS, Middeldrift 42IS, Rietfontein 43IS, Lourens 472IS, Vlaklaagte 45IS, Welstand 55IS, Clydesdale 483IS and Vaalkranz 29IS.



DRAWING LEGEND

- Rivers
- Roads
- Railways
- Railway Option 5
- Urban / Built-up land
- Waterbodies
- Mining_Rights_Area
- Farm Boundaries

CLIENT:

TOTAL COAL SOUTH AFRICA

PROJECT:

DORSTFONTEIN EXPANSION PROJECT

DRAWING TITLE:

FIGURE 1.1: DCM LOCATION MAP

DRAWN: FEBRUARY 2008

SCALE: 1:240,000

PROJECTION: WGS 84

GCS (PTY) LTD
WATER, ENVIRONMENTAL ENGINEERING & EARTH SCIENCE CONSULTANTS

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Fax: +27 (0) 11 803 5745
E-mail: jhb@gcs-sa.biz

1.3 Description of Land

The DCM environmental investigation and reporting addresses the total authorised mining area, which includes portions of the farms Dorstfontein 71 IS, Boschkrans 53 IS, Fentonia 54 IS, Rietkuil 58 IS and Welstand 55 IS, as well as the areas on which the railway line and water supply pipeline will be established (refer to Table 1.1).

TCSA currently owns all of the surface rights overlying the mineral rights. However, due to surface limitations, particularly in the eastern reserve block and in the area earmarked for the plant and the rail loop, additional surface rights (servitudes) need to be considered to implement the mine layout proposed.

TCSA owns all the mineral rights under consideration in the project having successfully transferred the rights from "old order" to "new order" under the requirements of the MPRDA.

Table 1.1: Title deed description of farm names and portions under the whole Expansion Project, including the railway line

Portion	Name of Owner	Title Deeds	Name of Farm	Surveyor-general Digits (SGD)
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3	Dorstfontein Coal Mines (Pty) Ltd	T26263/2004	Dorstfontein 71 IS	T0IS00000000007100003
4	Dorstfontein Coal Mines (Pty) Ltd	T26263/2004	Dorstfontein 71 IS	T0IS00000000007100004
5	Dorstfontein Coal Mines (Pty) Ltd	T26263/2004	Dorstfontein 71 IS	T0IS00000000007100005
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7	Dorstfontein Coal Mines (Pty) Ltd	T26263/2004	Dorstfontein 71 IS	T0IS00000000007100007
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Re 4	Dorstfontein Coal Mines (Pty) Ltd	T26262/2004	Welstand 55 IS	T0IS00000000005500004
Re 5	Dorstfontein Coal Mines (Pty) Ltd	T26262/2004	Welstand 55 IS	T0IS00000000005500005
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Railway line				
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1	Oostraland Boerdery Pty Ltd	T29304/1983	Steenkoolspruit 18 IS	T0IS00000000001800001
2	Phoenix Colliery Ltd	T110494/1992	Kromfontein 30 IS	T0IS00000000003000002
29	Republiek van Suide Afrika	T23451/1989	Kromfontein 30 IS	T0IS00000000003000029
31	Middledrift 42 Eiendomme Pty Ltd	T36355/2000	Kromfontein 30 IS	T0IS00000000003000031
0	Middeldrift 42 Eiendomme Pty Ltd	T36355/2000	Middeldrift 42 IS	T0IS00000000004200000
2	Diepspruit 41 Eiendomme Pty Ltd	T36354/2000	Middeldrift 42 IS	T0IS00000000004200002

1.4 Brief Description of Public Participation Process

The Public Participation Process (PPP) is a requirement of the EIA and EMP process and ensures that all relevant I&APs are consulted and involved. The process ensures that all stakeholders have an opportunity to raise their comments as part of an open and transparent process, which in turn ensures for a complete comprehensive environmental study.

A comprehensive PPP was initiated at an early stage in both Scoping Phases (NEMA and MPRDA) in order for the concerns of I&APs, authorities and the wider public to be recognised and understood. The PPP has been an ongoing process undertaken throughout the EIA and EMP.

GCS is continuously liaising with DME, keeping all relevant personnel updated on progress and following the advice from DME. The project has been outlined to DME through meetings between GCS and DME, with an introductory meeting at DCM on 3rd of October 2007.

The Scoping Authorities meeting took place on the 1st of November 2007. On the 6th of December 2007, another authorities meeting was held, in terms of NEMA, with MDALA, at DCM. The relevant authorities consulted were identified from authorities that have dealt with DCM in the past.

The existing list of I&APs/Stakeholders from DCM has been updated by GCS through information received in response to the press advertisements and notices. The site notices were placed during the consultation phase to inform the stakeholders about the first public meeting. TCSA, with GCS, has in addition continued in discussions with surrounding landowners who were also included into the database.

Background Information Documents (BIDs) were distributed to all I&APs/Stakeholders via e-mail, fax and/or post. The BIDs was made available in English.

Ongoing communication (i.e. telephonic, meetings, emails, fax etc.) has been undertaken to ensure an open and transparent channel of communication. All stakeholders and I&APs were given the opportunity to raise their concerns with regards to the proposed project. All comments and/or concerns received have been noted and are incorporated within the detailed investigations of the EIA and EMP phase (see Section 5 in EIA).

1.5 Methodology

TCSA DCM appointed GCS (Pty) Ltd to undertake the necessary environmental assessments and to ensure that all legislative requirements are adhered to as part of the environmental authorisation process.

In terms of Section 39 (1) of the MPRDA, DCM are required to conduct an environmental assessment and submit an EIA/EMP to the DME, in respect of any new operations and/or expansions of the mine as explained in Section 1.2.

The DCM environmental investigation and reporting will address the total Expansion Project Area.

Conducting the required environmental reporting according to the MPRDA involved the compilation of an Environmental Scoping Report (ESR) that has been submitted to the DME, and the EIA/EMP of which this report is part of. The EIA/EMP is submitted as a combined document to the stakeholders for comments.

1.5.1 *Legislation*

The environmental component of the project will comply with the requirements of *inter alia*, the following Legislation (and the Regulations promulgated hereunder):

- Constitution of South Africa, 1996 (Act 108 of 1996);
- The Mineral and Petroleum Resources Development Act (Act 28 of 2002);
- The National Environmental Management Act, 1998 (Act 107 of 1998);
- The National Water Act, 1998 (Act 36 of 1998);
- The Environment Conservation Act, 1989 (Act 73 of 1989);
- The Atmospheric Pollution Prevention Act, 1965 (Act 45 of 1965);
- The National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004);
- The Hazardous Substances Act, 1973 (Act 15 of 1973); and
- The National Heritage Resources Act, 1999 (Act 25 of 1999).

1.5.2 *Environmental Process Objectives*

In order to mitigate potentially negative impacts and to identify any potential fatal flaws that may render the project environmentally unacceptable, GCS have adopted an integrated, step-by-step process to identify issues of concern and to thoroughly investigate these issues. The environmental investigations undertaken addressed all phases related to the proposed expansion of the mine. These phases included the:

- Construction phase;
- Operation phase; and
- Closure and decommissioning phase.

To ensure that the negative impacts are identified and mitigated in the early stages of the project, and that the positive impacts are maximised, the environmental study are to meet the following aims:

- Follow the guideline process as outlined by the MPRDA;
- Provide input in the feasibility phases to ensure that the most technically feasible, and environmentally sound options are selected;
- Ensure that impacts are identified early through investigations to minimise environmental damage and maximise benefits;
- Conduct thorough special investigations that will allow the project team to develop an adequate understanding of the issues to be dealt with;
- Compile an EIA that will identify, evaluate and address the potential impacts;
- Provide ongoing environmental input into the project planning and development;
- Compile an EMP that will limit the significance of the negative impacts and maximise the positive aspects;
- Ensure that all relevant I&APs / Stakeholders are consulted and involved throughout the project;

1.3 Description of Land

The DCM environmental investigation and reporting addresses the total authorised mining area, which includes portions of the farms Dorstfontein 71 IS, Boschkrans 53 IS, Fentonia 54 IS, Rietkuil 58 IS and Welstand 55 IS, as well as the areas on which the railway line and water supply pipeline will be established (refer to Table 1.1).

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TCSA owns all the mineral rights under consideration in the project having successfully transferred the rights from "old order" to "new order" under the requirements of the MPRDA.

Table 1.1: Title deed description of farm names and portions under the whole Expansion Project, including the railway line

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10	Republiek van Suide Afrika	T27624/1988	Middeldrift 42 IS	T0IS00000000004200010
15	Ingwe Surface Holdings Ltd	T52913/2001	Middeldrift 42 IS	T0IS00000000004200015
0	Eyesizwe Coal (Pty) Ltd	T47039/2003	Rietfontein 43 IS	T0IS00000000004300000
1	Middledrift 42 Eiendomme Pty Ltd	T36355/2000	Rietfontein 43 IS	T0IS00000000004300001
3	Eyesizwe Coal (Pty) Ltd	T47038/2003	Rietfontein 43 IS	T0IS00000000004300003
6	Kanivest 3159 CC	T57180/2001	Rietfontein 43 IS	T0IS00000000004300006
0	Lourens Matthys Johannes	T25747/1982	Lourens 472 IS	T0IS00000000047200000
6	B H P Billiton Energy Coal South Africa Ltd	T65609/1991	Vlaklaagte 45 IS	T0IS00000000004500006
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31	B H P Billiton Energy Coal South Africa Ltd	T65609/1991	Vlaklaagte 45 IS	T0IS00000000004500031
2	Alnietel Pty Ltd	T6192/1976	Welstand 55 IS	T0IS00000000005500002
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Water supply pipeline				
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7	Alnietel Pty Ltd	T6192/1976	Welstand 55 IS	T0IS00000000005500007

The mine will enter into the necessary purchase agreements with surface right owners where applicable.

1.4 Brief Description of Public Participation Process

The Public Participation Process (PPP) is a requirement of the EIA and EMP process and ensures that all relevant I&APs are consulted and involved. The process ensures that all stakeholders have an opportunity to raise their comments as part of an open and transparent process, which in turn ensures for a complete comprehensive environmental study.

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- The National Heritage Resources Act, 1999 (Act 25 of 1999).

1.5.2 Environmental Process Objectives

In order to mitigate potentially negative impacts and to identify any potential fatal flaws that may render the project environmentally unacceptable, GCS have adopted an integrated, step-by-step process to identify issues of concern and to thoroughly investigate these issues. The environmental investigations undertaken addressed all phases related to the proposed expansion of the mine. These phases included the:

- Construction phase;
- Operation phase; and
- Closure and decommissioning phase.

To ensure that the negative impacts are identified and mitigated in the early stages of the project, and that the positive impacts are maximised, the environmental study are to meet the following aims:

- Follow the guideline process as outlined by the MPRDA;
- Provide input in the feasibility phases to ensure that the most technically feasible, and environmentally sound options are selected;
- Ensure that impacts are identified early through investigations to minimise environmental damage and maximise benefits;
- Conduct thorough special investigations that will allow the project team to develop an adequate understanding of the issues to be dealt with;
- Compile an EIA that will identify, evaluate and address the potential impacts;
- Provide ongoing environmental input into the project planning and development;
- Compile an EMP that will limit the significance of the negative impacts and maximise the positive aspects;
- Ensure that all relevant I&APs / Stakeholders are consulted and involved throughout the project;

- Ensure that an open and transparent communication structure is in place during the life of the mine; and
- Strong emphasis will also be placed on the NEMA process to ensure that the two (2) processes will be able to run concurrently, and will easily be comparable with no confusion between the different processes.

1.5.3 EMP Process

Each specialist was required to identify means of avoiding, mitigating and/or managing the negative impacts in his/her particular aspect of the investigation. The recommended management strategies are synthesised in this report by GCS to formulate the EMP for the proposed mining operation. Management strategies are based on the recommendations by specialists in their specific field of study. The management measures will be incorporated into the mine systems to avoid, or appropriately manage impacts from the outset.

The content of the EMP includes the following, as specified in the MPRDA:

A description of the objectives and specific goals for each phase of the mining operation including:

- Environmental impacts identified;
- Socio-economic conditions;
- Historical and cultural aspects; and
- Mine closure.

An outline of the implementation programme, which must include:

- A description of the chosen appropriate technical and management options for each environmental impact, socio-economic condition and historical and cultural aspects of the preferred alternative under each phase of the mining operation;
- Layout of action plans to achieve the objectives and specific goals (including a time schedule);
- Maintenance and emergency procedures for further remediation;
- Contingency measures;
- Requirements for monitoring and EMP assessment;
- Financial provision; and
- Environmental awareness plan.

The EIA ensures that the needs of the environment (biophysical and socio-economic) are identified. The EMP in turn provides a tool for meeting the objective to reduce or avoid negative environmental impacts associated with a project within a certain environment by providing detailed mitigation measures and management commitments.

All of these sections will become legally binding on the approval of this report.

1.6 Report Structure

The EMP has been compiled to supply the recommended management measures that need to be implemented in the construction, operation and decommissioning and closure phases to have the minimum impact on the environment.

Chapter 1: Background and Introduction

- This chapter provides a description of the location and the land ownership of the mine, as well as the purpose, approach and methodology followed for the completion of this project.

Chapter 2: Activities and Environmental Management Objectives

- This chapter provides a description of the activities that will happen on the proposed project and the environmental management objectives on how to mitigate significant environmental impacts.

Chapter 3: Management Measures

- This chapter details the required management measures to be implemented during the construction, operational, decommissioning and closure phases.

Chapter 4: Monitoring and Management Programme

- This chapter indicates the monitoring and management measures of environmental impacts (I.e. surface water monitoring, groundwater monitoring, air quality monitoring etc.) for the way forward should this project be approved.

Chapter 5: Procedure for Environmental Related Emergencies and Remediation

- This chapter details procedures for environmental related emergencies and remediation measures.

Chapter 6: Environmental Awareness Plan

- This chapter details an environmental awareness plan.

Chapter 7: Financial Provision

- This chapter assesses the final clean closure cost and the financial provision that needs to be provided for DCM to be able to rehabilitee the entire mining operation after operation seizes.

Chapter 8: Undertaking by Client

- This chapter contains the signatures of the mine manager and the director from the DME to make all information contained in EMP legally binding.

Chapter 9: Conclusion

- The conclusion provides a brief discussion on the findings in the report.

Appendices

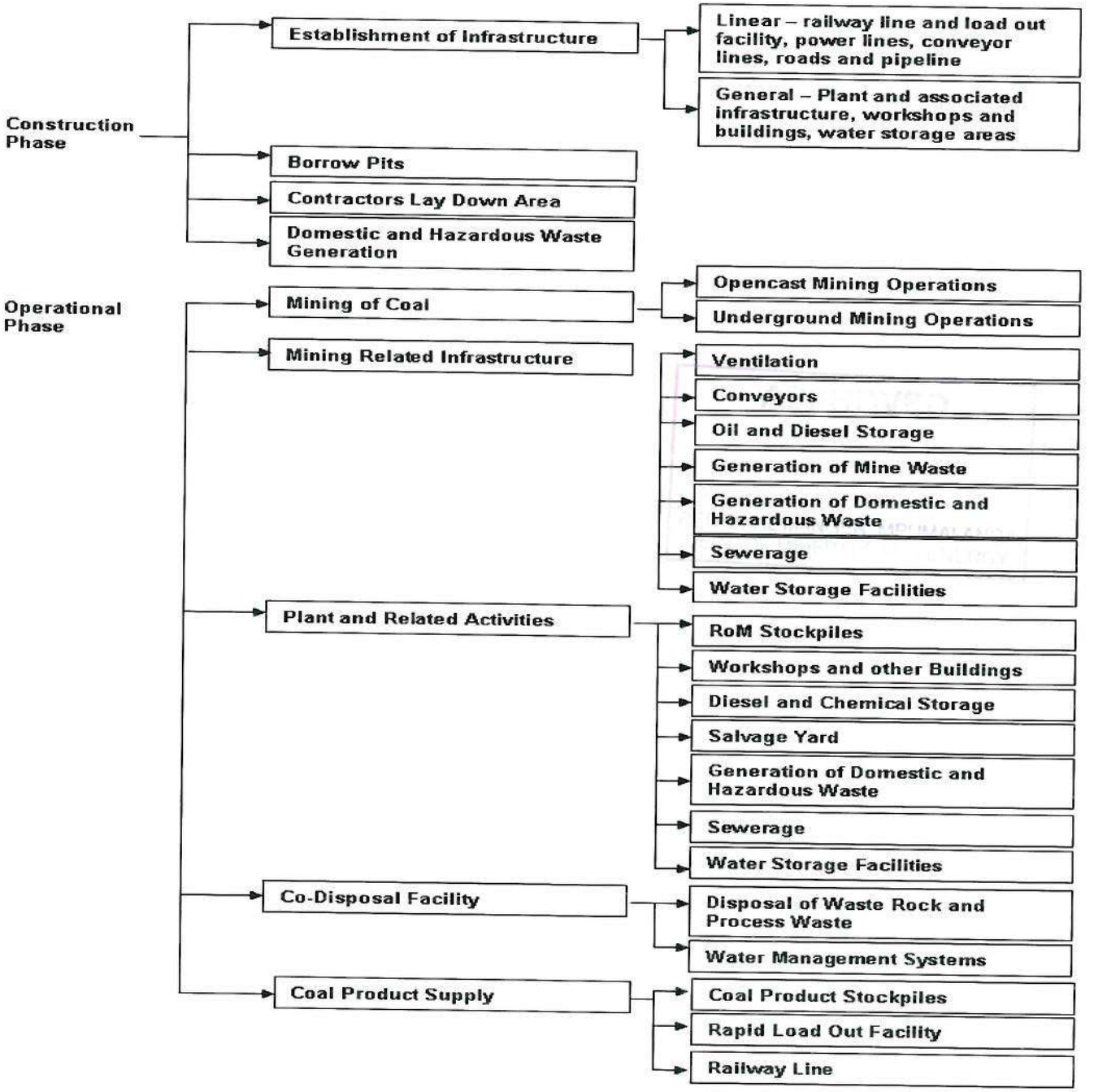
Supporting documentation.

2 ACTIVITIES AND ENVIRONMENTAL MANAGEMENT OBJECTIVES

Prior to identifying the various environmental impacts and the required management measures, it is essential to understand the activities associated with the DCM Expansion Project and the associated environmental objectives.

2.1 Activities

The following diagram is included to outline the various activities which may impact on the environment:



During the decommissioning and closure phase the following activities are envisaged:

- Demolishing of infrastructure;
- Making opencast pits safe; and
- Designing area to be free draining.

2.2 Environmental Management Objectives

2.2.1 *Establishment of Infrastructure*

The environmental objectives associated with the establishment of infrastructure are:

- Optimal utilisation and maintenance of existing infrastructure in a well-planned manner where possible;
- Ongoing maintenance of infrastructure in a well-planned manner;
- To take care that no new land surface, vegetation and habitats outside of the planned mining area are destroyed, disturbed and/or alienated;
- To prevent any cumulative impact (i.e. erosion and siltation of watercourses) associated with the removal of vegetation and topsoil;
- To ensure an effective surface run-off control system is in order from the commissioning of the construction activities to deal with the separation of clean and dirty water;
- To prevent, contain and clean up any spillages during the construction and operational activities;
- To reduce the noise associated with the construction and operational activities as far as possible;
- To reduce the dust dispersion as a result of the removal of earth material as far as possible;
- To manage any other nuisance which may occur as a result of the establishment of new infrastructure (i.e. light pollution);
- To manage the influx of people seeking work and the potential for informal establishment and associated petty crimes; and
- To rehabilitate the area as per the closure objectives in order to address all environmental impacts as far as possible and practical.

2.2.2 *Borrow Pits*

The environmental objectives associated with the borrow pits are:

- To limit the borrow pit areas to the areas in which opencast operations will take place and/or other infrastructures will be established in order to minimize the area of disturbance;
- To ensure that the original topography is disturbed as little as possible;
- To take care that no new land surface, vegetation and habitats outside of the planned mining area are destroyed, disturbed and/or alienated;
- To ensure that the area is safe and will not present a hazard to animal and/or human life; and

- To rehabilitate the area as per the closure objectives in order to address all environmental impacts as far as possible and practical.

2.2.3 *Contractors Lay Down Area*

The environmental objectives associated with the contractors lay down area are:

- To as for as far as possible aim to establish the contractors lay down area where opencast operations will take place and/or where other infrastructure will be established in order to minimise the area of disturbance;
- To take care that no new land surface, vegetation and habitats outside of the planned mining area are destroyed, disturbed and/or alienated;
- To prevent any cumulative impact (i.e. erosion and siltation of watercourses) associated with the removal of vegetation and topsoil;
- To ensure an effective surface run-off control system is in order to deal with the separation of clean and dirty water;
- To prevent, contain and clean up any spillages during the construction and operational activities;
- To strictly manage the activities taking place within the lay down area by implementing clear and effective ground rules; and
- To rehabilitate the area as per the closure objectives in order to address all environmental impacts as far as possible and practical.

2.2.4 *Domestic and Hazardous Waste Generation*

The environmental objectives associated with the generation of waste are:

- To enforce policies in terms of the removal of domestic and hazardous waste;
- To ensure an effective surface run-off control system is in order to deal with the separation of clean and dirty water; and
- To prevent, contain and clean up any spillages during the life of mine.

2.2.5 *Mining of Coal*

The environmental objectives associated with the mining of coal are:

- To optimally utilise the coal mineral reserves within a well planned mining strategy;
- To take care that no new land surface, vegetation and habitats outside of the planned mining area are destroyed, disturbed and/or alienated;
- To ensure that the original topography is disturbed as little as possible;
- To ensure an effective surface run-off control system is in order to deal with the separation of clean and dirty water;
- To reduce the noise associated with the construction and operational activities as far as possible;

- To reduce the dust dispersion as a result of the removal of coal reserves as far as possible;
- To have an open channel of communication with the surrounding land owners to ensure that all the needs of parties are adhered to as far as practically possible;
- To ensure that the area is safe and will not present a hazard to animal and/or human life; and
- To rehabilitate the area as per the closure objectives in order to address all environmental impacts as far as possible and practical.

2.2.6 *Mining Related Infrastructure*

The environmental objectives associated with the mining related infrastructure (i.e. conveyors, adits, ventilation, power lines, etc.) are:

- Optimal utilisation and maintenance of existing infrastructure in a well-planned manner where possible;
- To take care that no new land surface, vegetation and habitats outside of the planned mining area are destroyed, disturbed and/or alienated;
- To ensure an effective surface run-off control system is in order to deal with the separation of clean and dirty water;
- To prevent any cumulative impact (i.e. erosion and siltation of watercourses) associated with the removal of vegetation and topsoil;
- To prevent, contain and clean up any spillages in the environment;
- To reduce the noise associated with the construction and operational activities as far as possible; and
- To rehabilitate the area as per the closure objectives in order to address all environmental impacts as far as possible and practical.

2.2.7 *Plant and Related Infrastructure*

The environmental objectives associated with the plant and related infrastructure are:

- Optimal utilization of infrastructure in a well-planned manner;
- To minimize the impact on the surrounding infrastructure when new infrastructure is established;
- To take care that no new land surface, vegetation and habitats outside of the planned mining area are destroyed, disturbed and/or alienated;
- To prevent any cumulative impact (i.e. erosion and siltation of watercourses) associated with the removal of vegetation and topsoil;
- To ensure an effective surface run-off control system is in order to deal with the separation of clean and dirty water;
- To contain and prevent any pollution from these areas with structures and facilities provided therefore;
- To reduce the noise associated with the construction and operational activities as far as possible;
- The sustainable and responsible utilization of all water resources and the prevention of the pollution thereof; and

- To rehabilitate the area as per the closure objectives in order to address all environmental impacts as far as possible and practical.

2.2.8 Co-Disposal Facility

The environmental objectives associated with the co-disposal facility are:

- Optimal utilization of infrastructure in a well-planned mining strategy;
- To take care that no new land surface, vegetation and habitats outside of the planned mining area are destroyed, disturbed and/or alienated;
- To contain and prevent any pollution from waste rock and process waste with structures and facilities provided therefore;
- To ensure an effective surface run-off control system is in order to deal with the separation of clean and dirty water;
- To prevent any cumulative impact (i.e. erosion and siltation of watercourses) associated with the removal of vegetation and topsoil;
- To prevent, contain and clean up any spillages in the environment;
- To reduce the noise associated with the construction activities as far as possible;
- To reduce the dust dispersion as a result of the disposal of material as far as possible; and
- To rehabilitate the area as per the closure objectives in order to address all environmental impacts as far as possible and practical.

2.2.9 Coal Product Supply

The environmental objectives associated with the coal product supply are:

- Optimal utilization of infrastructure in a well-planned manner;
- To fulfill the requirements of the RBCT;
- To assist in the supply of coal to Eskom, to alleviate the current strain experienced by it's suppliers
- To take care that no new land surface, vegetation and habitats outside of the planned mining area are destroyed, disturbed and/or alienated;
- To contain and prevent any pollution from waste rock and process waste with structures and facilities provided therefore;
- To ensure an effective surface run-off control system is in order to deal with the separation of clean and dirty water;
- To prevent any cumulative impact (i.e. erosion and siltation of watercourses) associated with the removal of vegetation and topsoil;
- To prevent, contain and clean up any spillages in the environment;
- To reduce the noise associated with the construction and operational activities as far as possible;
- To reduce the dust dispersion as a result of the disposal of material as far as possible; and
- To rehabilitate the area as per the closure objectives in order to address all environmental impacts as far as possible and practical.

3 MANAGEMENT MEASURES

In terms of The Constitution of the Republic of South Africa (Act No. 108 of 1996) everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for benefit of present and future generations, though reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while prompting justifiable economic and social development. The needs of the environment, as well as I&APs should thus be integrated into overall project management. This EMP provides a tool for meeting this objective by providing detailed mitigation and management commitments by the DCM.

The following tables provide the management measures recommended to manage the potential impacts rated in the EIA. In addition to the management measures provided the table indicates the person responsible to ensure that these commitments are adhered to and implemented and the priority of these commitments (either prior a phase, during a phase and/or ongoing).

The responsible person at the DCM Section as well as the responsible parties at Total Coal South Africa have assessed these commitments in detail and have committed to the specific management measures where indicated in the table.

3.1 Construction Phase

3.1.1 Geology

There will be no impact on the geology associated with the construction phase.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
All infrastructure establishment	The potential sterilisation of coal resources due to the establishment of infrastructure on potential coal resources.	The mine must undertake detailed geological investigations to determine the extent of the resources and ensure that no mining infrastructure is located on areas of potential coal resources.	Ongoing	N/A

3.1.2 Topography

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Railway line Infrastructure	The stockpiling and removal of material as result of cut and fill methods will impact on the micro and macro topography due to the establishment of the railway line.	▪ All activities must remain within the dedicated footprints of the infrastructure within the mining area.	Prior and during the construction phase	N/A
		▪ The construction activities will be undertaken in such a way as to ensure that the area after construction is free draining (ensure effective run off from natural precipitation).	Prior and during the construction phase	Included in construction costs
		▪ Slope angles of stockpiles and dumps are not to exceed 18°.	During construction	Included in construction costs
		▪ Where possible the extension and expansion of the railway line should follow the route of the contours of the area to limit cut and fill.	During construction	
		▪ Where possible all other linear infrastructure should follow the contours of the area to limit cut and fill.	During construction	
		▪ Existing roads and infrastructure should be upgraded where possible, construction of new roads must be avoided.	During construction	Included in construction costs

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
	Pipeline, Power line, Conveyors	The stockpiling and removal of material as result of cut and fill methods will impact on the micro and macro topography due to the establishment of the pipeline, power line, and conveyors.		During the construction phase	
	All other infrastructure	The stockpiling and removal of material as result of cut and fill methods will impact on the micro and macro topography due to the establishment of the infrastructure associated with the mining operation.		During the construction phase	
Establishment of Borrow Pits		The stockpiling and removal of material as result of cut and fill methods will impact on the micro and macro topography due to the construction of borrow pits.	▪ The establishment of borrow pits must be within designated mining areas where opencast mining or other mining related infrastructure will be established, to minimize the impact borrow pits will have on the micro and macro topography of the area.	Prior and during construction phase	Included in construction costs
Contractors Lay Down Area		The impact on the micro and macro topography due to the establishment of a contractor lay down area.	▪ As all activities, limit the footprint of the contractors lay down area to the smallest area possible within the mining area.	Prior and during construction phase	Included in construction costs

3.1.3 Soils

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Railway line Infrastructure	Loss of the soil resource due to the establishment of the railway line.	▪ Topsoil will be stripped to 300mm or up until hard rock is reached. ▪ Topsoil's will be stockpiled for later use in the rehabilitation of the final land form. ▪ Topsoil and subsoil are to be stockpiled separately in the vicinity of the source of the soil and be clearly identifiable. ▪ Prior to the removal of the soils for stockpiling additional sampling and analysis of the soils must be undertaken, to determine their suitability for use during rehabilitation. This is necessary to ensure that the possible loss of nutrients from the soils during stockpiling is considered. ▪ Topsoils and subsoils will be sprayed with a dust allaying agent immediately after being stockpiled. The spraying product utilised must allow for the establishment of natural vegetation. ▪ The stockpile heights will be calculated by the volume of soil to be removed. Any stockpile higher than 1.5m must be equipped with engineered erosion control measures (i.e. terraces).	Prior and during construction phase	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ Rapid growth of vegetation on stockpiles must be promoted by means of watering.		
	Erosion as a result of the establishment of the railway line.	▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. ▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Soil physical and chemical degradation as result of railway line establishment.	▪ The mine will ensure that equipment movement over the stockpiles will be limited to avoid soil compaction and subsequent damage to soil structure or the seed bank.		Included in construction costs
		▪ Should vegetation be required, fertilizer will be applied to the topsoil stockpiles prior to vegetation. See management and monitoring programs in EMP for fertilizer usage as recommended by specialist.		Included in construction costs
		▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible, with the growing season and water availability being the primary constraints.		Included in construction costs
		▪ There will be an incident management system including procedures and training for dealing with incidents.		Included in construction costs
		▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities.		Spill Kits R120 000
		▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. Waste should be removed by licensed waste disposal companies.	Prior and during construction	Included in construction costs
		▪ Should chemical toilets be utilised the sewage must be removed by a licensed company.		
		▪ The mine must adopt the cradle to grave		

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated.	Prior and during construction	Included in the construction costs
		▪ A detailed waste management strategy will be established and implemented.		Included in the construction costs
		▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis.		Included in the construction costs
	Soil compaction due to different types of soils, and their wetness factor, during the construction of the railway line.	▪ Compaction is a problem to contend with if these soils are to be worked during the wet months of the year. ▪ Stockpiling of these soils should be done separately from the dry soils, and greater care is needed with the management of erosion problems during storage. ▪ Any strong structure that develops during the stockpiling stage will need to be dealt with prior to the use of this material for rehabilitation.	Prior and during construction	Included in construction costs

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
	Pipeline, Power line, Conveyors	Loss of the soil resource due to the establishment of the pipeline, power lines and conveyors.	▪ Topsoil will be stripped to 400mm or up until hard rock is reached. ▪ Topsoil's will be stockpiled for later use in the rehabilitation of the final land form. ▪ Topsoil and subsoil are to be stockpiled separately in the vicinity of the source of the soil and be clearly identifiable. ▪ Prior to the removal of the soils for stockpiling additional sampling and analysis of the soils must be undertaken, to determine their suitability for use during rehabilitation. This is necessary to ensure that the possible loss of nutrients from the soils during stockpiling is considered. ▪ Topsoils and subsoils will be sprayed with a dust allaying agent immediately after being stockpiled. The spraying product utilised must allow for the establishment of natural vegetation. ▪ The stockpile heights will be calculated by the volume of soil to be removed. Any stockpile higher than 1.5m must be equipped with engineered erosion control measures (i.e. terraces). ▪ Rapid growth of vegetation on stockpiles must be promoted by means of watering.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Erosion with regards to the establishment of the pipeline, power lines and conveyors.	▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. ▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Soil physical and chemical degradation as result of pipeline, power lines and conveyors establishment.	▪ The mine will ensure that equipment movement over the stockpiles will be limited to avoid soil compaction and subsequent damage to soil structure or the seed bank. ▪ Should vegetation be required, fertilizer will be applied to the topsoil stockpiles prior to vegetation. ▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible, with the growing season and water availability being the primary constraints. ▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be	Prior and during construction	Included in construction costs Spillkits R120 000 Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated.		Included in the construction costs
		▪ A detailed waste management strategy will be established and implemented.	Prior and during construction	Included in the construction costs
		▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis.		Included in the construction costs
	Soil compaction due to different types of soils, and their wetness factor, during the construction of pipelines, power lines and conveyors.	▪ Compaction is a problem to contend with if these soils are to be worked during the wet months of the year.		
		▪ Stockpiling of these soils should be done separately from the dry soils, and greater care is needed with the management of erosion problems during storage.	Prior and during construction	Included in construction costs
		▪ Any strong structure that develops during the stockpiling stage will need to be dealt with prior to the use of this material for rehabilitation.		
All other infrastructure	Loss of the soil resource due to the establishment of other infrastructure.	▪ Topsoil will be stripped to 400mm or up until hard rock is reached.		
		▪ Topsoil's will be stockpiled for later use in the rehabilitation of the final land form.		

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ Topsoil and subsoil are to be stockpiled separately in the vicinity of the source of the soil and be clearly identifiable. ▪ Prior to the removal of the soils for stockpiling additional sampling and analysis of the soils must be undertaken, to determine their suitability for use during rehabilitation. This is necessary to ensure that the possible loss of nutrients from the soils during stockpiling is considered. ▪ Topsoils and subsoils will be sprayed with a dust allaying agent immediately after being stockpiled. The spraying product utilised must allow for the establishment of natural vegetation. ▪ The stockpile heights will be calculated by the volume of soil to be removed. Any stockpile higher than 1.5m must be equipped with engineered erosion control measures (i.e. terraces). ▪ Rapid growth of vegetation on stockpiles must be promoted by means of watering and vegetation should self-succession not establish.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Erosion with regards to the establishment of other infrastructure.	▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible and only if self succession does not establish. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. ▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Soil physical and chemical degradation as result of other infrastructure establishment.	▪ The mine will ensure that equipment movement over the stockpiles will be limited to avoid soil compaction and subsequent damage to soil structure or the seed bank. ▪ Should vegetation be required, fertilizer will be applied to the topsoil stockpiles prior to vegetation. See management and monitoring programs in EMP for fertilizer usage as recommended by specialist. ▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible, with the growing season and water availability being the primary constraints. ▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Soil compaction due to different types of soils, and their wetness factor, during the construction of the all other infrastructure.	▪ Compaction is a problem to contend with if these soils are to be worked during the wet months of the year. ▪ Stockpiling of these soils should be done separately from the dry soils, and greater care is needed with the management of erosion problems during storage. ▪ Any strong structure that develops during the stockpiling stage will need to be dealt with prior to the use of this material for rehabilitation.	Prior and during construction	Included in construction costs
Establishment of Borrow Pits	Loss of soil resource due to the establishment of borrow pits.	▪ Borrow pits needs to be established within designated mining areas, or where the footprint of the area will become part of the mining infrastructure (i.e. co-disposal facility area or opencast mining areas). The establishment within these areas will have the minimal effect on soil resources. ▪ Topsoil will be stripped to 400mm or up until hard rock or borrow pit material is reached. ▪ Topsoil's will be stockpiled for later use in the rehabilitation of the final land form. ▪ Prior to the removal of the soils for stockpiling additional sampling and analysis of the soils must be undertaken, to determine their	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		suitability for use during rehabilitation. This is necessary to ensure that the possible loss of nutrients from the soils during stockpiling is considered. ▪ Topsoil and subsoil not used as borrow pit material are to be stockpiled separately in the vicinity of the source of the soil and be clearly identifiable. ▪ Topsoils and subsoils not used as borrow pit material will be sprayed with a dust allaying agent immediately after being stockpiled. The spraying product utilised must allow for the establishment of natural vegetation. ▪ The stockpile heights will be calculated by the volume of soil to be removed. Any stockpile higher than 1.5m must be equipped with engineered erosion control measures (i.e. terraces).		

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Soil compaction due to different types of soils, and their wetness factor, during the establishment of borrow pits.	▪ Compaction is a problem to contend with if these soils are to be worked during the wet months of the year. ▪ Stockpiling of these soils should be done separately from the dry soils, and greater care is needed with the management of erosion problems during storage. ▪ Any strong structure that develops during the stockpiling stage will need to be dealt with prior to the use of this material for rehabilitation.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Contractors Lay Down Area	Loss of the soil resource due to the establishment of the Contractors Lay Down Area.	▪ Contractors Lay Down Area needs to be established within designated mining areas, or where the footprint of the area will become part of the mining infrastructure (i.e. co-disposal facility area or opencast mining areas). The establishment within these areas will have the minimal effect on the loss of soil resources. ▪ Topsoil will be stripped to 400mm or up until hard rock is reached. ▪ Topsoil's will be stockpiled for later use in the rehabilitation of the final land form. ▪ Topsoil and subsoil are to be stockpiled separately in the vicinity of the source of the soil and be clearly identifiable. ▪ Prior to the removal of the soils for stockpiling additional sampling and analysis of the soils must be undertaken, to determine their suitability for use during rehabilitation. This is necessary to ensure that the possible loss of nutrients from the soils during stockpiling is considered.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ Topsoils and subsoils will be sprayed with a dust allaying agent immediately after being stockpiled. The spraying product utilised must allow for the establishment of natural vegetation. ▪ The stockpile heights will be calculated by the volume of soil to be removed. Any stockpile higher than 1.5m must be equipped with engineered erosion control measures (i.e. terraces). ▪ Rapid growth of vegetation on stockpiles must be promoted by means of watering.	Prior and during construction	Included in construction costs
	Erosion with regards to the establishment of the Contractors Lay Down Area.	▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.		

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Soil physical and chemical degradation as result of the Contractors Lay Down Area establishment.	▪ Contractors Lay Down Area needs to be established within designated mining areas, or where the footprint of the area will become part of the mining infrastructure (i.e. opencast mining areas). The establishment within these areas will have the minimal effect on the physical and chemical degradation of soil resources. ▪ The mine will ensure that equipment movement over undesignated areas and stockpiles will be limited to avoid soil compaction and subsequent damage to soil structure or the seed bank. ▪ Should vegetation be required, fertilizer will be applied to the topsoil stockpiles prior to vegetation. See management and monitoring programs in EMP for fertilizer usage as recommended by specialist. ▪ Fairly standard fertilizer treatments will be needed for optimum agricultural production of crops on areas that have previously been planted, and/or stockpiled for any length of time.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible, with the growing season and water availability being the primary constraints. ▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ A detailed waste management strategy will be established and implemented. ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ Should chemical toilets be utilised the sewage must be removed by a licensed company. ▪ The mine must adopt the cradle to grave principle.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Soil compaction due to different types of soils, and their wetness factor, during the lay down of the contractors' area.	▪ Compaction is a problem to contend with if these soils are to be worked during the wet months of the year. ▪ Stockpiling of these soils should be done separately from the dry soils, and greater care is needed with the management of erosion problems during storage. ▪ Any strong structure that develops during the stockpiling stage will need to be dealt with prior to the use of this material for rehabilitation.	Prior and during construction	Included in construction costs
Generation of Domestic and/or Hazardous Waste	Soil structure contamination due to waste contamination and spillages.	▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the	Prior and during construction	Part of construction costs Spill Kits R120000 Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented. ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ Should chemical toilets be utilised the sewage must be removed by a licensed company. ▪ The mine must adopt the cradle to grave principle.		Chemical toilets R96 000

3.1.4 Ecology (Fauna and Flora)

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Infrastructure	Railway line	Removal of vegetation from railway servitude.	▪ The railway will be a permanent fixture. Where possible as little as possible vegetation should be removed.	Prior and during construction	Included in construction costs
	Pipeline, Power line, Conveyors	Removal of all vegetation.	▪ Construction activities should be limited to the designated areas. ▪ Where possible as little as possible vegetation should be removed. ▪ In areas disturbed the main grass species will be reintroduced after fertilization has been added. ▪ Fertilizers are required where grass is to be planted on soils that are leached or eroded and that have low organic matter content. Add minimum recommended amounts of fertilizer to get successful establishment and good coverage of the grass to bind soils. ▪ The need for fertilizer will be determined by the recommendations of the specialist soil study, see EMP Section 4).	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Removal of indigenous vegetation	▪ Revegetate sites with the main grass species after operations have ended. Revegetation of the area will ensure that erosion of the site will be kept to a minimum. ▪ Should any rare or endangered species be found within the Expansion Project area will they be relocated under the guidance of MDALA.	Prior and during construction	Included in construction costs
	Dust deposition	▪ The potential for dust will be kept to a minimum. ▪ Dust must be suppressed by using the same dust suppression method as for topsoil stockpiles.	Prior and during construction	Included in construction costs R432 000
	Destruction of natural habitat for fauna	▪ Due to the high level of mechanisation of the project, most, if not all animal species will relocate from the area of disturbances and find alternate habitat in the vicinity. This will however be a low to moderate impact with mitigation owning to the fact that the land is predominately under crops and, as a result, the diversity of the animal species is low. ▪ The animals will move back once mining activities have ceased and rehabilitation has taken place.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Poaching and hunting of animals	▪ Due to the activities during construction the amount of people will increase and this could lead to a potential for poaching and hunting of animals on site. ▪ Fines will be implemented for poaching and hunting of animals. ▪ All employees will be made aware of all environmental issues during induction, and must continuously be updated of all new issues.	Prior and during construction	Included in construction costs
All other infrastructure	Removal of all vegetation	▪ Construction activities should be limited to the designated areas. ▪ Where possible as little as possible vegetation should be removed. ▪ In areas disturbed the main grass species will be reintroduced after fertilization has been added. ▪ Fertilizers are required where grass is to be planted on soils that are leached or eroded and that have low organic matter content. Add minimum recommended amounts of fertilizer to get successful establishment and good coverage of the grass to bind soils. ▪ The need for fertilizer will be determined by the recommendations of the specialist soil study, see EMP Section 4)).	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Removal of indigenous vegetation	▪ Revegetate sites with the main grass species after operations have ended. Revegetation of the area will ensure that erosion of the site will be kept to a minimum. ▪ The potential for dust will be kept to a minimum.	Prior and during construction	Included in construction costs
	Dust deposition	▪ Dust must be suppressed by using the same dust suppression method as for topsoil stockpiles.	Prior and during construction	Included in construction costs R432 000
	Destruction of natural habitat for fauna	▪ Due to the high level of mechanization of the project, most, if not all animal species will relocate from the area of disturbances and find alternate habitat in the vicinity. This will however be a low to moderate impact with mitigation owning to the fact that the land is predominately under crops and, as a result, the diversity of the animal species is low. ▪ The animals will move back once mining activities have ceased and rehabilitation has taken place.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Poaching and hunting of animals	▪ Due to the activities during construction the amount of people will increase and this could lead to a potential for poaching and hunting of animals on site. ▪ Fines will be implemented for poaching and hunting of animals. ▪ All employees will be made aware of all environmental issues during induction, and must continuously be updated of all new issues.		

3.1.5 Surface Water

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Infrastructure	Railway line, Pipeline, Power line, Conveyors	Due to increase bare surfaces, the runoff coefficient of the area will increase and therefore higher volumes of water will be produced during rain events. In addition to this the changing of the land profile could increase erosion and contribute to the siltation of water courses. Dust from equipment or vehicle movement could impact on the surface water quality.	▪ Clean and dirty water systems should be implemented prior to the commencement of construction activities, and should be designed for the 1:50 year storm event with additional capacity as an emergency measure (0.8m freeboard). ▪ No infrastructure is to be placed within the 1:100 year floodline without the necessary authorisation. ▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure and points of water discharge. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.		
	The type of material used during the construction activities may impact on the surface water quality.	▪ No carbonaceous materials must be used during the construction phase.	Prior and during construction	Included in construction costs
	The establishment of infrastructure will limit reduce the catchment area.	▪ Clean and dirty water systems should be implemented prior to the commencement of construction activities. ▪ All activities must remain within the dedicated footprints of the infrastructure within the mining area.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
All other infrastructure	Due to increase in bare surfaces, the runoff coefficient of the area will increase and therefore higher volumes of water will be produced during rain events. In addition to this the changing of the land profile could increase erosion and contribute to the siltation of water courses.	▪ Clean and dirty water systems should be implemented prior to the commencement of construction activities. ▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure and points of water discharge. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	The establishment of infrastructure will limit reduce the catchment area.	▪ Clean and dirty water systems should be implemented prior to the commencement of construction activities. ▪ All activities must remain within the dedicated footprints of the infrastructure within the mining area.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Diesel and Oil Storage	Spillages of hydrocarbons or any other chemical could lead to surface water pollution.	▪ No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area. ▪ All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 110% of the volume stored within. ▪ A spill contingency plan should be available and enforced. ▪ Spill clean up kits should be available at each area where hydrocarbons are being utilised. ▪ During induction and ongoing all employees must be trained in how to rehabilitate contaminated spill areas. ▪ MSDS sheets should be available where hydrocarbons or other chemicals are stored. There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities.	Prior and during construction	Spill Kits R120 000-

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented ▪ All employees will be made aware of all environmental issues during induction, and must continuously be updated of all new issues. Mitigation measures and operational procedures in case of any environmental emergency must be communicated.	Prior and during construction	Spill Kits R120 000-
Establishment of Borrow Pits	The establishment of infrastructure will limit reduce the catchment area.	▪ Clean and dirty water systems should be implemented prior to the commencement of construction activities. ▪ All activities must remain within the dedicated footprints of the infrastructure within the mining area.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Generation of Domestic and/or Hazardous Waste	The incorrect disposal of domestic and/or hazardous waste could contribute to the pollution of surface water resources.	▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented. ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ Should chemical toilets be utilised the sewage	Prior and during construction	Spill Kits R120 000-

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		must be removed by a licensed company. ▪ The mine must adopt the cradle to grave principle. ▪ All employees will be made aware of all environmental issues during induction, and must continuously be updated of all new issues. Mitigation measures and operational procedures in case of any environmental emergency must be communicated.		

3.1.6 Groundwater

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Infrastructure	Railway line	Groundwater level changes and change in water quality due to the surface infrastructure construction relating to the railway line	No mitigation measures can be implemented		
	Pipeline, Power line, Conveyors	Groundwater level changes and change in water quality due to the surface infrastructure construction relating to the railway line	No mitigation measures can be implemented		
	All other infrastructure	Negative impact on groundwater quality from boxcut, stockpiles and pollution control dams	▪ Stockpiles must be on designated areas that are lined, and measures must be implemented to decrease dust from stockpiles. ▪ The construction of stockpiles and pollution control dams must be within the mining rights area and be within designated areas. ▪ Around all infrastructure dirty water and clean water systems must be implemented to mitigate and reduce impact on groundwater aquifers. ▪ All pollution control dams must be lined to reduce the potential for leakage into underground aquifers. Investigations to	Prior and during construction	Included in construction costs

		determine the most viable lining options for pollution control dams must be investigated. It is recommended that dirty water drains and stockpiles be lined.		
	Negative impact on groundwater levels due to the dewatering of the mining pits as construction starts.	The ongoing monitoring and reporting programme must already be in place when construction starts. The ongoing reporting on groundwater levels must be undertaken throughout all stages of the project.	Prior and during construction	Included in construction costs Groundwater monitoring R100 000
	Groundwater level changes and change in water quality due to the surface infrastructure construction relating to the railway line	No mitigation measures can be implemented		
Establishment of Borrow Pits	Negative impact on groundwater levels due to the dewatering of areas where borrow pits are constructed.	The ongoing monitoring and reporting programme must already be in place when construction starts. The ongoing reporting on groundwater levels must be undertaken throughout all stages of the project.	Prior and during construction	Included in construction costs Groundwater monitoring R100 000
	Negative impact on groundwater quality from borrow pit construction.	The construction of borrow pits, stockpiles and pollution control dams must be within the mining rights area and be within designated areas. Around all infrastructure dirty water and clean water systems must be implemented to mitigate and reduce impact on groundwater aquifers.	Prior and during construction	Included in construction costs Groundwater monitoring R100 000

3.1.7 Wetlands

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Infrastructure	All infrastructure, including contractors lay down area	Clearing of wetland vegetation and destruction of wetland habitat.	▪ All wetlands must be clearly demarcated. ▪ All construction servitudes should be located outside the wetland areas, where possible. ▪ All activities must remain within the dedicated footprints of the infrastructure within the mining area. ▪ Where servitudes do intrude into the wetlands these areas will need to be ripped. The area must be re-vegetated by a suitable mix of plant species as determined by a qualified botanist. ▪ After construction, all areas devoid of vegetation must be ploughed and re-vegetated with a suitable mix of indigenous plant species as determined by a qualified botanist. ▪ Invasion by alien species should be monitored and managed. ▪ Where possible the railway line should cross all wetland and rivers perpendicular to the direction of flow. ▪ Where this is not practically possible, sufficient culverts should be placed along the crossing to ensure flows remain spread across	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		the width of the wetland.		
	Increased sediment movement off the site due to erosion on bare soil surfaces and increased sediment load in the valley bottom wetlands.	▪ Bare areas must be vegetated with a suitable mix of indigenous plant species as determined by a qualified botanist immediately where necessary. ▪ Erosion control measures must be implemented and maintained. ▪ Where possible storm water should be conveyed through grassed swales, rather than concrete channels to aid infiltration and reduce run off volumes. ▪ Should storm water be discharged into wetlands, gabions should be constructed to contain erosion (this should be done in consultation with an appropriate wetland and storm water specialist. ▪ The gabion structures should include measures to dissipate energy of flows and to disperse flows over a greater area.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Soil compaction in areas traversed by heavy machinery.	▪ Construction servitudes must be kept as narrow as possible. ▪ All activities must remain within the dedicated footprints of the infrastructure within the mining area. ▪ All infrastructure should be located outside the wetland boundaries as far as is practically possible. ▪ Where compaction is evident, ongoing ripping must be undertaken to break up the compacted soil surface. ▪ Should self succession of vegetation not take place, the area must be re-vegetated.	Prior and during construction	Included in construction costs
Establishment of Borrow Pits	The destruction of wetland due to the establishment of borrow pits.	▪ Borrow pits should as far as possible be located within the footprints of the opencast operations. ▪ Should other areas be required the borrow pits must remain outside the wetland boundaries as far as is practically possible.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Generation of Domestic and/or Hazardous Waste	The potential pollution of wetlands	▪ A comprehensive waste management plan must be available and enforced on site. ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ Should chemical toilets be utilised the sewage must be removed by a licensed company. ▪ The mine must adopt the cradle to grave principle.	Prior and during construction	Included in construction costs Including Spill Kits

3.1.8 Air Quality

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Infrastructure	Air borne dust as a result of site clearing and construction vehicles travelling on gravel roads.	▪ Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. ▪ Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site. ▪ Effective dust management practices should be employed. ▪ Gravel roads, topsoils and subsoils will be sprayed with a dust allaying agent immediately after being stockpiled. The spraying product utilised must allow for the establishment of natural vegetation. ▪ The stockpile heights will be calculated by the volume of soil to be removed. Any stockpile higher than 1.5m must be equipped with engineered erosion control measures (i.e. terraces). ▪ Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%.	Prior and during construction	Included in construction costs Dust Management R432 000 Dust Monitoring R166 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		▪ Rapid growth of vegetation on stockpiles must be promoted by means of watering and vegetation should self-succession not establish.		

3.1.9 *Sites of Historical and Cultural Importance*

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Railway line Infrastructure siding	The removal of a graveyard (GY02)	▪ If graveyards can be preserved ▪ If the grave yards can be preserved in situ, they must be demarcated with brick walls or with fences. ▪ The mine will remain responsible for their future unaffected existence and maintenance. ▪ Controlled access to these graved must exist for any relative or friends. ▪ If graveyards must be exhumed and relocated ▪ The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. ▪ Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police. ▪ The necessary permits and/or authorisations must be obtained from the SAHRA. ▪ A consultation process of 60 days must be adhered to for graves older than 60 years. ▪ A forensic archaeologist or reputed undertaker	When necessary	Included in construction costs if approved by TCSA

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		who is acquainted with the administrative procedures and relevant legislation must be involved whenever human remains are exhumed and relocated.		
Conveyor and Power line	The impact on coal remains from the past due to the construction of the conveyor line and power line (RP02).	▪ No management measures required. The site has been identified with no historical significance.		
All other infrastructure	The possible impact on historically significant sites.	▪ Should any graves or other sites with potential historical and/or cultural importance be identified, all activities in that vicinity must cease immediately.		
Establishment of Borrow Pits	The possible impact on historically significant sites.	▪ The mine environmental and safety and health office must be informed. ▪ The area must be cordoned off. ▪ An archaeologist should be informed immediately to investigate and inspect the site to determine the importance. Should a grave be found, the SAHRA should be informed as well.	Prior and during construction	Included in construction costs

3.1.10 Noise

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Railway line Infrastructure	Increase in the ambient noise levels due to the construction of the railway line.	▪ Equipment ▪ Equipment with lower sound power levels will be selected. ▪ Install suitable mufflers on engine exhausts and compressor components. ▪ Install vibration isolation for mechanical equipment; ▪ Install acoustic enclosures for equipment causing radiating noise. ▪ Equipment utilised must be in good working condition and be maintained continuously. ▪ The scheduling of equipment within the opencast pits must take into consideration the noise emissions from the equipment in order to spread tem out over the interface area. ▪ Noise barriers ▪ During the design operations make use of the natural topography of the area as a noise buffer where possible. ▪ Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding where necessary. ▪ All digging faces on the eastern and western	Prior and during construction; when necessary.	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		side of the mine must have alternate overburden dumps or other means of attenuating the noise, which can be activated should the noise levels approach unacceptable levels. ▪ Construction hours ▪ Limit the hours of operation for specific equipment and mobile sources with high sound power outputs. ▪ Communication ▪ Open channel of communication should be established by the mine with the surrounding landowners. ▪ Develop a mechanism to record and respond to all complaints.		
	Pipeline, Power line, Conveyors The establishment of the pipeline and power line is assumed to have a negligible significance.	Increase in the ambient noise levels due to the construction of the conveyors.		
	All other infrastructure	Increase in the ambient noise levels due to the construction of the siding and plant.		
Establishment of Borrow Pits		Increase in the ambient noise levels due to the construction of the borrow pits.		

3.1.11 Blasting

Activity	Potential Impact	Management Measures		
Construction of Railway line Infrastructure	Impact on surrounding properties as a result of the construction of the railway line.	Prior to the commissioning of any blasting activities, the blast team needs to assess the blasting schedules. The blasting schedules need to be in place to limit the impact of blasting activities on surrounding houses. Surrounding property owners will be informed of the blasting procedures and schedules. Scheduled blasting times will be planned in advance and will be clearly indicated in the mining area. Blasting boards, at the access routes to construction areas, will be updated 24 hours prior to the blast, displaying time and date of blast. Employees and outside contractors will be informed of the blasting procedures and the associated safety measures during induction. Prior to the blasting, all vehicles and machinery will be removed from the blast area and parked at a designated site, as determined by the responsible manager. All possible access roads will be blocked by personnel with red flags. The mine will implement a temporary testing model during the initial blasting phase. Should the results indicate it necessary (vibrations above or on	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures		
		impact level), permanent monitoring stations will be implemented in order to establish whether any potential impact could result due to the blasting activities. The areas of most influence as identified by the temporary seismic monitoring stations will be equipped with permanent seismic monitoring stations. Installation of electronic crack monitors will also be undertaken if it is requested by surrounding property owners. These monitors employ a single sensor that measures both weather-induced micrometer changes in crack width and those produced by habitation and ground motion-induced vibrations. The mine will establish an open channel of communication in order to ensure that all issues and concerns are known and are addressed.	Prior and during construction	Included in construction costs
Pipeline, Power line, Conveyors	Impact on surrounding properties as a result of the construction of the pipeline, power lines and conveyors.	See for construction of railway line.		
All other infrastructure	Impact on surrounding properties as a result of the construction of all other infrastructure	See for construction of railway line.		

Activity	Potential Impact	Management Measures
Establishment of Borrow Pits	Impact on surrounding properties as a result of establishment of borrow pits.	See for construction of railway line.

3.1.12 Visual

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Construction of Railway line Infrastructure	Visual impact from construction activities at the railway line.	▪ Very little mitigation is possible. ▪ Avoid construction with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds. ▪ The minimum amount of existing flora and topsoil will be removed from the construction sites. ▪ Ensure, wherever possible, that all existing natural flora is retained and incorporated into the site design. ▪ During construction and operation, haulage roads will be treated with Dust-a-side or a similar product to reduce water usage and dust creation. ▪ Ensure that lights are positioned in such a manner as to not create a nuisance to surrounding landowners and night life.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Pipeline, Power line, Conveyors	Visual impact from construction activities for the pipeline, power line and conveyors.	▪ Very little mitigation is possible. ▪ Avoid construction with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds. ▪ The minimum amount of existing flora and topsoil will be removed from the construction sites. ▪ Ensure, wherever possible, that all existing natural flora is retained and incorporated into the site design. ▪ During construction and operation, haulage roads will be treated with Dust-a-side or a similar product to reduce water usage and dust creation. ▪ Ensure that lights are positioned in such a manner as to not create a nuisance to surrounding landowners and night life.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
All other infrastructure	Visual impact from construction activities for all other infrastructure.	▪ Very little mitigation is possible. ▪ Avoid construction with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds. ▪ The minimum amount of existing flora and topsoil will be removed from the construction sites. ▪ Ensure, wherever possible, that all existing natural flora is retained and incorporated into the site design. ▪ During construction and operation, haulage roads will be treated with Dust-a-side or a similar product to reduce water usage and dust creation. ▪ Ensure that lights are positioned in such a manner as to not create a nuisance to surrounding landowners and night life.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Establishment of Borrow Pits	Visual impact from establishment of the borrow pits.	▪ Very little mitigation is possible. ▪ Avoid construction with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds. ▪ The minimum amount of existing flora and topsoil will be removed from the construction sites. ▪ Ensure, wherever possible, that all existing natural flora is retained and incorporated into the site design. ▪ During construction and operation, haulage roads will be treated with Dust-a-side or a similar product to reduce water usage and dust creation. ▪ Ensure that lights are positioned in such a manner as to not create a nuisance to surrounding landowners and night life.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Contractors Lay Down Area	Visual impact from contractors lay down area.	▪ Very little mitigation is possible. ▪ The contractor's lay-down area must be kept to the minimal size. The areas must be within designated mining areas or where mining activities will take place as to minimize the after effect of the lay down area when construction is complete. ▪ Avoid construction material with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds. ▪ The minimum amount of existing flora and topsoil will be removed from the construction sites. ▪ Ensure, wherever possible, that all existing natural flora is retained and incorporated into the site design. ▪ During construction and operation, haulage roads will be treated with Dust-a-side or a similar product to reduce water usage and dust creation. ▪ Ensure that lights are positioned in such a manner as to not create a nuisance to surrounding landowners and night life.	Prior and during construction	Included in construction costs

3.1.13 Socio-Economic

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Changes in Population Characteristics	Population change	Environmental impacts associated with an influx of people to area and the possible construction of a contractor's camp.	The use of local labour should be maximised to limit the negative impact associated with this variable. Pro-active measures should be put in place by the Emalahleni Local Municipality and DCM to minimise negative impacts associated with the influx of construction workers and potential job seekers to the area. Criminal incidents should be communicated to the workforce and mine employees to ensure a general awareness of the safety situation in the area. Maximise the usage of local service providers. Introduce contractual obligations for contractors to use local labour as far as possible. If possible, do not introduce construction camps, but accommodate any newcomers in the surrounding townships. Ensure safe and secure public transport access points. Ensure effective safety and security measures.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Inflow of temporary workers	Informal business trading due to presence of buying power at construction camp (positive); and spread of sexually transmitted diseases (negative).	Use of local labour and contractors where possible. As far as possible, the movement of construction workers should be confined to the work site to avoid any potential for impact from this variable in proximate residential areas. Specify the conduct of contract workers in worker related management plans and employment contracts. Develop a strategy to minimize the influx of outsiders to the area. Before construction commences, representatives from the local authority and community-based organisations, as well as neighbouring residents should be informed of the details of the construction company, size of the workforce and construction schedules. Construction workers should be easily identified as part of the construction team by e.g. wearing specific clothing and/or name tags. Ensure adequate housing facilities for possible workers from outside the area. This should be within accessible distance from the proposed project to avoid traffic related problems (increased risk of pedestrian crossing main roads, transport modes and so forth). Criminal incidents should be communicated to the	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		workforce and mine employees to ensure a general awareness of the safety situation in the area.		
Impact on community and institutional structures Attitude formation	Possible action group formation against expansion.	Construction activities should take sensitivities voiced by surrounding communities and landowners into account and mitigate these as far as possible. Construction schedule to be clearly communicated to the surrounding communities and landowners. No unrealistic employment expectations should be created. Local labour should be used where skills are available. Ongoing and transparent communication with community leaders, landowners and spokespersons.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Impact on local municipality	Increased pressure on infrastructure due to proposed expansion and other developments proposed in the area.	Detailed communication and planning with the Local Municipality in terms of the service and infrastructure needs. Quantify the use of local labour, the needs of contract workers and number of outside workers to be employed at any given time. Additional service and infrastructure needs to be assimilated with the local IDP and LED. Implement a traffic impact assessment. Ensure safe and secure public transport access points. Implement access control. Ensure effective safety and security measures. Monitor the condition of local roads used as transport linkages. Implement road maintenance and upgrade programmes in collaboration with the municipality.	Prior and during construction	Included in construction costs

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
	Impacts on infrastructure development and maintenance	Increased pressure on water related infrastructure.	The Expansion Project should link with the Integrated Development Plan (IDP) of the Emalahleni Local Municipality especially with regards to the planning processes to ensure adequate water supply. Ensure that a proper emergency plan that fits with the municipal Disaster Management Plan is in place. Such a plan should be developed by the Emalahleni Local Municipality together with DCM. DCM to pro-actively liaise with the Emalahleni Local Municipality regarding their additional infrastructural requirements. Additional electricity supply requirements should be fed into the Electricity Master Plan to determine whether the demands can be met.	Prior and during construction	Included in construction costs
Impacts on Occupational and Community Resources	Economic Contribution and Revenue creation	Economic opportunities for local and regional businesses e.g. supplying services and materials during the construction phase.	Local goods and services should be used as far as possible. Implement contractual requirement for contractors to use local goods and services as far as possible.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Impact on Job Opportunities	Increased purchasing power of those employed by the mine. Indirect benefits to businesses.	The use of local labour should be maximised. A skills development programme should be embarked upon before the mine is fully operation to ensure that locals are "employable". Contractors should capacitate locals where practical. The recruitment process and policy of the mine should be widely communicated to also limit the influx of potential job seekers. Local SMME should be allowed the opportunity to become involved in e.g. maintenance, security services, garden services, cleaning and catering services, transport services and as input suppliers. During the construction process an equitable process should be achieved whereby minorities and previously disadvantaged individuals (women) are taken into account.	Prior and during construction	Included in construction costs
	Impact on Property values	Indirect negative economic impacts on landowners affected by blasting. Possible housing shortage.	Crack surveys should be undertaken prior to and after blasting activities have taken place to determine possible damage and to eliminate misconceived perceptions regarding the impact of blasting. Take care to implement the aspects indicated in the EMP, with a specific focus on water (surface and underground) and dust management).	Prior and during construction	Included in construction costs

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
	Local Procurement	Local Economic Development and Capacity Building.	Provide support and encouragement to small businesses in the area. Continue to provide technical advise to small businesses in the area Actively pursue local SMME links. Provide opportunities for local businesses to become involve at the start of the procurement process and by allowing them to form part of the tender process.	Prior and during construction	Included in construction costs
	Capacity Building and Skills Training	Implement a skills audit and develop a skills database. Ensure that contractors use local skills, or train semiskilled people or re-skill appropriate candidates for employment purposes.	N/A		

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Individual, Community And Family Level Impacts	Impacts on daily living and movement patterns	Increase in traffic (construction and residential) and associated impacts on local and regional roads; intrusion impacts during construction phase.	Access roads and entrances to the mining area should be carefully planned to limit any intrusion impacts, noise and dust pollution, as well as to limit any risks of accidents. Construction vehicles should adhere to the speed levels. Construction vehicles and those transporting materials and goods should be inspected to ensure that these are in good working order and not overloaded. Source material and goods locally as far as possible to limit transportation of these. Implement agreements to ensure that contractors, subcontractors and suppliers adhere to regulations that manage construction related vehicle use to ensure minimum impact. Avoid busy routes, residential areas and roads past schools, churches, hospitals, etc. Adhere to road safety regulations, including strict adherence to speed limits. Construction traffic should be diverted away from the residential areas. Proactively inform municipality and local resident of roads closures and diversions. Consultation and cooperation with local law enforcement agencies to ensure legal and regulatory compliance. Proactively inform municipality and local resident of roads closures and diversions.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Impact on Social Networks	Long-term impact on social network.	Contractor lay down areas should be properly managed - The EMP guidelines should be strictly adhered to. Use local labour and contractors where possible. As far as possible, the movement of construction workers should be confined to the work site to avoid any potential for impact from this variable in proximate residential areas. Specify the conduct of contract workers in worker related management plans and employment contracts. Consult with local structures and NGOs on employment matters. Do not house construction workers on site. Ensure sufficient safety and security measures	Prior and during construction	Included in construction costs
Health Impacts	Impact on family members that should care for ill or disabled mine workers.	First aid supplies should be available at the construction camp. Continue and extend the current HIV/AIDS awareness and support programmes, with specific focus on those in and nearby the construction camp. Ensure effective monitoring of water (surface and underground) and air quality and ensure regulatory compliance.	Prior and during construction	Included in construction costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Safety Impacts	Increase in crime due to opportunists taking advantage of situation where construction workers from outside the area are present in area.	Ongoing movement of unknown people through the residential areas or privately owned farms should be avoided. Discuss the safety and security issues, as well as construction schedule with the local community policing forum and local SAPS. The construction area should be fenced or access to the area should be controlled to avoid animals or people entering the area without authorisation. The construction sites should be clearly marked and "danger" and "no entry" signs should be erected. Speed limits on the local roads surrounding the construction sites should be enforced. The blasting "buffer zone" of 500m should be strictly adhered to. A "crack survey" should be undertaken prior to, during and after construction. Findings of the "crack survey" should be clearly communicated to the affected parties.	Prior and during construction	Included in construction costs

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
	Impacts on daily living and movement patterns with regards to construction of railway line	Increase in traffic (construction and residential) and associated impacts on local and regional roads; intrusion impacts during construction phase.	Access roads to and from the construction sites should be kept to a minimum. Access roads and entrances to the site should be carefully planned to limit any intrusion impacts, noise and dust pollution, as well as to limit any risks of accidents. Construction vehicles should adhere to the speed limits. Construction vehicles and those transporting materials and goods should be inspected to ensure that these are in good working order and not overloaded. Source material and goods locally as far as possible to limit transportation of these.	Prior and during construction	Included in construction costs

3.2 Operational Phase

3.2.1 Geology

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining of Coal	Opencast	Removal of the geological coal and associated resources	▪ Make optimal utilisation of the coal resources which forms part of the mining rights area. ▪ The mining operations must remain within the limits of the designated mining rights area. ▪ Coal resources may not only be exported but must also be supplied to ESKOM power stations to fulfill their requirements.	During operational	Included in operational costs
	Underground	Removal of the geological coal and associated resources			

3.2.2 *Topography*

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining of Coal	Opencast	The stockpiling and removal of material as result of cut and fill methods will impact on the micro and macro topography due to the construction of opencast operations.	▪ The slopes of the opencast pits should not exceed 18° to ensure that it could be made safe during the decommissioning phases. ▪ Progressive rehabilitation must take place as soon as possible after each opencast block has been mined.	During operational	Included in operational costs
	Underground	Potential subsidence due to presence of underground mining operations.	▪ Ongoing monitoring must be undertaken of the surface area to determine whether any subsidence is taking place. ▪ The underground mining operations must be undertaken by means of stabilizing infrastructure (pillars) to reduce the potential of subsidence. ▪ Should subsidence be detected it must be made safe and rehabilitated as soon as possible.	During operational	Included in operational costs
Plant and Related Activities	RoM Stockpiles	The stockpiling of material will impact on the micro and macro topography due to the establishment of the RoM Stockpiles.	▪ Stockpiles should be shaped to resemble the original landform as far as practically possible. ▪ Ongoing rehabilitation must be undertaken to limit the potential of erosion.	During operational	Included in operational costs

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Co-disposal Facility	The stockpiling, dumping and pumping of material as result of operational activities will impact on the micro and macro topography due to the construction of the co-disposal facility.	▪ The co-disposal facility must be designed with the mind on closure. ▪ The co-disposal facility should be shaped to blend in with the surrounding topography as far as possible. ▪ Ongoing rehabilitation must be undertaken to limit the potential of erosion. ▪ Topsoils must be place over the co-disposal facility and fertilizer and plants must be re established should self succession not take place.	During operational	Included in operational costs
Coal Product Supply Coal Product Stockpiles	The stockpiling will impact on the micro and macro topography due to the coal product stockpiles.	▪ Stockpiles should be shaped to resemble the original landform as far as practically possible. ▪ Ongoing rehabilitation must be undertaken to limit the potential of erosion.	During operational	Included in operational costs

3.2.3 Soils Land Use and Land Capability

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Mining of Opencast Coal	Erosion with regards to opencast mining	▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. ▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented. See management and monitoring	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		programs in EMP for fertilizer usage as recommended by specialist. ▪ Fairly standard fertilizer treatments will be needed for optimum agricultural production of crops on areas that have previously been planted, and/or stockpiled for any length of time.		
	Soil physical and chemical degradation as result of opencast mining.	▪ The nutrient status (as returned from the limited sampling undertaken) indicates a need for fertilizer applications of calcium (Ca), phosphorous (P), and zinc (Zn). It should be noted that additions of potassium (K), phosphorous (P) and zinc (Zn) in the form of commercial fertilizers are potential pollutants to the riverine and ground water environment if added in excess. See soil utilisation guide (section 7.2.3.1) ▪ The mine will ensure that equipment movement over the undesignated mining areas and topsoil stockpiles will be limited to avoid soil compaction and subsequent damage to soil structure or the seed bank. ▪ Should vegetation be required, fertilizer will be applied to the topsoil stockpiles prior to vegetation. ▪ Vegetation establishment in disturbed areas will	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		be undertaken as soon as practically possible, with the growing season and water availability being the primary constraints. See management and monitoring programs in EMP for fertilizer usage as recommended by specialist. ▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented. ▪ Best waste management practices should be emphasized during the induction phase and on	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ Should chemical toilets be utilised the sewage must be removed by a licensed company. ▪ The mine must adopt the cradle to grave principle.		
	Soil compaction due to different types of soils, and their wetness factor, during mining operations.	▪ Compaction is a problem to contend with if these soils are to be worked during the wet months of the year. ▪ Stockpiling of these soils should be done separately from the dry soils, and greater care is needed with the management of erosion problems during storage. ▪ Any strong structure that develops during the stockpiling stage will need to be dealt with prior to the use of this material for rehabilitation.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Underground	Erosion with regards to underground mining and the construction and upkeep of all highwalls, stockpiles, berms and adits.	▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. ▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented. See management and monitoring programs in EMP for fertilizer usage as recommended by specialist. ▪ Fairly standard fertilizer treatments will be needed for optimum agricultural production of crops on areas that have previously been planted, and/or stockpiled for any length of	During operational phase	Included in operational costs.

Activity		Potential Impact	Management Measures	Frequency	Annual management Cost
Mining Related Infrastructure	Conveyors	Erosion with regards to operation of conveyors	▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. ▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Oil and Diesel Storage	Soil physical and chemical degradation as result of oil and diesel storage.	▪ No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area. ▪ All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 120% of the volume stored within. ▪ A spill contingency plan should be available and enforced. ▪ Spill clean up kits should be available at each area where hydrocarbons are being utilised. ▪ During induction and ongoing all employees must be trained in how to rehabilitate contaminated spill areas. ▪ MSDS sheets should be available where hydrocarbons or other chemicals are stored. ▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		▪ A detailed waste management strategy will be established and implemented ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Generation of Mine Waste	Soil physical and chemical degradation as result of mine waste	▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented. ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Generation of Domestic and Hazardous Waste	Soil physical and chemical degradation as result of domestic and hazardous waste	▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ Should chemical toilets be utilised the sewage must be removed by a licensed company.	During operational phase	Included in operational costs. Spill Kits R120 000 Chemical toilets R96 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		▪ The mine must adopt the cradle to grave principle.		
Sewage	Soil physical and chemical degradation as result of sewage	▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented. ▪ Best waste management practices should be	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ Should chemical toilets be utilised the sewage must be removed by a licensed company. ▪ The mine must adopt the cradle to grave principle.		

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Water Storage Facilities	Soil physical and chemical degradation at water storage facilities and spillages during operations	▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented. ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Plant and RoM Stockpiles Related Activities	Soil physical and chemical degradation as result of RoM stockpiles and spillages during operations	▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented. ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Workshops and other Buildings	Erosion with regards to workshops and buildings.	▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Diesel and Chemical Storage	Soil physical and chemical degradation as result of diesel and chemical storage.	▪ There will be an incident management system including procedures and training for dealing with incidents. ▪ Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. ▪ If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. ▪ A detailed waste management strategy will be established and implemented. ▪ Best waste management practices should be emphasized during the induction phase and on ongoing basis. ▪ Waste should be removed by licensed waste disposal companies. ▪ The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Salvage Yard	Erosion with regards to the selvage yard.	▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. ▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Water Management Facilities	Erosion from slopes around water management facilities and pipelines due to heavy rain, extreme weather events or return water dam and pollution control dam leaks..	▪ Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. ▪ Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. ▪ Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. ▪ The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. ▪ Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. ▪ Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.		

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Co disposal Facility	Erosion with regards to the co-disposal facility.	Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented. See management and monitoring programs in EMP for fertilizer usage as recommended by specialist.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		Fairly standard fertilizer treatments will be needed for optimum agricultural production of crops on areas that have previously been planted, and/or stockpiled for any length of time. The nutrient status (as returned from the limited sampling undertaken) indicates a need for fertilizer applications of calcium (Ca), phosphorous (P), and zinc (Zn). It should be noted that additions of potassium (K), phosphorous (P) and zinc (Zn) in the form of commercial fertilizers are potential pollutants to the riverine and ground water environment if added in excess. See soil utilisation guide (section 7.2.3.1)d.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
	Soil physical and chemical degradation as result of the co-disposal facility and possible spillages that might occur during operations.	There will be an incident management system including procedures and training for dealing with incidents. Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. A detailed waste management strategy will be established and implemented. Best waste management practices should be emphasized during the induction phase and on ongoing basis. Waste should be removed by licensed waste disposal companies. The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs. Spill Kits R120 000

Activity		Potential Impact	Management Measures	Frequency	Annual management Cost
Coal Product Supply	Coal Product Stockpiles	Erosion with regards to operation phase of coal product stockpiles	Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented.		

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
	Soil physical and chemical degradation as result of coal product stockpiles and spillages of coal.	There will be an incident management system including procedures and training for dealing with incidents. Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. A detailed waste management strategy will be established and implemented. Best waste management practices should be emphasized during the induction phase and on ongoing basis. Waste should be removed by licensed waste disposal companies. The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs. Spill Kits R120,000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Rapid Load Out Facility	Erosion with regards to the rapid load out facility.	Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented. See management and monitoring programs in EMP for fertilizer usage as recommended by specialist.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		Fairly standard fertilizer treatments will be needed for optimum agricultural production of crops on areas that have previously been planted, and/or stockpiled for any length of time. The nutrient status (as returned from the limited sampling undertaken) indicates a need for fertilizer applications of calcium (Ca), phosphorous (P), and zinc (Zn). It should be noted that additions of potassium (K), phosphorous (P) and zinc (Zn) in the form of commercial fertilizers are potential pollutants to the riverine and ground water environment if added in excess. See soil utilisation guide (section 7.2.3.1)d.	During operational phase	Included in operational costs. Spill Kits R120,000
	Soil physical and chemical degradation as result of spillages at rapid load out facility.	There will be an incident management system including procedures and training for dealing with incidents. Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. If spills do occur and soils become contaminated,	During operational phase	Included in operational costs. Spill Kits R120,000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. A detailed waste management strategy will be established and implemented. Best waste management practices should be emphasized during the induction phase and on ongoing basis. Waste should be removed by licensed waste disposal companies. Should chemical toilets be utilised the sewage must be removed by a licensed company. The mine must adopt the cradle to grave principle.		

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Railway Line	Erosion with regards to operation of the railway line.	Vegetation establishment in disturbed areas will be undertaken as soon as practically possible. Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. Erosion control measures are required on all slopes exceeding 2% and engineering erosion control measures are required on all slopes exceeding 15%. The mine will ensure that all erosion controls are included in the designs of all linear infrastructure (railway lines, power lines, conveyors, pipelines etc.) and points of water discharge. Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness. Soil replacement and the preparation of a seedbed to facilitate the revegetation program to limit potential erodibility should be implemented. See management and monitoring programs in EMP for fertilizer usage as recommended by specialist.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
		Fairly standard fertilizer treatments will be needed for optimum agricultural production of crops on areas that have previously been planted, and/or stockpiled for any length of time. The nutrient status (as returned from the limited sampling undertaken) indicates a need for fertilizer applications of calcium (Ca), phosphorous (P), and zinc (Zn). It should be noted that additions of potassium (K), phosphorous (P) and zinc (Zn) in the form of commercial fertilizers are potential pollutants to the riverine and ground water environment if added in excess. See soil utilisation guide (section 7.2.3.1)d.	During operational phase	Included in operational costs. Spill Kits R120,000

3.2.4 *Ecology*

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining of Opencast Coal	Removal of all vegetation. The impact on the vegetation will be due to the increase size in the opencast area. Nearly al the vegetation to be impacted are grasses that are growing on disturbed sites or invader weeds	Impact on the vegetation could be mitigated if a roll over method is used during opencast mining. Revegetate backfilled areas as soon as possible after mining with the main grass species	During operational phase	Included in operational costs.
	Destruction of natural habitat for fauna. The loss of vegetation will have an effect on the animal live.	It is likely that the animals will move to the surrounding areas when mining activities start. The animals will move back once mining activities have ceased and rehabilitation has taken place.	During operational phase	Included in operational costs.
	Increase in alien invasive species. Due to the disturbance of the mining activities, the potential for the spreading of invasive alien plant species increase.	A plan to eradicate al invasive alien species must be established on site	During operational phase	Included in operational costs.
	Erosion of Topsoil. Due to the removal of topsoil and sub-soils and the ongoing stockpiling thereof during the operational phase, the potential of soil erosion increase.	Dust must be suppressed by using a dust suppression method. Revegetation of area if exposed for longer than 18 months	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Windblown dust from the conveyor transportation, stockpiles, co-disposal facility and from the opencast pit could prohibit the photosynthesis process in plants. This could cause reduced growth rates and plant vigour.	Dust must be suppressed by using a dust suppression method. Dumps should be revegetated to decrease the amount of dust. A dust management plan that includes some of the following mitigation measures must be implemented on the mine: Water sprays must be used in the loading of stockpiles (50% reduction). Variable height in stackers should also be implemented (25% reduction. Telescoping chute with water sprays could reduce the emission by 75%. Should emissions continue to exceed the guidelines the enclosure to the loading stockpiles should be investigated. Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. Erosion control measures should be employed and maintained at all dumps and stockpiles. Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site.	During operational phase	Included in operational costs.

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining Related Infrastructure	Conveyors	Windblown dust from the conveyor transportation, stockpiles, co-disposal facility and from the opencast pit could prohibit the photosynthesis process in plants. This could cause reduced growth rates and plant vigour.	Dust must be suppressed by using a dust suppression method. Dumps should be revegetated to decrease the amount of dust.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Oil and Diesels Storage	Avoid unnecessary impacts on the flora and fauna.	No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area. All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 120% of the volume stored within. A spill contingency plan should be available and enforced. Spill clean up kits should be available at each area where hydrocarbons are being utilised. During induction and ongoing all employees must be trained in how to rehabilitate contaminated spill areas. MSDS sheets should be available where hydrocarbons or other chemicals are stored.Contain the impacts to the smallest areas and remove all foreign materials from the area. No littering. No spills. There will be an incident management system including procedures and training for dealing with incidents. Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities.	During operational phase	Included in operational costs. Spill controls

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Generation of Mine Waste	Windblown dust from the conveyor transportation, stockpiles, co-disposal facility and from the opencast pit could prohibit the photosynthesis process in plants. This could cause reduced growth rates and plant vigour.	Dust must be suppressed by using a dust suppression method. Dumps should be revegetated to decrease the amount of dust.	During operational phase	Included in operational costs.
	Avoid unnecessary impacts on the flora and fauna resulting from the generation of mine waste.	Contain the impacts to the smallest areas and remove all foreign materials from the area. Avoid all spills or incidents with mine waste. There will be an incident management system including procedures and training for dealing with incidents.	During operational phase	Included in operational costs.
Generation of Domestic and Hazardous Waste	Avoid unnecessary destruction of fauna and flora from resulting impacts of improper domestic and hazardous waste handling procedures.	Contain the impacts to the smallest areas and remove all foreign materials from the area. Avoid littering around site, remove all waste from site through proper waste management procedures. Avoid all spills or incidents regarding domestic and hazardous waste. There will be an incident management system including procedures and training for dealing with incidents.	During operational phase	Included in operational costs.

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
	Sewage	Avoid unnecessary impacts on the flora and fauna.	Contain the impacts to the smallest areas and remove all foreign materials from the area. No littering. No spills. There will be an incident management system including procedures and training for dealing with incidents.	During operational phase	Included in operational costs. Chemical Toilets R96 000
Plant and Related Activities	RoM Stockpiles	Windblown dust from the conveyor transportation, stockpiles, co-disposal facility and from the opencast pit could prohibit the photosynthesis process in plants. This could cause reduced growth rates and plant vigour.	Dust must be suppressed by using a dust suppression method. Dumps should be revegetated to decrease the amount of dust. A dust management plan that includes some of the following mitigation measures must be implemented on the mine: Water sprays must be used in the loading of stockpiles (50% reduction). Variable height in stackers should also be implemented (25% reduction. Telescoping chute with water sprays could reduce the emission by 75%. Should emissions continue to exceed the guidelines the enclosure to the loading stockpiles should be investigated. Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. Erosion control measures should be employed and	During operational phase	Included in operational costs. Dust suppression R432 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		maintained at all dumps and stockpiles. Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site.		
	Increase in alien invasive species. Due to the disturbance of the mining activities, the potential for the spreading of invasive alien plant species increase.	A plan to eradicate al invasive alien species must be established on site.	During operational phase	Included in operational costs. R180 000
Workshops and other Buildings	Increase in alien invasive species. Due to the disturbance of the mining activities, and all infrastructure, the potential for the spreading of invasive alien plant species increase.	A plan to eradicate al invasive alien species must be established on site.	During operational phase	Included in operational costs. R180 000
Diesel and Chemical Storage	Avoid unnecessary destruction of fauna and flora from resulting impacts of improper diesel and chemical storage procedures.	Contain the impacts to the smallest areas and remove all foreign materials from the area. No littering. No spills. There will be an incident management system including procedures and training for dealing with incidents. Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities.	During operational phase	Included in operational costs. Spill Kits R120 000

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
	Salvage Yard	Avoid unnecessary destruction of fauna and flora from resulting impacts of improper upkeep of salvage yard..	Contain the impacts to the smallest areas and remove all foreign materials from the area. No littering. No spills. There will be an incident management system including procedures and training for dealing with incidents.	During operational phase	Included in operational costs.
	Water Management Facilities and pipeline	Avoid unnecessary destruction of fauna and flora from resulting impacts of improper water management facility and pipeline management procedures.	Contain the impacts to the smallest areas and remove all foreign materials from the area. No littering. No spills. There will be an incident management system including procedures and training for dealing with incidents.	During operational phase	Included in operational costs.
Co-disposal Facility		Increase in alien invasive species. Due to the disturbance of the mining activities, and all other infrastructure, the potential for the spreading of invasive alien plant species increase.	A plan to eradicate al invasive alien species must be established on site	During operational phase	Included in operational costs. R180 000

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Coal Product Supply	Coal Product Stockpiles	Windblown dust from the conveyor transportation, stockpiles, co-disposal facility and from the opencast pit could prohibit the photosynthesis process in plants. This could cause reduced growth rates and plant vigour.	Dust must be suppressed by using a dust suppression method. Dumps should be revegetated to decrease the amount of dust. A dust management plan that includes some of the following mitigation measures must be implemented on the mine: Water sprays must be used in the loading of stockpiles (50% reduction). Variable height in stackers should also be implemented (25% reduction. Telescoping chute with water sprays could reduce the emission by 75%. Should emissions continue to exceed the guidelines the enclosure to the loading stockpiles should be investigated. Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. Erosion control measures should be employed and maintained at all dumps and stockpiles. Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site.	During operational phase	Included in operational costs. Dust suppression R432 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Railway Line	Increase in alien invasive species. Due to the disturbance of the mining activities, and all infrastructure, including the railway line, the potential for the spreading of invasive alien plant species increase.	A plan to eradicate al invasive alien species must be established on site	Ongoing	Included in operational costs R180 000

3.2.5 *Surface Water*

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining of Coal	Opencast	Pollution of surface water resources.	Runoff that is captured in the opencast pits should be contained in the lined pollution control dams. Water could be utilised for dust suppression should the quality be acceptable.	During operational phase	Included in operational costs.
		Potential for an increase in erosion could lead to the siltation of watercourses.	Clean and dirty water systems must be maintained to ensure that it remains effective. Ongoing rehabilitation and the maintenance of erosion control measures must be undertaken to reduce the possibility of erosion.	During operational phase	Included in operational costs.
		Increase dust could lead to lead to the contamination of watercourses	Roads, topsoils and subsoils will be sprayed with a dust allaying agent. Ongoing rehabilitation and the maintenance of erosion control measures must be undertaken to reduce the possibility of erosion.	During operational phase	Included in operational costs R432 000.
		PIT 2 of the opencast mining area will impact on a non-perennial stream that is flowing through the current area where the planned activities will take place.	Clean and dirty water systems must be maintained to ensure that it remains effective. The clean and dirty water systems must be kept in good conditions to ensure that the river diversion and the artificial route that will be layed out for the river, will be efficient, and that there will be no further negative effects on the diverted river.	During operational phase	Included in operational costs.

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining Related Infrastructure	Conveyors	Spillages of coal could impact lead to the pollution of the surrounding watercourses.	Dirty water catchments must be as small as possible. Where conveyors cross wetland and drainage line the conveyors should be either enclosed or measures should be ii place to ensure that no spillages could come into contact with watercourses. Ongoing water monitoring must be undertake to ensure that no water contamination is taking place. Should water contamination be detected measures should be in place to rehabilitate the situation.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Oil and Diesel Storage	Spillages and the incorrect storage of diesels and chemicals could lead to the contamination of water courses	No activities associated with hydrocarbons and or chemicals (i.e. washbays etc.) may be undertaken outside of an effectively designed contained area. All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 120% of the volume stored within. A spill contingency plan should be available and enforced. Spill clean up kits should be available at each area where hydrocarbons are being utilised. During induction and ongoing all employees must be trained in how to rehabilitate contaminated spill areas. MSDS sheets should be available where hydrocarbons or other chemicals are stored.There will be an incident management system including procedures and training for dealing with incidents. Major spillage incidents will be reported to the DME, DWAF, MDAL and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		appropriate permitted waste site. After the removal of the contaminated soils, the affected areas will be landscaped and rehabilitated. A detailed waste management strategy will be established and implemented		

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Generation of Domestic and Hazardous Waste	The incorrect disposal of domestic and hazardous waste could lead to the contamination of watercourses.	A comprehensive waste management plan must be available and enforced on site. Best waste management practices should be emphasized during the induction phase and on ongoing bases.	During operational phase	Included in operational costs.
Sewage	Spillages could lead to the contamination of water courses	Waste should be removed by licensed waste disposal companies. Should chemical toilets be utilised the sewage must be removed by a licensed company. The mine must adopt the cradle to grave principle.		
Water Storage Facilities	Dirty water stored on site could contribute to the contamination of watercourses should these overflow or be unlined.	All dirty water storage areas must be designed for a 1:50 year storm event, with additional capacity for emergency preparedness. Secondary containment (i.e. bunded areas) must be available for emergency preparedness measures. Operation of dams and associated infrastructure must be carried out under the supervision of a Professional Civil Engineer registered under the Engineering profession of South Africa.	During operational phase	Included in operational costs.
	Due to the containment of dirty water, the water runoff will be reduced.	Dirty water catchments must be kept as small as possible. Polluted water at the bottom of the stockpiles must be captured and pumped to the pollution control dams. Effective clean and dirty water systems must be maintained.	During operational phase	Included in operational costs. Surface water monitoring R50 000

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
			Ongoing rehabilitation must be undertaken to reduce the potential of erosion. Ongoing water monitoring must be undertaken to determine the impact of the mining infrastructure on the surrounding watercourses. Should it be found that pollution is taking place the mine must implement measures to rehabilitate the situation.		
Plant and Related Activities	RoM Stockpiles	The fine material from the coal stockpiles can be transported to watercourses and lead to the contamination thereof.			
	Salvage Yard	Spillages and the incorrect storage of machinery and old equipment could lead to the contamination of water courses	A clear material separation guide should be available at the storage area. Records of the inflows and outflows should be available at all times. All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 120% of the volume stored within. A spill contingency plan should be available and enforced. Spill clean up kits should be available at each area where hydrocarbons are being utilised.	During operational phase	Included in operational costs. Spill Kits R120 000

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Co disposal Facility		The fine material from the coal stockpiles can be transported to watercourses and lead to the contamination thereof.	Ongoing rehabilitation must be undertaken to ensure that no erosion of the side slopes take place. Polluted water at the bottom of the dumps must be captured and pumped to the pollution control dams.	During operational phase	Included in operational costs.
Coal Product Supply	Coal Product Stockpiles	The fine material from the coal stockpiles can be transported to watercourses and lead to the contamination thereof.	Dirty water catchments must be kept as small as possible. Polluted water at the bottom of the stockpiles must be captured and pumped to the pollution control dams. Effective clean and dirty water systems must be maintained. Ongoing rehabilitation must be undertaken to reduce the potential of erosion. Ongoing water monitoring must be undertaken to determine the impact of the mining infrastructure on the surrounding watercourses. Should it be found that pollution is taking place the mine must implement measures to rehabilitate the situation.	During operational phase	Included in operational costs.
	Rapid Load Out Facility	Spillages of coal could impact lead to the pollution of the surrounding watercourses.	Dirty water catchments must be as small as possible. Effective clean and dirty water systems must be maintained. Ongoing rehabilitation must be undertaken to reduce the potential of erosion.	During operational phase	Included in operational costs. Surface water monthly Groundwater,

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		Ongoing water monitoring must be undertaken to determine the impact of the mining infrastructure on the surrounding watercourses. Should it be found that pollution is taking place the mine must implement measures to rehabilitate the situation.		quarterly
Railway Line	Spillages of coal could impact lead to the pollution of the surrounding watercourses.	Dirty water catchments must be as small as possible. Where the railway line cross wetland and drainage line the conveyors should be either enclosed or measures should be in lace to ensure that no spillages could come into contact with watercourses. Ongoing water monitoring must be undertake to ensure that no water contamination is taking place. Should water contamination be detected measures should be in place to rehabilitate the situation.	During operational phase	Included in operational costs.

3.2.6 *Groundwater*

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining of Coal	Opencast and Underground Mining	Dewatering of the aquifers due to the mine dewatering.	The ongoing monitoring and reporting programme must be followed. The ongoing reporting on groundwater levels must be undertaken throughout all stages of the project. If water quality or quantity is impacted on by the mine, water must be supplied to water users, if the groundwater study proofs that the mine is impacting on the groundwater. Water must be of similar quality used prior to the mining activities. Clean and dirty water systems must be maintained to ensure that it remains effective. The clean and dirty water systems must be kept in good conditions to ensure that aquifers will not be polluted by dirty water, and that there will be no further negative effects on the groundwater aquifers.	During operational phase	Included in operational costs. Groundwater monitoring R100 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Contamination of surrounding groundwater from mined-out areas.	The ongoing monitoring and reporting programme must be followed. The ongoing reporting on groundwater levels must be undertaken throughout all stages of the project. If water quality or quantity is impacted on by the mine, water must be supplied to water users, if the groundwater study proofs that the mine is impacting on the groundwater. Water must be of similar quality used prior to the mining activities. Clean and dirty water systems must be maintained to ensure that it remains effective. The clean and dirty water systems must be kept in good conditions to ensure that aquifers will not be polluted by dirty water, and that there will be no further negative effects on the groundwater aquifers.	During operational phase	Included in operational costs. Groundwater monitoring R100 000
	Decrease in the TNC underground workings groundwater level recovery rate.	Ensure that the amount of water that is extracted must always be smaller than the recharge figures back into the TNC mine. Should the extraction of groundwater be more than this figure discussions must be entered into with DWAF and surrounding groundwater users. If water quality or quantity is impacted on by the mine, water must be supplied to water users, if the groundwater study proofs that the mine is impacting on the groundwater. Water must be of	During operational phase	Included in operational costs. Groundwater monitoring R100 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		similar quality used prior to the mining activities.		
Co disposal Facility	Contamination of surrounding groundwater from the co-disposal facility.	Management measures must be put in place to reduce seepage through the base of the co-disposal facility, also under the coal-product stockpile and the RoM stockpiles. The ongoing monitoring and reporting programme must be followed. The ongoing reporting on groundwater levels must be undertaken throughout all stages of the project. If water quality or quantity is impacted on by the mine, water must be supplied to water users, if the groundwater study proofs that the mine is impacting on the groundwater. Water must be of similar quality used prior to the mining activities. Clean and dirty water systems must be maintained to ensure that it remains effective. The clean and dirty water systems must be kept in good conditions to ensure that aquifers will not be polluted by dirty water, and that there will be no further negative effects on the groundwater aquifers.	During operational phase	Included in operational costs. Groundwater monitoring R100 000

3.2.7 *Wetlands*

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining of Opencast Coal	Loss of wetland vegetation and destruction of wetland habitat	Opencast operations should remain within the authorised boundaries of the mining operations. All activities must remain within the dedicated footprints of the infrastructure within the mining area. All infrastructure associated with the opencast pits should be located outside the wetland boundaries as far as is practically possible.	During operational phase	Included in operational costs.
	Increased sediment movement off the site due to erosion on bare soil surfaces and increased sediment load in the valley bottoms.	A low berm, approximately 1m high by 2-3m wide must be established prior to the commencement of opencast operations, between the opencast workings and the valley bottom wetlands, and where possible outside the wetland boundary, to intercept flows containing suspended soils and create a depositional environment.		

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Soil compaction in areas traversed by heavy machinery	All activities must remain within the dedicated footprints of the infrastructure within the mining area. All infrastructure associated with the opencast pits should be located outside the wetland boundaries as far as is practically possible. Where compaction is evident, ongoing ripping must be undertaken to break up the compacted soil surface. Should self succession of vegetation not take place, the area must be re-vegetated.	During operational phase	Included in operational costs.