

Ferreira Coal Mine Project

Revised Environmental Management Report

Version - 6

October 2011

Client Name: Mashala Resources (Pty) Ltd

Project Number: 00078/000/00/08-111

DMR Reference Number: MP30/5/1/2/2/345EM



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Environmental Impact Assessment Report Version - 6

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EXECUTIVE SUMMARY

Mashala Resources (Pty) Ltd (“Mashala”) has applied for a mining right in respect of coal reserves on Portion 19 of the farm Witbank 262 IT which is approximately 264ha in size, situated approximately four (4) kilometers, south east of Ermelo adjacent to the N2 national road. It is the intention of Mashala to develop an opencast coal mine on the above mentioned property. The project falls within the Msukaligwa Local Municipality which covers 830 957ha within the Gert Sibande District Municipality.

The proposed mining method to be used is conventional opencast mining, making use of the roll-over method. Rehabilitation will take place on an ongoing basis.

The amendment of this document (Ferreira Mine EIA) is in accordance with Section 102 of the Mineral and Petroleum Resource Development Act (Act No. 28 of 2002) (MPRDA) for the application for the extension of the North eastern boundary of the existing mining right. The proposed extension of the existing mining boundary (through this Section 102 application process) involves the inclusion of Remaining extent 0 of Farm 538 IT (formerly known as portions 25 of Witbank 262 IT) and portion 27 of Witbank 262IT.

Project Description

A Mining Right Application (MRA) was submitted to the Department of Mineral Resources (DMR) on 25 August 2008. Acceptance of this application was received on 10 October 2008. Following the acceptance by DMR a Scoping Report and an Environmental Management Programme (EMP) is required to be compiled and submitted. The Scoping Report was submitted to the relevant authorities on 30 October 2008 and made available to the public on 31 October 2008 for a review period of 30 days. The EMP was submitted to the relevant Authorities and the public on 24 December 2008. The EMP has been compiled in terms of Section 39(1) and Regulation 51 of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). An Environmental Impact Assessment (EIA), undertaken in terms of Regulation 50 of the Act, is a necessary pre-requisite for the EMP. The EMP must be submitted to the Regional Director of Mineral Development at the DMR for approval. It is a requirement that the approved EMP is implemented throughout the life of the mine until closure is granted. The DMR will be the lead authority with regard to the above-mentioned applications.

The proposed mining method to be used is conventional opencast mining, making use of the roll-over method. Rehabilitation will take place on an ongoing basis.

The open pit areas cover a vast majority of the reserve and they will be mined using the conventional roll over method. The material from the boxcut will be placed as close to the final void as possible to reduce the work at closure. The strips will be between 30 and 40m wide so as to use the selected equipment efficiently.

The mining layout of the main development has been designed in such a way to ensure optimal reserve utilization. The mining layout has been design in such a way to cater for maximum panel lengths of approximately 1000m. Most of the reserve is between 0.75m and 1.2m.

The proposed mine infrastructure within the mining area for Ferreira includes the following:

- Opencast workings;
- Pollution control dams;
- Topsoil Stockpiles;
- Existing access routes and haul roads;
- Storm water control trenches;
- Dewatering infrastructure;
- Water pipelines; and
- Offices, change rooms, store rooms and workshops, diesel storage and other ancillary infrastructure.

However the following infrastructure from the Delta plant will be utilized by the Ferreira project:

- Wash plant;
- Stockpiles; and
- Storage of Diesel fuel.

Mashala is the holder of the mining right as described above (MP30/5/1/2/2/345MR). It is the intention of Mashala, should approval be granted by DMR, to extend the north eastern boundary of the mining right to include Remaining extent 0 of Farm 538 IT (formerly known as portions 25 of Witbank 262 IT) and portion 27 of Witbank 262IT. This proposed extension includes only a small area of these two properties. The proposed mining method is identical to that which is currently implemented in the existing Ferreira opencast pit (north pit). No additional infrastructure is proposed.

Public Participation Process

The identification and registration of I&APs have been an ongoing activity during the course of this project. I&APs, as listed as part of Ferreira, were contacted at the start of the project. During the consultation with the I&APs as well as with the mine, additional parties were identified and were included within the existing database to provide an updated database. Numerous I&APs were notified by word of mouth. Parties who responded to the notifications placed were included within the database.

GCS has developed and will maintain an electronic database for the duration of the project where stakeholder details are captured and automatically updated as and when information is received from I&APs.

Site notices were placed at the entrance to the Mashala Delta Plant and the Proposed Ferreira site.

Advertisements regarding the project background and the assessment process being followed were placed in the Highvelder and the Highveld Tribune during 16-19 September 2008.

A Background Information Document or BID was sent to all I&APs by means of e-mail, fax and/or post. The BID included details of the proposed project, as well as the purpose for compiling an EMP, requirements of the MPRDA and the EMP process. The BID also included relevant contact details and a comment/registration sheet for I&APs to complete. I&APs were invited to register and send responses by fax, telephone or e-mail to GCS.

Throughout the Scoping Process the I&APs were invited and encouraged to communicate their concerns and/or views on the proposed project to GCS.

The public raised concerns over the potential for:

- The influx of migrant workers and the associated concerns which arise from that;
- Water quality in the area and the implications of a decline in the water quality;
- Erosion and deterioration of the gravel roads;
- Corrosion of farm/agricultural equipment.
- Dust from trucks travelling along the road to the existing Mashala Delta Plant entrance as well as potential dust from the proposed opencast mining operations.
- Noise and vibration generated by the proposed mining operation.
- Further pollution of the water in the area.
- Theft and security; and
- Effect of mining on the surrounding agricultural area

The opportunity to contribute to the Scoping and EIA phase of the Section 102 amendment application, to register as an I&AP and to participate in the proposed project has been widely announced to the I&APs, to ensure fair and equal access to information. Applicable IAP's registered during the original Ferreira Mine right application were included as well as those respondents from the advertisement.

The opportunity to participate in the Scoping and EIA was announced in May 2011 in English as follows:

- A notice/advertisement was published in the *Hoewelder* newspaper on Friday 27 May 2011.
- The Background Information Document/letter (BID) of invitation to participate in the Scoping and EIA, was personally addressed and sent via email transmission to all registered IAP's accompanied by a map of the project area, and a registration and comment sheet for further I&APs to register for the EIA process and/or to provide comment.

Site notices have been erected at four locations along the property boundary.

Specialist studies conclusions

The conclusions of the various specialist studies conducted are summarised below.

Geohydrological

Local Aquifer characteristics:

- Available groundwater level data indicates piezometric heads of 1710mamsl in the south (in the area of the N2 national road) to 1680mamsl (further to the north and lower topographical settings) for the proposed mining area and coal floor depths around 1672 to 1695mamsl.
- Aquifer parameters; hydraulic conductivity / transmissivity, piezometric levels, gradients, etc, were obtained from the assessment work, available data and relevant literature. By making use of these values, a proper conceptual model (for the hydrogeological environment) for the mining area was developed.
- Analytical calculations indicate slow groundwater movement and poor aquifer condition. Any pollutants generated by the mining activities (SO₄ content usually) will therefore migrate according to these flow rates. However, it must be noted that dewatering activities, during the operational phase, will cause a cone of depression towards the opencast areas and groundwater flow tends to flow back towards these areas. This will limit mass transport to the surrounding aquifers during operations. Mass transport will increase after the rebound of water levels during the de-commissioning phase and after.

- A constant source of contamination was assumed for the opencast area. This is not always realistic but can be regarded as the worse case scenario. It must be noted that the exposed coal seams within the mined out areas will be filled with groundwater again after the rebound period. This will minimise and reduce oxidation and the associated creation of AMD.

Hydro-chemistry:

- The groundwater generally has a good quality with sodium and bi-carbonate dominant character. It is recommended that follow-up samples be obtained to confirm the metal concentrations for the newly drilled boreholes.
- Available data from the Delta Plant area indicates similar water qualities with increased SO₄²⁻ concentrations.

Hydrological

- The Hydrological investigations included catchment hydrology, catchment analysis, Risk assessment and sizing of pollution control dams.
- The Witpuntspruit flows in a southerly direction on the north eastern side of the study area. This river is approximately 1.24km from the boundary of the mining area. The Witpuntspruit confluence with the Humanspruit is approximately 6km downstream of the study area. The Witpuntspruit flows through the Camden community next to Camden power station, the G10 military base and the farm Mooiplaats.
- Any impacts on the water quality of the Witpuntspruit and the Humanspruit will have an impact on the Vaal River.
- There is a natural pan on the northern boundary of the farm Witbank 262 IT. There is also a farm dam near the proposed location of the South Western Opencast pit.

Wetland

- Based on the terrain unit and soil indicators and vegetation, the map units of the project area may be classified according to the temporary, seasonal and permanent wetland zones. Unit FP has been classified as a permanent/seasonal zone because of uncertainty: it is not known whether the pan is covered by free surface water throughout most years or possibly dries out seasonally during dry periods.
- In the project area, map unit FA1q (temporary wetland zone) had been affected seriously by human impact due to past sand quarrying. The other wetland areas are largely natural with few modifications on the Present Ecological Status (PES) scale. The present ecological conditions also reflect the past grazing pressure and fire regime history of the area. The tar road has also had a limited impact on the condition of the wetland downslope notwithstanding concentration of runoff through two culverts

causing slight erosion and deposition of sediments in the valley bottom area as well as probably inhibiting subsurface flow of water through footslope soils

- The wetlands provide a suite of environmental services to the upper Vaal catchment. The most important of these are flood attenuation, stream flow regulation, sediment trapping and biodiversity maintenance. The seasonal and temporary zones on the valley bottom and footslopes map units FKa1 and FA1 have the highest scores for these services. The pan is important for flood attenuation and as a habitat for a large number of waterfowl, waders and possibly amphibians. It must be noted that due to its size the condition of temporary wetlands on FA1 unit shall determine the ecological status of the seasonal wetland FKa1 unit downstream. The two units should ideally be managed as one to maximise the ecosystem services to the catchment both on and off the site.
- The proposed expansion of the Ferreira mine through the Section 102 process will not directly affect the wetland zones along the Witpuntspruit and the 2 tributaries to the north and south. However, the northern edge of the proposed mining area intersects a section of a temporary hill slope wetland.

Soil and Land capability

- Several soil map units were identified. A description of the most important soil characteristics of each unit, such as the dominant soil form and family, soil depth, topsoil texture and underlying material, is given in the soil legend.
- In general, the soils are shallow to moderately deep, grey-brown to yellow-brown, light-textured soils, with no significant degree of structure. Shallower soils, with ferricrete outcrops in places, also occur, as well as some areas of disturbance. The soils in the lower-lying positions are darker brown to black, with a slightly heavier texture and signs of wetness lower in the profile.
- The analysis shows that most of the survey area comprises soils of limited agricultural potential, due mainly to their limited rooting depth, coupled with the underlying impermeable cemented ferricrete.
- The only unit with a high arable potential is the dCv unit, which occupies a small area in the east of the area.
- Both the pan and the Ka unit comprise wetlands (the pan being a permanent wetland and the Ka unit a temporary/seasonal one), and these should, as far as possible be left undisturbed
- The Dist map unit comprises areas where excavations have occurred, presumably to mine the underlying ferricrete. In some instances, there has been replacement of topsoil, but there are also significant areas where the excavation has been left with

very little topsoil and in some cases with the ferricrete outcropping at the surface. Due to the uneven distribution of these areas, the increased compaction of the soils in places and the subsequent significant reduction in available soil depth, this map unit has a very low potential for agriculture.

- With regard to the proposed expansion of the Ferreira mine boundary:
It was found that 44.81% (17.08 ha) of the proposed mining area consist of well-drained, yellow brown soils with **arable** land capability and moderate to high agricultural potential, dominated by the Clovelly soil form, symbolized as soil types Cv. It was also found that 48.99% (18.67 ha) of the proposed mining area consist of shallow, well drained, yellow brown soils and grey, imperfectly drained soils with **grazing** land capability and low agricultural potential, dominated by Dresden and Longlands soil forms symbolized as soil types Dr and Lo. Results also showed that 6.2% (2.36 ha) of the proposed mining area consist of grey, imperfectly to poorly drained soils of which the land capability were classified as a temporary **wetland zone** with low agricultural potential, dominated by the Wasbank soil form, symbolized as soil type Wa. No soils or areas were classified as wilderness land.

Ecology

There are a wide variety of functioning ecosystems on the site, containing and providing habitat for a diversity of plant and animal life. The north western section is rated as “highly significant” for its faunal diversity; however it has a lower floral biodiversity compared to other sections that were previously classified as areas of “least concern”. Several small mammal species have burrows in the centre of the site and small antelope graze in the vlei area. The resident birds are highly dependent on the pan, whilst the vulnerable African Grass Owl (*Tyto capensis*) was found residing in the vlei area during the dry season (REMS 2008a). There are also many other migratory and nomadic birds that range over the site during the year the most important of these are critically endangered Rudds Lark (*Heteromira fra ruddii*), endangered Botha’s Lark (*Spizocorys fringullaris*), and vulnerable, Barrows Korhaan (*Eupodotis barrowi*) and Southern Bald Ibis (*Geronticus calvus*).

Most of the areas zoned for opencast mining are upland grasslands. There are portions of the wetland habitat that have been included in this mining activity. From a biodiversity perspective the most important part of this area is the *E. chloromelas* - *C. compacta* community on the valley bottom, it contains both seasonal and temporary wetlands and has high species richness. The following Red Data species are found within this community *Nemsia fruticans*, *Impomea bathycolpos* and *Khadia carolinensis* and these plants *Brunsviga radulosa* (found nowhere else on the site), *Cyrtanthus brevifolia*

and *C. contractus* are protected by Mpumalanga's provincial legislation. The wetland grasslands also provide the most substantial ecosystem services on the site (REMS 2008b). This community grades into the *H. lanatus* - *J. oxycarpus* community downstream in the wetland which also has *N. fruticans* and *I. bathycolpos*. Both communities are bordered by the *E. chloromelas* - *S. vulgaris* grassland which is contains more upland plants. Two other plant communities are affected by open cast mining; these are the *T. triandra* - *T. leucothrix* community which is on the extreme south eastern portion of the site. The latter community has several endemic plants such as the vulnerable, *Eucomis* spp and the vulnerable mesem *Khadia carolinensis*.

Heritage

During the survey six sites were found of which one has higher heritage significance value. During a subsequent specialist assessment (April 2011) of the proposed properties included in the Section 102 application, one building of heritage value was identified and assessed and is referred to as Site 7.

Site 1-4 and 6

Consist of recent historic structures and homesteads of low heritage significance. No further action is required on these structures.

Site 5

The site consist of 5 unmarked graves aligned east-west.

Graveyards can either be exhumed or fenced of, and the historic structures and homestead which are present are not of significant enough concern to warrant a choice either way. SAHRA permits will be required for the removal of the grave sites.

Site 7

The sandstone milking shed falls within the proposed Ferreira mine expansion area on portion 27 of the Farm Witbank 262 IT.

The structure is older than 60 years and it is, therefore, protected by Section 34 of the National Heritage Resources Act, No.25 of 1999. Before the expansion of the mine into the farmstead area as proposed; a destruction permit with the South African Heritage Resources Agency (SAHRA), Built Environment and Landscape Office, will be required. To get a permit with the SAHRA BELCOM (Built Environment & Landscape Committee) a Heritage Impact Assessment (HIA) study of the proposed mining expansion area would need to be conducted or at least an archival study will be required. The work on the site for the destruction permit will include among other things: A scaled layout sketch

(require thorough measurements) and Documentation of the whole structure by means of photography; this will require paying special attention to historic architectural features on the shed, techniques and angles. In conclusion all this recommended work will serve as means of positive heritage conservation for the: the recording, documentation and mapping of the site.

Noise

- The proposed Ferreira's Coal project will take place on partially agricultural land and vacant land covered with natural vegetation. The N2 Freeway separates the area in two sections. The ambient noise level in the vicinity of this road is 67.0dBA for the daytime and 64.2dBA for the night-time period. The ambient noise level along the North-eastern boundary is 44.1dBA for the day-time and 41.1dBA for the night-time period at the opencast mining area and 42.0dBA and 37.1dBA for the day/night period at the boundary of the previously planned underground mining area.
- On the South-western boundary the ambient noise level is 58.5dBA and 55.5 dBA for the day/night period at the opencast mining area and 53.4dBA and 56.4dBA for the day/night period of the previously planned underground mining area respectively. This is because this side abuts the railway loop, which is used at the existing mining activities to the Southwest of the proposed mining activities.
- The noise impact will be the most on the North-eastern boundary because there are no additional intrusive sounds i.e. traffic which could raise the prevailing noise level as experienced on the South-western boundary. There is already a shift in the prevailing ambient noise levels due to the impact of high traffic volumes and noise from other mining activities in the region.
- This district can by no means be classified as a rural district according to the definition of table 2 of the SANS 10103 of 2004. There is the N2 Freeway, which runs through the proposed mining area, an increase of mining and/or train activities with the result that there is more traffic (heavy-duty vehicles), which is the biggest contributor to the higher prevailing ambient noise level.
- The residents in the vicinity of the N2 Freeway are already exposed to the indifferent and higher ambient noise levels, which are created by the existing mining activities, train noise and traffic to and from Ermelo.
- This is a typical open cast mine operation with some blasting, which will impact on the environment, 10 seconds at the most during blasting. The other activities are some distance from the identified noise sensitive areas and noise reduction will take place by means of the distance from the source, topographical barriers and ground conditions, which will enhance the reduction of noise as it propagates from the source.

- The overpressure level which is synonymous with blasting must at all times be controlled in order to minimize the impact on the environment and the people living in the vicinity of such an activity. The ambient noise level is exceeded for a very short time during a blast and this noise is similar to a highveld thunderstorm.
- The mining activity will create a shift in the prevailing ambient noise levels on the North-eastern side of the proposed mining area and at times this will be a temporary shift of the ambient noise level. The noise intrusion can however be controlled by means of state of the art equipment, proper noise management principles and compliance to the International Health and Safety Guidelines.

Air Quality

- The proposed activities will result in dust emissions, both from mining activities and fugitive emissions from the large areas of previously vegetated land that will now be exposed. Provided sufficient mitigation measures are instigated, it is unlikely that these emissions will result in the exceedance of South Africa's guidelines for particulate emissions.
- The activity within the pit area is likely to be the primary sources of emissions.

Visual

Visual impacts would result from the construction, operation and closure phase of the proposed Ferreira open cast mine. Specifically, impacts would result from the open cast mining activities being seen from sensitive viewpoints (i.e. impacts of views from residences) and the negative effects (relating primarily to visibility and intrusion) on the scenic quality and sense of place of the landscape of the proposed site.

Impacts to some sensitive sites are rated high because these views are from the farmsteads directly east and north of the site and the N2 road which runs through the site. Other sensitive views (surrounding farmsteads and informal settlement) are either fully or partially screened by vegetation and other buildings and the visual impact is moderate to high for these views. As indicated by the viewshed, the screening effect of the topography should also be taken into consideration when assessing the visual impacts. Judging by the viewshed results, less than half of the study area within a 5km radius of the site would have clear views towards the Ferreira open cast mining activities. This is mainly due to the hill on the southern side of the proposed site.

It was determined that the intensity of the visual impact of the proposed Ferreira open cast mine would be *MODERATE* to *HIGH* and that the significance of this impact would be *MODERATE NEGATIVE*. With successful mitigating measures the significance can be reduced to *MODERATE* to *LOW*

Motivation for the project

Although the project will only create a small addition to the existing employment opportunities, the project will ensure:

- A mining operation with a sustainable life of mine;
- Provision of sustainable employment (retention);
- Ongoing economic input into the area;
- Provision of a regional socio-economic benefit;
- Economic injection into the region in terms of small business enterprises (e.g. community services);
- Ongoing supply of export and local coal;
- Supply of coal to ESKOM when needed;
- Improved environmental management commitments; and
- Less impact on the environment due to the utilisation of the Delta plant.

Potential impacts identified during the specialist studies

Specialist studies listed the main environmental impacts as the following:

Geohydrological

- Impact on surrounding aquifer levels due to mine de-watering activities;
- Impact the catchment dam and non-perennial tributary stream due to loss in base-flow due to mining de-watering activities;
- Impact on mine safety and overall water balance (during the operational phase) due to groundwater seepage into the pits;
- Impact on surrounding groundwater quality; and
- Identification of sensitive areas for long-term poor quality seepage due to mine decant.

Hydrological

Soil erosion

- During this phase the land profile will be changed due to stripping of vegetation;
- Due to an increased percentage of bare surfaces, there is a high potential for erosion; and
- Vegetation will be changed due to the activities.

Surface water pollution

- The type of material used during this phase may impact negatively on the runoff quality;
- Dust from moving construction plant will have a significant impact on the surface runoff;
- Contaminated water will be stored in pollution control dams. Unlined or overflowing pollution control dams impacts negatively on the water resources; and
- Contaminated soil on the mining area will pollute clean surface runoff during rain events.

Water quantity

- Due to vegetation clearance, the runoff coefficient of the opencast area will increase and therefore higher volumes of water will be produced during rain events; and
- Contaminant run off from the opencast will be contained to ensure that the development runoff will not reach the Witpuntspruit.

Wetland

- Impact on the wetland from opencast mining; and
- Impact on threatened wetland vegetation.

Ecology

The following impacts/ issues were identified that could affect the floristic attributes of the study area adversely:

- Destruction of threatened/protected species and habitat;
- Destruction of sensitive/pristine habitat types;
- Changes in the local and regional biodiversity; and
- Impacts on surrounding habitat and species.
- The fauna study indicated the following impacts:
 - Loss and degradation of pristine faunal habitat;
 - Impact on avifaunal breeding grounds;
 - Road deaths of animals on access roads;
 - Disruption of ecological connectivity and migration routes as well as territorial infringement;
 - Increase in poaching, snaring and trapping of animals;
 - Chemical compounds from the operation to the animals; and
 - Effect on hearing abilities of waterfowl due to blasting.

Heritage

The HIA study for the proposed Ferreira Mine Project revealed the following types and ranges of heritage resources:

- Historic structures and homesteads; and
- Graveyard.

Graveyards can either be exhumed or fenced off, and the historic structures and homestead which are present are not of significant enough concern to warrant a choice either way. SAHRA permits will be required for the removal of the grave sites.

Noise

- The increase in the ambient noise levels due to the opencast mining operations and associated blasting activities;
- The increase in the ambient noise levels due to the ventilation shafts;
- The increase in the ambient noise levels due to the necessary transportation of coal to the Eskom Power stations; and
- Impact of blasting activities on surrounding properties.

Air Quality

- Dust and associated emissions during building and decommissioning phases, particularly associated with blasting, loading and offloading of material, dumping of overburden and waste rock, and the transport of the coal via truck or conveyor, as well as bulldozer activity on either coal or overburden;
- Fugitive dust emissions associated with the wind entrainment of large areas of exposed earth, dumped material and coal that will be created during the project; and
- Vehicle emissions associated with the building, operation and decommissioning phases.

Visual

- Visual impacts would result from the construction, operation and closure phase of the proposed Ferreira open cast mine. Specifically, impacts would result from the open cast mining activities being seen from sensitive viewpoints (i.e. impacts of views from residences) and the negative effects (relating primarily to visibility and intrusion) on the scenic quality and sense of place of the landscape of the proposed site; and
- Impacts to some sensitive sites are rated high because these views are from the farmsteads directly east and north of the site and the N2 road which runs through the site.

Identification of Gaps

At the date of submission of this revised EIA/EMP no comments had yet been received from the authorities regarding the Scoping Report.

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1 INTRODUCTION AND METHODOLOGY

1.1 Background

Mashala Resources (Pty) Ltd (“Mashala”) has applied for a mining right in respect of coal reserves on Portion 19 of the farm Witbank 262 IT which is approximately 264ha in size, situated approximately four (4) kilometers, south east of Ermelo adjacent to the N2 national road (see figure 1). It is the intention of Mashala to develop an opencast coal mine on the above mentioned property

The proposed mining method to be used is conventional opencast mining, making use of the roll-over method. Rehabilitation will take place on an ongoing basis.

A Mining Right Application (MRA) was submitted to the Department of Mineral Resources (DMR) on 25 August 2008. Acceptance of this application was received on 10 October 2008. Following the acceptance by DMR a Scoping Report and an Environmental Management Programme (EMP) is required to be compiled and submitted. The Scoping Report was submitted to the relevant authorities on 30 October 2008 and made available to the public on 31 October 2008 for a review period of 30 days. The EMP was submitted to the relevant Authorities and the public on 24 December 2008. The EMP has been compiled in terms of Section 39(1) and Regulation 51 of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). An Environmental Impact Assessment (EIA), undertaken in terms of Regulation 50 of the Act, is a necessary pre-requisite for the EMP. The EMP must be submitted to the Regional Director of Mineral Development at the DMR for approval. It is a requirement that the approved EMP is implemented throughout the life of the mine until closure is granted. The DMR will be the lead authority with regard to the above-mentioned applications.

Mashala proposes, through a Section 102 application, the extension of the north eastern boundary of the existing mining right (as described in the paragraphs above). This proposed extension of the existing mining boundary involves the inclusion of Remaining extent 0 of Farm 538 IT (formerly known as portions 25 of Witbank 262 IT) and portion 27 of Witbank 262IT. The proposed inclusion of these properties into the existing mining right would enable Mashala to extend the life of mine by approximately 12 months. This EIA is therefore amended in accordance with the Section 102 of the MPRDA. Cognisance has been taken of the “Standard Directive” as stated in the DMR template for a Section 102 application as well as the instruction to submit a revised/amended document as a simple addendum is not accepted. The locality map in Figure 1 is appropriate to the

proposed expansion as the expansion falls directly on the north eastern boundary of the existing mining right.

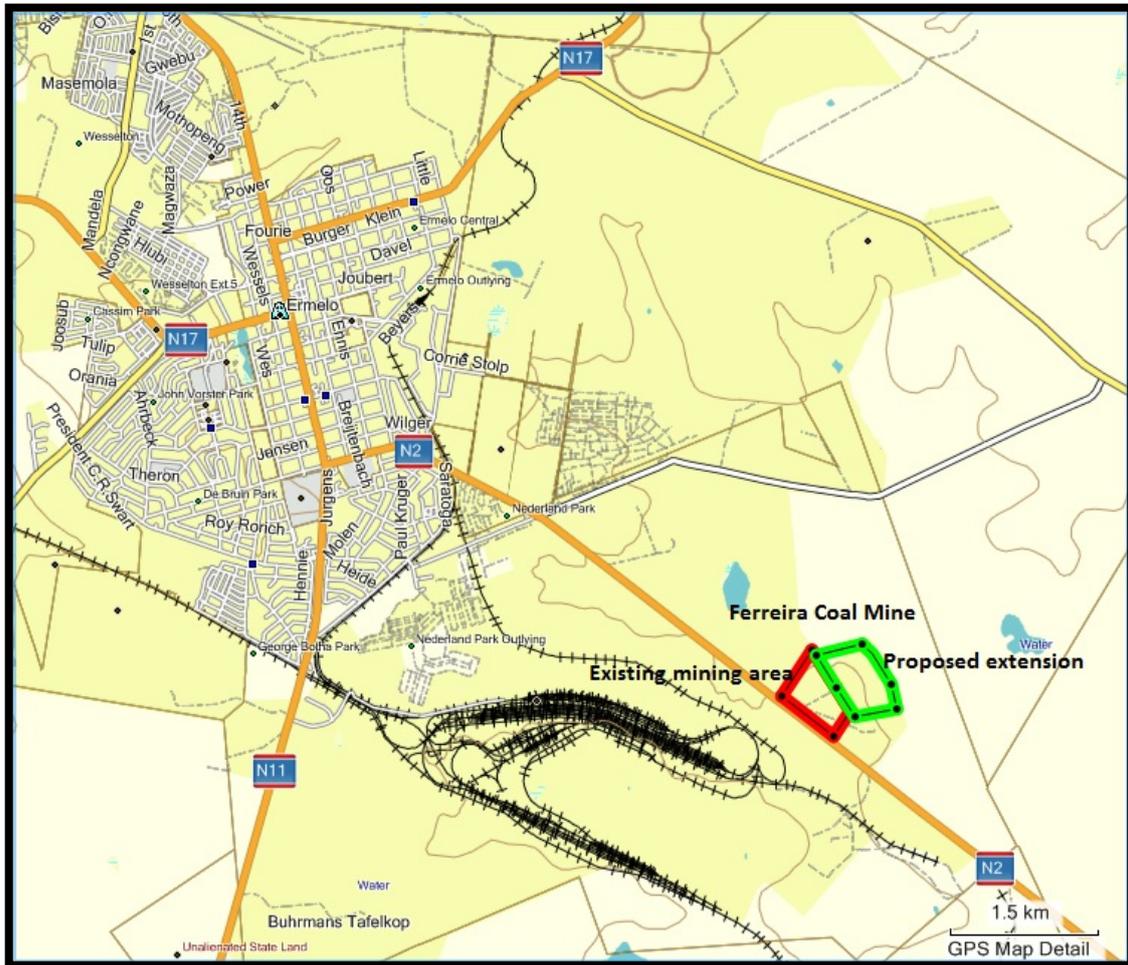


Figure 1: Locality map of the Ferreira Project outside Ermelo indicating the existing mining area as well as the proposed extension of the mine boundary.

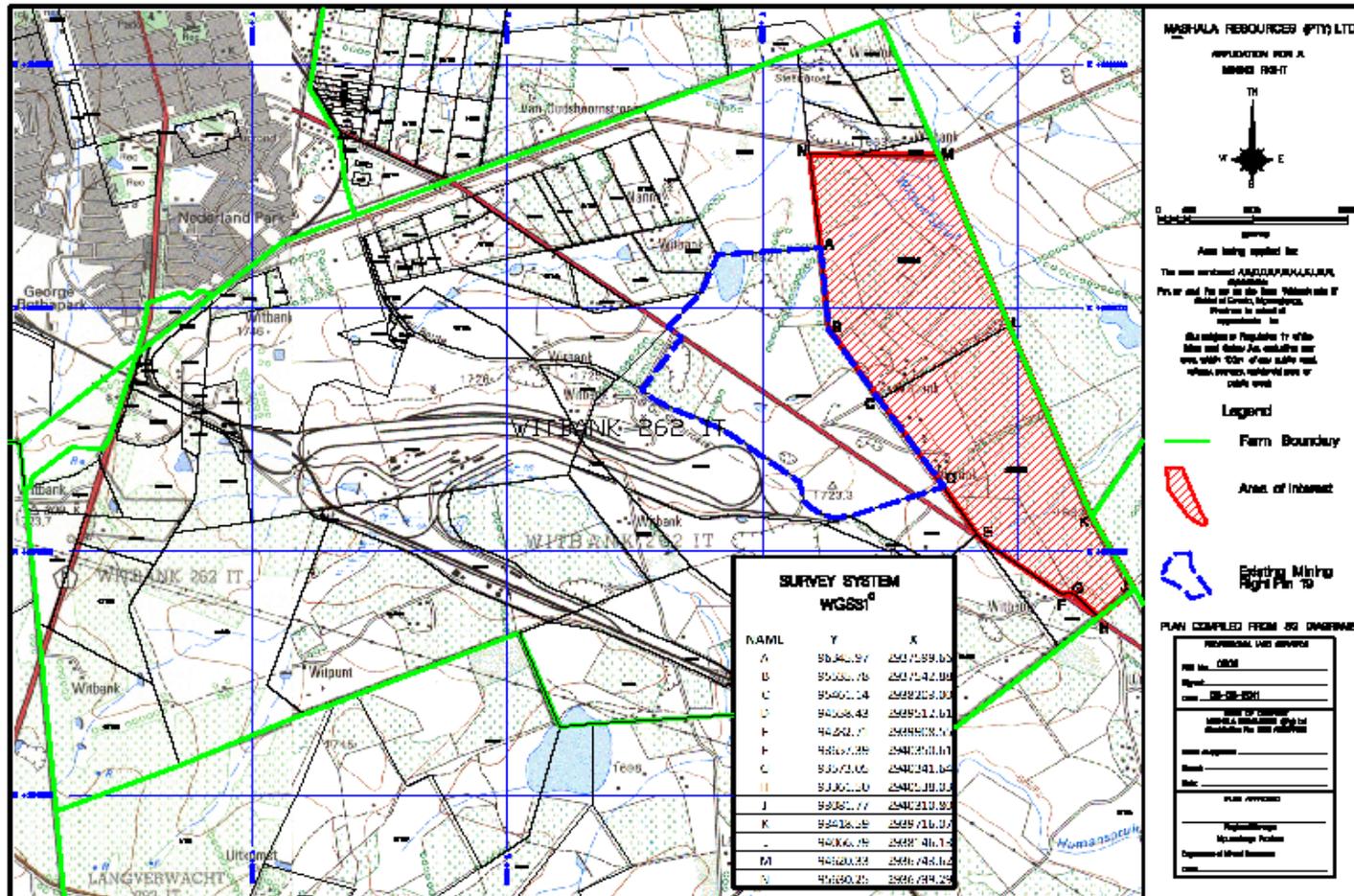


Figure 2: Topographical map of the Ferreira Project indicating the existing and proposed extension of the mine boundary.

1.2 Brief Project Description

1.2.1 Mining Method

The proposed mining method to be used is conventional opencast mining, making use of the roll-over method. Rehabilitation will take place on an ongoing basis.

1.2.2 Mining Resource

Most of the reserve is between 0.75m and 1.2m. The additional resource available within the proposed mine extension (identified within a small area of portion 27 of Witbank 262 IT and Remaining extent 0 of Farm 538) amounts to 1,023,863 GTIS.

	Location	Seam	Ave. ST	Volume	RD	GTIS
GEMECS	Ptn 27 of Witbank 262 IT and RE(0) of Farm 538	SCL	1.79	669192	1.53	1023863

1.2.3 Production Rate

The Ferreira project will commence in 2 phases:

Phase 1: Initiation of the opencast mining upon commissioning of the mine; and

Phase 2: Initiation of expansion of the opencast upon written approval from the minister.

The forecast of annual production rates is based on an average of 70 000 tonnes per month. Table 1 below gives an indication of the annual open pit production figures. The same annual production rates will be applied to the expansion of the north eastern boundary of the mine should it be approved.

Table 1: Annual production rate for Opencast.

Quarters	BCM	ROM	SR
1	612911	117118	5.2
2	988012	141569	7.0
3	1776271	253265	7.0
4	2408476	306089	7.9
5	1602532	260031	6.2
6	1295741	227285	5.7

Quarters	BCM	ROM	SR
7	1194827	236524	5.1
8	1165855	214002	5.4
9	1212903	229224	5.3
10	1054917	189471	5.6
11	967221	214410	4.5
12	1042769	197865	5.3
Total	15322357	2586856	5.9

1.2.4 Life of Mine

The life of this resource at the planned mining rate is 72 months (6 years). The proposed extension of the north eastern boundary, if approved is expected to increase the life of mine by 12 months (1 year).

1.2.5 Surface infrastructure

The proposed mine infrastructure within the mining area for Ferreira includes the following:

- Opencast workings;
- Pollution control dams;
- Topsoil Stockpiles;
- Existing access routes and haul roads;
- Storm water control trenches;
- Dewatering infrastructure;
- Water pipelines; and
- Offices, change rooms, store rooms and workshops, and other ancillary infrastructure.

However the following infrastructure from the Delta plant will be utilized by the Ferreira project:

- Wash plant;
- Stockpiles; and
- Storage of Diesel fuel.

1.3 Agreement between the South African National Road Agency Ltd and Mashala

An application for the use of explosives and blasting operations within 500m of the N2 has been approved by the South African National Road Agency Ltd (SANRAL) (See Appendix B).

No under mining of the N2 will occur and opencast mining will be restricted to the approved distance as specified by SANRAL.

1.4 Title Deed Description

The Ferreira Environmental investigation and reporting addresses the total proposed mining area, which is situated on Portion 19 of the farm Witbank 262 IT.

Table 2: Surface Right Owners and Title Deed descriptions

Farm	Portion	Surface Right Owner	Size	Title Deed Number	Surveyor - General Digits (SGD)
Witbank 262 IT	Remaining extent of portion 19 (portion of portion 2)	Mashala Resources (Pty) Ltd	264 ha	T000008664/2008	TOIT00000000026200019
Witbank 262 IT	Portion 27	Mashala Resources (Pty) Ltd	214 ha	T000001550/2011	TOIT00000000026200027
Farm 538 IT	Remaining extent 0 (formerly known as portions 25 of Witbank 262 IT)	Wilhelmina Ferreira	366 ha	T0000044291/2004	TOIT00000000053800000

1.5 Brief Description of Public Participation Process

The identification and registration of I&APs have been an ongoing activity during the course of this project. I&APs, as listed as part of Ferreira, were contacted at the start of the project. During the consultation with the I&APs as well as with the mine, additional parties were identified and were included within the existing database to provide an updated database. Numerous I&APs were notified by word of mouth. Parties who responded to the notifications placed were included within the database.

GCS has developed and will maintain an electronic database for the duration of the project where stakeholder details are captured and automatically updated as and when information is received from I&APs.

Site notices were placed at the entrance to the Mashala Delta Plant and the Proposed Ferreira site.

Advertisements regarding the project background and the assessment process being followed were placed in the *Highvelder* and the *Highveld Tribune* during 16-19 September 2008.

A Background Information Document or BID was sent to all I&APs by means of e-mail, fax and/or post. The BID included details of the proposed project, as well as the purpose for compiling an EMP, requirements of the MPRDA and the EMP process. The BID also included relevant contact details and a comment/registration sheet for I&APs to complete. I&APs were invited to register and send responses by fax, telephone or e-mail to GCS.

Throughout the Scoping Process the I&APs were invited and encouraged to communicate their concerns and/or views on the proposed project to GCS.

The public raised concerns over the potential for:

- The influx of migrant workers and the associated concerns which arise from that;
- Water quality in the area and the implications of a decline in the water quality;
- Erosion and deterioration of the gravel roads;
- Corrosion of farm/agricultural equipment.
- Dust from trucks travelling along the road to the existing Mashala Delta Plant entrance as well as potential dust from the proposed opencast mining operations.
- Noise and vibration generated by the proposed mining operation.
- Further pollution of the water in the area.
- Theft and security; and
- Effect of mining on the surrounding agricultural area

The opportunity to contribute to the Scoping and EIA phase of the Section 102 amendment application, to register as an I&AP and to participate in the proposed project has been widely announced to the I&APs, to ensure fair and equal access to information. Applicable IAP's registered during the original Ferreira Mine right application were included as well as those respondents from the advertisement.

The opportunity to participate in the Scoping and EIA was announced in May 2011 in English as follows:

- A notice/advertisement was published in the *Highveld* newspaper on Friday 27 May 2011.
- The Background Information Document/letter (BID) of invitation to participate in the Scoping and EIA, was personally addressed and sent via email transmission to all registered IAP's accompanied by a map of the project area, and a registration and comment sheet for further I&APs to register for the EIA process and/or to provide comment.

Site notices have been erected at four locations along the property boundary.

At the time of submission of this revision of the EMP, no comments had been received regarding the Section 102 application by Mashala.

2 METHODOLOGY

2.1 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, 2002 (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);
- The National Heritage Resources Act, 1999 (Act 25 of 1999);
- The National Nuclear Regulator Act, 1999 (Act 47 of 1999); and
- The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004).

2.2 Reporting - EIA / EMP

In accordance with the requirements of the MPRDA, an EIA needs to be submitted to the DMR. The objectives of the EIA Report are to:

- Provide a description of the environment in which the project will be situated;
- Assess and do a comparative assessment on all potential alternatives that exist for the proposed project and determine which are the most feasible on an environmental, social and economical level (if relevant);
- Provide feedback on the stakeholder consultation undertaken for the proposed project;
- Identification of the impacts, which could occur as a result of the proposed project based on the nature, extent, duration, probability and significance of the impacts;
- Description of the arrangements for monitoring and management of environmental impacts;
- Identify knowledge gaps and report on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information; and

- Assessing and utilising the comments received from all stakeholders, as well as the investigations undertaken by the environmental consultants and specialists, to identify all the impacts, which could occur as a result of the proposed project, accomplish the above.

The proposed expansion of the Ferreira mine necessitates a similar EIA/EMP process in support of Mashala Resources Section 102 application. The Scoping Report has been submitted to DMR on 6 September 2011 along with the revised Mine Work Program. In accordance with the DMR template for Section 102 applications, this existing EIA/EMP is revised to include the additional impacts and be submitted.

2.3 Environmental Reporting Procedures

Figure 3 outlines the phases for the Environmental Reporting Procedures, which has been followed for the Mining Right Application and subsequent environmental reporting for Ferreira.

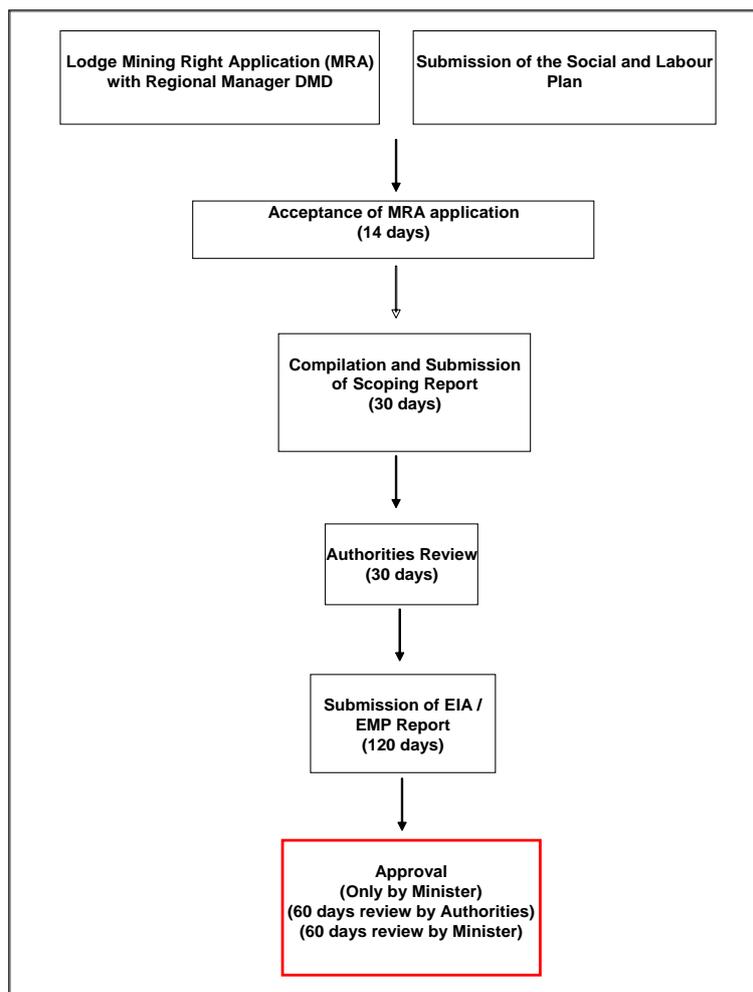


Figure 3: Environmental Reporting Procedures

The Mining Right Application was submitted to DMR on 25 August 2008. A letter requesting the Scoping Report and EIA/EMP Reports was received from the DMR on 10 October 2008.

2.4 Baseline Description / Specialist Investigation

The Ferreira MRA includes only a opencast mining section. To ensure that the EIA and EMP are complete, specialists surveyed the area to identify the potential impacts of the project on the area.

The following specialist surveys were conducted for the Ferreira EIA/EMP:

- Geohydrological Impact Assessment;
- Hydrological Impact Assessment;
- Air Quality Impact Assessment;
- Wetland Impact Assessment;
- Soils and Land Capability Assessment;
- Noise Impact Assessment;
- Visual Impact Assessment;
- Archaeological Impact Assessment; and
- Ecological Impact Assessment (Fauna & Flora).

The following specialist surveys were conducted for the Section 102 application for the extension of the north eastern boundary of the Ferreira mine:

- Wetland Impact Assessment;
- Soils and Land Capability Assessment; and
- Heritage Impact Assessment;

It is anticipated that since the proposed extension of the existing mine right boundary will only impact on approximately 38 ha, the specialist studies conducted for the original mining right will be applied to the evaluation of impacts for this application.

2.5 Environmental Impact Assessment Process

In terms of Section 50 of the regulations promulgated under the MPRDA, the EIA Report must determine the nature, extent, duration, probability and significance of the environmental, social and cultural impacts of the project, along with the reasonable

alternatives and the required mitigation measures for each impact during the life of the mine.

The following must be included in the EIA Report:

Investigation of the environment likely to be significantly affected by the proposed project;

- Geohydrological Impact Assessment;
 - Hydrological Impact Assessment;
 - Air Quality Impact Assessment;
 - Wetland Impact Assessment;
 - Soils and Land Capability Assessment;
 - Noise Impact Assessment;
 - Visual Impact Assessment;
 - Archaeological Impact Assessment; and
 - Ecological Impact Assessment (Fauna & Flora).
- Investigation of the potential impacts (including cumulative impacts) of the proposed operation and its alternatives on the environment, socio-economic condition and cultural heritage;
 - An assessment of the nature, extent, duration, probability and significance of the potential environmental, social and cultural impacts of the proposed operations, including the cumulative impacts;
 - A comparative assessment of the feasible alternatives and their potential environmental social and cultural impacts;
 - Investigation and description of remedial measures for each significant impact of the project and the preferred alternatives to keep the impacts to a minimum;
 - Description of the public participation process followed during the course of the assessment and an indication of how issues raised have been addressed;
 - Reporting on knowledge gaps, the adequacy of predictive methods and the underlying assumptions and uncertainties encountered in compiling the required information;
 - Description of the arrangements for the monitoring and management of impacts, and the assessment of the effectiveness of such arrangements after their implementation; and
 - Inclusion of technical supporting information as appendices.

2.6 Report Structure

The report structure for the compilation of the EMP is detailed below and will guide the reader to the relevant sections.

Chapter 1 - Background and Introduction

Chapter 2 - Methodology

Chapter 3 - Environmental Objectives and Goals

Chapter 4 - Procedure for Environmental related Emergencies and Remediation

Chapter 5 - Environmental Awareness Plan

Chapter 6 - Environmental Management Programme

Chapter 7 - Planned Environmental monitoring and performance assessments

Chapter 8 - Financial Provision

Chapter 9 - Undertaking by Client

Chapter 10 - Conclusion

Chapter 11 - References

Appendices

3 BROAD 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 Ferreira Project and the associated environmental objectives.

- Construction of Opencast workings;
- Construction of Pollution control dams;
- Topsoil Stockpiles;
- Access and haul roads;
- Storm water control trenches;
- Dewatering infrastructure;
- Water pipelines; and
- Offices, change rooms, store rooms and workshops, diesel storage and other ancillary infrastructure.

However the following infrastructure from the Delta plant will be utilized by the Ferreira project:

- Wash plant;
- Stockpiles; and
- Storage of Diesel fuel.

All of objectives outlined in this section are based on the central tenet of Best Practical Environmental Option. All planning and implementation will take place in such a manner that environmental risks are minimized, mitigated and where possible removed all together.

3.1 Proposed activity objectives

3.1.1 Road networks

With regard to the construction of access roads, the mitigation of all environmental impacts and addressing all environmental aspects will be carried out by focusing on the following objectives:

- Optimal utilization and maintenance of existing road network in a well planned manner.
- To take care that no new land surface, habitats of vegetation and animals are destroyed, disturbed or alienated unnecessarily.

- To prevent, contain and clean-up any spillages from vehicles in the surrounding environment.
- The sustainable rehabilitation of access roads (if not required anymore,) in order to address all environmental impacts as far as practical.

3.1.2 Power Requirements

Currently ESKOM provides the existing farmers with power via a single 11 kV overhead line running parallel to the national road (N2). This 3.5 km line will have to be moved prior to mining the area north of the N2 national road.

No power is required for the workshop or related infrastructure.

3.1.3 Opencast pits

The environmental objectives associated with the opencast pits are:

- To limit 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.

3.1.4 Establishment of Infrastructure

There are existing buildings on site that will be used as workshops and administration buildings during the life of the mine. The workshops will be the only new infrastructure that will be constructed. The environmental objectives associated with the existing infrastructure are:

- Optimal utilization 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, contain and clean up any spillages during the operational activities;
- 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.

3.1.5 Administrative buildings

The environmental objectives in terms of the operation within administrative buildings are:

- Optimal utilisation and maintenance of existing administrative buildings in a well-planned manner;
- Ensure that the land surface, habitats, vegetation and animals are not destroyed, disturbed and/or alienated unnecessarily;
- To contain and prevent any pollution from these areas with structures and facilities;
- Ensure that an effective surface run-off control system is in place in order to deal with the separation of clean and dirty water;
- The sustainable and responsible utilization (re-use) of all water resources and the prevention of pollution thereof; and
- The sustainable rehabilitation of the plant sites and related activities (if not required anymore) in order to address all environmental impacts as far as practically possible.

3.1.6 Clean and dirty water infrastructure.

Earth berms and cut-off drains will be constructed around the open pit excavations to divert all the clean uncontaminated water around the mining area and back into the natural streams:

- Ensure that an effective surface run-off control system is in place in order to deal with the separation of clean and dirty water;
- The sustainable and responsible utilization (re-use) of all water resources and the prevention of pollution thereof;
- Ensure that the land surface, habitats, vegetation and animals are destroyed, disturbed and/or alienated unnecessarily;
- To prevent, contain and clean-up any environmental pollution caused by the construction and operation of the clean and dirty water infrastructure.

3.1.7 Contractor lay down areas

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

- To as far as possible, aim to establish the contractors lay down areas where opencast operations will take place and/or where other infrastructure is established in order to minimise the area of disturbance;
- 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 place 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, taking into account the nature of materials stored and any requirements related to their storage, use and disposal;
- To rehabilitate the area as per the closure objectives in order to address all environmental impacts as far as possible and practical.

It is important to note that no additional infrastructure is planned for the proposed extension of the north eastern boundary of the Ferreira mine. The proposed mine boundary extension only influences the extension of the north eastern edge of the north pit.

3.2 Mining operation objectives

3.2.1 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.

3.2.2 Transportation of materials

The environmental objectives in terms of transportation of materials via the existing and proposed road infrastructure on site are:

- Optimal utilization and maintenance of existing road network in a well planned manner.
- To take care that no new land surface, habitats of vegetation and animals are destroyed, disturbed or alienated unnecessarily.
- To prevent, contain and clean-up any spillages from vehicles in the surrounding environment.

3.2.3 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.

4 PROCEDURE FOR ENVIRONMENTAL RELATED EMERGENCIES AND REMEDIATION

An effective, comprehensive, well-considered and tested environmental emergency preparedness and response plan has the potential to save lives, prevent unnecessary damage to the company and other property and to manage environmental risk in the event of a large chemical spill, oil spill, fuel spill or explosives spill.

The MPRDA requires in the Regulations Section 51(b) iii that the mine implement procedures to environmental related emergencies and remediation.

4.1 What is an Environmental Emergency Response Plan?

Environmental emergencies occur over the short term and require an immediate response. A mine, as part of its management tools, especially if it is ISO 9000 and ISO 14001 compliant, should have an Emergency Response Plan. If one does not exist then one should be compiled and disseminated to all employees and contractors and in the event of an emergency, the emergency response plan should be consulted.

This plan should be placed around the mine where it will be easily viewed. The plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers. It is advisable that the mine tests the emergency response plan in order to identify any areas for improvement.

If the emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community will be informed, prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.

Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios, pagers or telephones, must be placed around the mine. A checklist of emergency response units must be consulted and the relevant units notified.

The checklist includes:

- Fire department;
- Police;

- Emergency health services such as ambulances, paramedic teams, poisons centers;
- Hospitals, both local and further afield, for specialist care;
- Public health authorities;
- Environmental agencies, especially those responsible for air, water and waste issues;
- Other industrial facilities in the vicinity with emergency response facilities;
- Public works and highways departments, port and airport authorities; and
- Public information authorities and media organizations.

4.1.1 Emergency Procedures

Accident Handling Procedure for Duty Officials

1. Take down details from reportee including the following:
 - (a) Telephone number of reportee;
 - (b) Nature of injuries to accident victim;
 - (c) If assistance is required from the paramedic;
 - (d) Where the accident victim is located;
 - (e) If transport is required to case vac patient; and
 - (f) Instruct reportee to leave a messenger by the phone.
2. If the injuries are serious contact ER 24 who will notify the paramedics.
3. Await paramedics and instruct them to proceed to the accident site.
4. Notify security and inform them of ambulance arrangements and where the said vehicle must go to.
5. Inform the paramedic called out on the following:
 - (a) Telephone number of reportee;
 - (b) Nature of injuries to accident victim or victims;
 - (c) Where is the injury, part of body (arm, leg, head, etc.);
 - (d) Where the accident victim is presently;
 - (e) What is the condition of victim (breathing, stable, etc); and
 - (f) If an ambulance is required to case vac victim from surface location to hospital.
6. If necessary provide a guide, at security gate, to escort the ambulance or paramedics to the required location.
7. Inform manager of the accident.

NOTE:

The procedure does not change because there is more than one accident victim. One victim or 20 victims must be handled in the same manner.

Emergency Procedure for Duty Officials

In the event of an explosion or fire occurring, the following action must be taken by the duty official as a first phase:

First Phase:

1. Take down the following details of the incident from the reportee:
 - (a) Nature of the incident, explosion, fire etc;
 - (b) Location of the incident, explosion, fire etc;
 - (c) If there are casualties and the nature and extent of their injuries;
 - (d) Ask if the reportee requires assistance (rescue team, doctor, paramedic, transport etc);
 - (e) If the reportee and his team are going to or are in the rescue chamber;
 - (f) The phone number of the reportee; and
 - (g) Name of person reporting the incident.
2. Based on the above-mentioned information, the official on duty will take a decision whether to evacuate any or all other work areas of the mine, making use of the current escape plan for the section or area.
3. Report the incident to the mine manager and the Subordinate Manager.
4. If the mine manager is unobtainable then report the incident to the *next* lowest level of official (engineer, mine overseer, etc).
5. Contact and call out the following personnel:
 - The mine doctor and paramedics;
 - Occupational hygienist (Ventilation Officer)
 - The mine overseer for the incident area;
 - The mine engineer; and
 - The safety manager.
6. Begin a logbook or record of events putting in detail of times and who said what, where and when, going back to the original reportee.

NOTE:

- (i) The official will assume the position of the incident controller until relieved of that position by the newly appointed incident controller, i.e. (mine manager, engineer, etc).
- (ii) It is important to ensure that all phone messages are kept to a minimum duration throughout the incident period.

Second Phase:

1. Appoint lamp room attendant as required in terms of this emergency standard procedure to conduct shaft clearance of evacuates.
2. If necessary send for ER 24, contracted service of the mine, fire brigade, police, etc.
3. Give feedback to newly appointed incident coordinator once he is present on the mine and hand over role to new incident coordinator.
4. Follow instructions of Mine Manager.

5. Refer all media enquiries to head office legal department.
6. Remain in position at control room until relieved.
7. Brief official on current situation.

NOTE:

Remember to maintain the logbook at all times throughout the duration of the incident.

4.1.2 Emergencies, Procedures and Remedial Action

The following define the most likely potential environmental emergencies:

- Accidents;
- Fires;
- A major hydrocarbon spill or leak;
- A major spill or leak of process water;
- Flooding;
- Explosions;
- Subsidence; and
- Dump Failure.

4.1.2.1 Accidents:

In the case of a medical accident or problem, the mine should have at least a first aid kit available and a First Aid officer should be on duty at all times. It is preferential that the mine has a First Aid room or a small clinic. In the event of an emergency a checklist of emergency response units must be consulted and the relevant units notified. In this case, many of the emergency services will be sourced from the nearest main town.

4.1.2.2 Fire:

Veld fires and fires resulting from other sources must be handled with extreme caution. Fire extinguishers should be placed around the mine.

Procedure:

- In the event of a fire an alarm should be activated to alert all employees and contractors.

- Identify the type of fire and the appropriate extinguishing material. For example water for a grass fire, and mono ammonium phosphate based fire extinguisher for chemical and electrical fires.
- In the event of a small fire the fire extinguishers placed around the mine should be used to contain and extinguish the fire.
- In the event of a large fire, the local area council's fire department will be notified and should react timeously.
- All staff will receive training in response to a fire emergency on site.
- A Fire Association should be set up with the mine and surrounding land owners to facilitate communication during fire events and assist in fighting fires, where necessary.
- If possible all surrounding drains, such as storm water drains need to be covered and or protected to prevent any contaminated water from entering the drains.
- In case of a chemical or petroleum fire, run-off from the area should be contained as far as possible using the most appropriate measures e.g. spill absorbent cushions, sand or a physical barrier.
- Contaminated run-off must be diverted into an oil sump, or cleaned up.

4.1.2.3 *Major Hydrocarbon Spill*

Hydrocarbons such as diesel, petrol, and oil which is used as fuel for mine machinery will not be kept on site., but there is the possibility that spillage may occur onsite. As this is a coal mine there is also the possibility of a coal spillage occurring. In the event of a spillage, procedures must be put into place to ensure that there are minimal impacts to the surrounding environment.

Diesel, engine oil and hydraulic oil are the most likely hydrocarbons identified during impact assessments that can result in an emergency situation.

The following procedure applies to a major hydrocarbon spill:

- In the event of a small spillage, the soil should be treated in situ, using spill cleanup kits.
- Every precaution should be taken to prevent the spill from entering the surface water environment.
- In the event of a large spillage, adequate emergency equipment for spill containment or collection, such as additional supplies of booms and absorbent materials, will be available and if required, a specialized cleanup crew will be called in to decontaminate

the area. The soil should be removed and treated at a special soil rehabilitation facility.

- Reasonable measures must be taken to stop the spread of hydrocarbons and secure the area to limit access.
- Dispatch necessary services.
- The incident must be reported to the Environmental coordinator immediately.
- The Environmental Coordinator will assess the situation from the information provided, and set up an investigation team or relevant personnel. Included in this team could be the Mine Manager, Chief Safety Officer, the employee who reported the incident and any individual responsible for the incident.
- When investigating the incident, priority must be given to safety.
- Once the situation has been assessed, the Environmental Coordinator must report back to the Mine Manager.
- The Mine Manager and the investigation team must make a decision on what measures can be taken to limit the damage caused by the incident, and if possible any remediation measures that can be taken.
- The Environmental Officer or person in charge should have a list of company contact details that will facilitate with the cleanup operations.

4.1.2.4 Major Water Leak or Spill

Dam wall failures and burst high-volume dirty water pipelines have been identified as potential emergency situations. The following steps should be followed:

- Turn off all water supply to the dam/pipeline.
- Dispatch necessary emergency services.
- Take all reasonable measures to stop the spread of contaminated water.
- The incident must be reported to the Environmental Coordinator immediately.
- The Environmental Coordinator will assess the situation from the information provided, and set up an investigation team or relevant personnel. Included in this team could be the Mine Manager, contracted service of the mine, the employee who reported the incident and any individual responsible for the incident.
- When investigating the incident, priority must be given to safety.
- Once the situation has been assessed, the Environmental Officer must report back to the Mine Manager.
- The Mine Manager and the investigating team must take a decision on what measures can be taken to limit the damage caused by the incident, and if possible any remediation measures that can be taken.

4.1.2.5 *Flooding*

There is potential for flooding during the rainy season, but particularly November to January when severe thunderstorms can occur. This could result in a large volume of water flowing downstream or accumulating in a water containment facility and could cause major damage to equipment and endanger the lives of employees on site. Procedures must be put in place to ensure that there is a quick response to flood events and damage is kept to a minimum.

Procedure:

- DWAF's flood warning system should be reviewed annually.
- The use of emergency pumps should occur if the water floods the boxcuts, where it may be exposed to contamination.
- Mine management should be made aware of any such event so they can take appropriate action to ensure production losses are kept to a minimum.
- All dams and water containment facilities should have a 0.8m freeboard and an overflow or outlet to ensure that no damage occurs to the facilities.
- All contaminated water should be contained on site, as far as possible and discharges to the environment should only occur if absolutely necessary in an extreme flood event.

4.1.2.6 *Explosions*

Explosions can occur in the plant and workshop areas when working with gas cylinders and chemicals. These could result in large numbers of employees being injured and requiring medical assistance.

Procedure:

- Alternative evacuation routes should be devised, should a rock fall occur as a result of the explosion;
- Alternative air supply routes should be identified and implemented; and
- All relevant emergency response units must be notified and hospitals informed of incoming patients.

5 ENVIRONMENTAL AWARENESS PLAN

Mashala will implement an Environmental Awareness Plan (EAP) at Ferreira Coal Mine.

The material/source of information for the EAP will be the approved Environmental Management Programme Report(s), as well as other relevant specialist reports. The environmental awareness plan is detailed in the table below.

Table 3: Environmental Awareness Plan

Aspects	Objectives	Description	Time Period	Responsible Party/Person
1. Environmental policy	Demonstrate management commitment to responsible environmental management	<p>Top management has a role to play in building awareness and motivating employees by explaining the company's environmental values and communicating its commitment to environmental policy. All workers of the company should understand and be encouraged to accept the importance of implementing the environmental management program.</p> <p>Motivation to continually improve can be enhanced when employees are recognized for achieving environmental objectives and targets and encouraged to make suggestions that can lead to improved environmental performance.</p>	In place	Environmental Manager
2.HSEC Management System		<p>Identify, assess and manage risks to employees, non-employees, the environment and the communities within which the activity is carried out.</p> <p>Set HSEC targets, allocate appropriate resources to achieve those targets, and undertake periodic reporting of HSEC performance.</p>	Ongoing	Environmental Manager
3.Communication	Describe the manner in which Mashala will inform employees of any environmental risks which may result from their work and; The manner in which the risks	<p>How do the employees receive the information?</p> <p>At safety training sessions;</p> <p>Induction programmes;</p> <p>Regular publications and information leaflets;</p>	Ongoing	Management & Environmental Manager

Aspects	Objectives	Description	Time Period	Responsible Party/Person
	must be dealt with in order to avoid pollution or the degradation of the environment	Bulletin boards (posters), Electronic mail messages, Forum meetings, which involves the local I & AP's and the DMR. Communicate and consult with employees and contractors in developing HSEC systems and improvements.		
4. Information		Information from internal (EMP, etc) and external sources would be put in a language understandable to workers. Environmental information will be communicated via the methods spelled out above.	Ongoing	Environmental Manager
5. Training		All employees should receive basic environmental awareness training, either as induction training or later at special training sessions. Different levels of responsibility in relation to individual's potential impact on the environment must be addressed in the training session. Further motivation of the workforce will be achieved through in-house training and attending short courses with regard to environmental management, etc. Appropriate training relevant to the achievement of the environmental policy, implementation of the environmental management program will be provided to all personnel. Employees shall have an appropriate knowledge base. Mashala will also ensure that the	Ongoing	Environmental Manager

Aspects	Objectives	Description	Time Period	Responsible Party/Person
		<p>contractors working on site provide evidence that they have the requisite knowledge and skills to perform the work in an “environmentally responsible manner”.</p> <p>Education and training is needed to ensure that the employees’ knowledge of regulatory requirements, internal standards and policies and objectives is current.</p>		
6. Reporting		<p>Every environmental incident that might happen and which the workers become aware off should be reported to the manager.</p> <p>The worker can only report on incidents if he is made aware off the possible environmental risks through the communications methods indicated in section 1.</p> <p>A written reporting format should be put in place.</p> <p>Communication includes establishing processes to report internally and, where desired, externally, on environmental activities in order to:</p> <ul style="list-style-type: none"> Demonstrate management commitment to responsible environmental management; Deal with concerns and questions about environmental issues (handled within the Forum); Raise awareness of the organization’s environmental policies, environmental management program; and Inform internal or external interested parties about the mine’s management system; <p>A formal complaints/concerns reporting system to address</p>	Ongoing	All

Aspects	Objectives	Description	Time Period	Responsible Party/Person
		I &AP will be put in place (complaints register); Mashala Resources (Pty) Ltd. will regularly communicate with the affected community. This communication must address new developments, problems, achievements and all other relevant aspects of mutual interest.		

6 ENVIRONMENTAL MANAGEMENT PROGRAMME

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, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting 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 Mashala.

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 persons have assessed these commitments in detail and have committed to the specific management measures where indicated in the table.

Based on the environmental setting, as well as the issues raised during consultation as presented in the following table, GCS has identified the main impact areas requiring specialist studies.

The following sections provide the reader with a view on how the potential impacts will be rated in terms of their significance and what the contents of the EIA/EMP will entail.

6.1.1 Environmental Impact Significance Rating Methodology

To ensure uniformity, the assessment of potential impacts will be addressed in a standard manner so that a wide range of impacts is comparable. For this reason a clearly defined rating scale will be provided to the specialist to assess the impacts associated with their investigation. Each impact identified will be assessed in terms of probability (likelihood of occurring), extent (spatial scale), intensity (severity) and duration (temporal scale). To enable a scientific approach to the determination of the impact significance (importance), a numerical value was linked to each rating scale. The sum of the numerical values defined the significance. In each instance the

significance was indicated with either +/- sign in the EIA, which indicates a positive or negative influence on the environment respectively.

6.2 Construction Phase

The following sections details the significance of the potential impact associated with the activities of the construction phase associated with the Ferreira Coal Mine project:

- Construction of access roads where necessary;
- Construction of opencast pits;
- Stormwater management facilities; and
- Construction of HEF Silo's

Should the proposed north pit extension be approved, no additional impacts are envisaged in terms of access road construction since the existing access roads will be utilized during the north pit extension. The impacts described in Tables 48 with regard to the construction of open cast pits apply to the proposed expansion of the north pit. It should however be noted that impacts associated with infrastructure development (E.g. Construction of HEF silo's) do not apply as this proposed expansion includes no additional infrastructure.

6.2.1 Establishment of access roads

An existing gravel road will be used for transport of plant feed from the mining area to the existing Delta wash plant site approximately 1km away. This road will also be used for access to the mining area.

Access and haul roads will be constructed between the opencast areas and the workshops and supporting infrastructure. Access roads will be constructed where necessary for the farmers to allow access to their lands.

No additional access roads are planned as part of the north pit extension.

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management costs
Ecology (Fauna & Flora)	Concentrated run-off could lead to erosion, which will reduce the fertility of soils and the subsequent establishment of flora.	Sustainable erosion control measures (wind and water erosion) will be implemented and maintained where necessary in areas disturbed by the operations and the existing infrastructure will be maintained.	Prior to construction	
	The settling of dust (generated use of haul roads on leaves could reduce the potential of growth in flora and impact on the habitat of the fauna in the area.	Wet suppression techniques will be implemented to limit dust dispersion where and when necessary.	At establishment	
	Increase in alien species	<ul style="list-style-type: none"> A detailed weed monitoring programme must be compiled and enforced at the mine. Ongoing monitoring must be undertaken (recommended for every two weeks) to identify areas impacted by weeds. A weed eradication programme must be implemented. Where possible local people should be utilised to undertake the weed eradication project. 	<p>Prior to construction</p> <p>Monthly</p>	R10 000-00

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management costs
Air Quality	Vehicle activity on unpaved roads and paved roads releases fugitive dust.	Mitigation measures will be implemented on the roads and unpaved roads to prevent the release of fugitive dust.	Prior to construction	
Noise	Vehicle activity on access roads and haul roads will lead to an increase in noise	<ul style="list-style-type: none"> • Roads leading to the mine and internal roads within the mining are to be maintained in a good order at all times and maintenance of the road system to be done on a daily basis. • The speed of the trucks to be monitored and speed limits to be enforced according to the capacity and the condition of the trucks. • Select equipment with lower sound power levels • Install silencer for fans • Installing suitable mufflers on engine exhausts and compressors components. • Limiting the hours of operation for specific equipment and mobile sources with high sound power outputs 	Prior to construction	

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management costs
Visual	Visual impact regarding te use of haul roads	Access roads will require effective dust suppression .I.e. regular wetting and/or the use of non-polluting chemicals that will retain moisture in the road surface.	Daily	R65 000-00
Social Impact	Erosion of existing roads	<ul style="list-style-type: none"> • A suitable Stormwater management plan must be implemented as it limits erosion. • Clean Stormwater will be released to the environment in a controlled manner to tie in with existing surface drainage features. 	At establishment	

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
Ecology (Fauna and Flora)	Loss of habitat and local extinction of fauna and flora	<ul style="list-style-type: none"> Construction activities should be limited to the designated areas. Construction activities should be confined outside of the 30m wetland buffer zone Where possible as little as possible vegetation should be removed. Relocate sensitive species 	Prior to construction	R15 000-00
	Death or injury to from machinery to fauna and flora	<ul style="list-style-type: none"> Construction area to be scanned for threatened or endangered plants before allowing heavy machinery on site. No go areas to be demarcated with danger tape. 	Prior to construction	
	Destruction of natural habitat for fauna	<ul style="list-style-type: none"> Are to be scanned for nests before heavy machinery are allowed on site. Nests to be relocated to alternate conservation site. 	Prior to Construction	R15 000-00
Surface water	Soil Erosion	Temporary vegetation and berms must be used during to reduce the potential of erosion	Concurrent	

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
	Surface water pollution	<ul style="list-style-type: none"> No carbonaceous materials may be used during the construction phase Water must be used for dust suppression on access roads 	Daily	R65 000-00
	Water quantity	Temporary attenuation dams must be constructed to ensure that the volume of water leaving the site is not higher than the pre-development volumes	Concurrent	
Wetland	Destruction of wetlands due to the construction of the opencast pit	<ul style="list-style-type: none"> Ensure unpolluted supply of seasonal water flows from drainage ditch to Wetlands and pan Keep mining outside the 30m buffer zone around the wetland The top of the drainage ditch under the N2 highway must be kept open to allow water flow into the pan 	Weekly	

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
Archaeology	Disturbance of graves and other historical infrastructure found on proposed opencast pits	<ul style="list-style-type: none"> A buffer of 20m must be kept between any mining activity and the cemetery. Graves to be relocated when opencast activity extends towards cemetery. In event of relocation of graves, the grave relocations process must be undertaken under NHRA Section 36. 	As soon as opencast activity extends towards cemetery	R57 193.80 R100 000.00
Visual Impact	Visual intrusion	<ul style="list-style-type: none"> Dust suppression should be implemented during construction of opencast pit. Only the footprint and a small construction buffer zone around the opencast pit should be exposed. Natural vegetation should be retained. All topsoil and subsoil should be placed along the northern, eastern and western edges of the property to act as visual screens. 	Daily Concurrent	R65 000-00

6.2.3 Construction of HEF Silo

Table 6: Construction of HEF Silo

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management costs
Geology	No Impacts expected			
Topography	The construction of the HEF Silo will impact on the micro and macro topography due to the construction of opencast operations.	<ul style="list-style-type: none"> • Areas of construction must be clearly demarcated. • No construction or project related activities may be undertaken outside of the demarcated areas. 	<p>Concurrent</p> <p>Concurrent</p>	
Soil Land Capability	Loss of soil resources and land capability due to stripping of soil for the establishment of the HEF Silo	<ul style="list-style-type: none"> • Areas of construction must be clearly demarcated. • No construction or project related activities may be undertaken outside of the demarcated areas. • Prior to construction of the HEF Silo, the soil will be stripped and placed on a soil stockpile. 	<p>Concurrent</p> <p>Concurrent</p>	R100 000-00
	The construction of the HEF Silo could lead to the alienation of existing land uses in the area.	<ul style="list-style-type: none"> • Existing roads will be utilised as a first priority to limit the need for additional roads where possible. • Areas of construction must be clearly demarcated. • No construction or project related activities 	Prior to construction	

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management costs
		<p>may be undertaken outside of the demarcated areas.</p> <ul style="list-style-type: none"> Where necessary access to existing areas will be provided. 	Concurrent	
Ecology (Fauna & Flora)	Concentrated run-off could lead to erosion, which will reduce the fertility of soils and the subsequent establishment of flora.	Sustainable erosion control measures (wind and water erosion) will be implemented and maintained where necessary in areas disturbed by the operations and the existing infrastructure will be maintained.	Prior to construction	
	The settling of dust (generated by the construction activity) on leaves could reduce the potential of growth in flora and impact on the habitat of the fauna in the area.	Wet suppression techniques will be implemented to limit dust dispersion where and when necessary.	At establishment	
	Increase in alien species	<ul style="list-style-type: none"> A detailed weed monitoring programme must be compiled and enforced at the mine. Ongoing monitoring must be undertaken (recommended for every two weeks) to identify areas impacted by weeds. A weed eradication programme must be implemented. 	<p>Prior to construction</p> <p>Monthly</p>	R10 000-00

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management costs
		<ul style="list-style-type: none"> Where possible local people should be utilised to undertake the weed eradication project. 		
Air Quality	Construction vehicle used on unpaved roads and paved roads releases fugitive dust.	Mitigation measures will be implemented on the roads and unpaved roads to prevent the release of fugitive dust.	Prior to construction	
Noise	Due to the nature of the construction activities an increase in noise levels is anticipated	<ul style="list-style-type: none"> Roads leading to the HEF Silo area are to be maintained in a good order at all times and maintenance of the road system to be done on a daily basis. The speed of the construction vehicles to be monitored and speed limits to be enforced according to the capacity and the condition of the trucks. Select equipment with lower sound power levels. Install silencer in the fans of vehicles. Installing suitable mufflers on engine exhausts and compressors components. Limiting the hours of operation for specific equipment and mobile sources with high sound power outputs. 	Prior to construction	

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management costs
Visual	Visual intrusion due to the erection of the HEF Silo	Only the footprint and a small construction buffer zone around the HEF Silo area should be exposed. Natural vegetation should be retained.	Frequently	

6.3 Operational Phase

The operational phase will comprise of the following activities that could lead to potential impacts:

- Use of access and haul roads
- Opencast mining
- Ancillary infrastructure

6.3.1 Use of access and haul roads

An existing gravel road will be used for transport of plant feed from the mining area to the existing Delta wash plant site approximately 1 km away. This road will also be used for access to the mining area. During the operational phase of the mine access and haul roads will have been constructed between the opencast areas and the workshops and supporting infrastructure. Access roads will have been constructed where necessary for the farmers to allow access to their lands. Water management will be an important factor throughout the life of mine.

The proposed extension of the north eastern boundary of the existing Ferreira mine is not expected to influence the existing access routes used by the mine. In addition, no new haul roads are planned as the proposed north pit extension will utilize the existing infrastructure.

Table 7: Activities, Associated Impacts and Management measures for use of access and haul roads

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
Geology	No Impacts expected			
Topography	No Impacts expected			
Soil Land Capability	Erosion due to the change in the geomorphology and surface drainage of the area.	<ul style="list-style-type: none"> • Sustainable erosion control measures (wind and water erosion) will be implemented and maintained where necessary in areas disturbed during the operational phase. • Erosion control measures will be implemented as part of the designs of linear infrastructure to limit the development of erosion and the associated siltation potential. • Existing infrastructure will be maintained. • Surface water drainage diversions (as part of the clean and dirty water systems and associated culverts), management measures and designs must incorporate the geomorphological components of the area in order to ensure that as far as practically possible the man-made structures have the 	<p>Prior to construction</p> <p>Concurrent</p> <p>As needed</p> <p>At establishment</p>	

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
		least impact on the environmental processes in the area. <ul style="list-style-type: none"> All soil stockpiles should be sloped to limit erosion and be constructed to encourage vegetation. 	At Establishment	
Ecology (Fauna & Flora)	The presence of mining infrastructure has resulted in the destruction of animal habitats, it is not envisaged that the construction of the haul roads will significantly increase this impact.	<ul style="list-style-type: none"> Existing roads will be utilised as a first priority to limit the need for additional roads where possible. Areas of operation must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas. Where possible the mine will ensure to provide sufficient time for animals to relocate from the construction area. 		
	Concentrated run-off could lead to erosion, which will reduce the fertility of soils and the subsequent establishment of flora.	Sustainable erosion control measures (wind and water erosion) will be implemented and maintained where necessary in areas disturbed by the operations and the existing infrastructure	Concurrent	

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
		will be maintained.		
	The settling of dust (generated by operational activities) on leaves could reduce the potential of growth in flora and impact on the habitat of the fauna in the area.	Wet suppression techniques will be implemented to limit dust dispersion where and when necessary.	Daily	R65 000-00
	The clearing of vegetation and associated construction activities could lead to the increase and spreading of alien species.	<ul style="list-style-type: none"> • A detailed weed monitoring programme must be compiled and enforced at the mine. • Ongoing monitoring must be undertaken to identify areas impacted by weeds. • A weed eradication programme must be implemented. • Where possible local people should be utilised to undertake the weed eradication project. 	Monthly	R10 000-00

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
Groundwater	Spillage of oils, greases, diesel during construction could result in the contamination of the surface water resources and the subsequent groundwater resources.	<ul style="list-style-type: none"> • All vehicles and equipment will be serviced regularly and will be kept in good working order. • All chemicals, contaminated water and/or hydrocarbons will be stored in designated areas. • Spill kits will be available at all areas where hydrocarbons are utilised. • Employees will be trained in the utilisation of the spill kits. If any other minor spillage occurs the spillage will be cleaned immediately and the contaminated area will be rehabilitated, as appropriate. • Employees will be educated by means of training and the Environmental Awareness Plan to make them aware of the necessity to prevent spillages by the implementation of the good housekeeping practices. 	Concurrent	

Impacted Area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
Surface Water	The removal of vegetation and other associated activities could lead to the siltation of surrounding watercourses.	Clean and dirty water systems will be constructed prior to the construction of infrastructure as far as practically possible.	Ongoing	R10 000-00
Air Quality	Vehicle activity on unpaved roads and paved roads releases fugitive dust.	Mitigation measures will be implemented on the roads and unpaved roads to prevent the release of fugitive dust.	Daily	R65 000-00
Noise	Operational activities will increase the ambient noise levels in the area. This is however only temporary.	<ul style="list-style-type: none"> Where noise becomes a nuisance management measures will be investigated and implemented to address these. Operational activities will be limited to the hours of 7h00 to 18h00 weekdays. 	Concurrent	
Visual	No Impacts Expected			

6.3.2 Opencast section

The open pit areas cover the majority of the reserve and these will be mined using the conventional roll over method. The material from the boxcut will be placed as close to the final void as possible to reduce the work at closure. The strips will be between 30 and 40m wide so as to use the selected equipment efficiently.

The open pit area will be mined using trucks and excavators with other equipment to assist where required. Continuous roll over rehabilitation will take place during the life of mine.

The proposed extension of the north eastern boundary of the mining right, if approved, will influence the extension of the north eastern boundary of the north pit. Identical open cast mining methods will be utilized during the extension of the pit.

Table 8: Activities, Associated Impacts and Management measures for Opencast Mining

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
Geology	Removal of the geological coal and associated resources	<p>Make optimal utilisation of the coal resources which forms part of the mining rights area.</p> <p>The mine must ensure to optimally utilise all available coal resources. Should additional coal resources be identified outside the boundaries as stipulated within this report, the necessary applications must be made to the relevant authorities, who will include, but are not limited to the DMR (for mining), MDALA (for listed activities); DWAF (for water related issues), NDA (for potential impacts on land use and capability), SAHRA (for potential impact on unidentified graves or culturally important sites).</p>	Daily	
Topography	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.	<ul style="list-style-type: none"> 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. (Refer to figure 3) 	<p>Concurrent</p> <p>Concurrent</p>	R250 000

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
Soils	Erosion with regards to opencast mining	<ul style="list-style-type: none"> • 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 allaying 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 (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. 	<p>At Establishment</p> <p>Concurrent</p> <p>Concurrent</p> <p>Weekly</p>	R50 000.00
Ecology (Fauna and Flora)	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 all invasive alien species must be established on site	Monthly	R10 000-00

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
	Polluted water exiting mine works reduces genetic fitness of population	<ul style="list-style-type: none"> • Set up filtration ponds on outlets of the mine. Neutralize any acidic water. • All equipment to be repaired outside of the mine works. • Remove polluted soil. • Ensure clean supply of water into drainage ditch 	Concurrent	Filtration ponds shall be constructed only if polluted water exits at the mine, however this is not envisaged.
	Injury to fauna during blasting and operational phase	<ul style="list-style-type: none"> • Let of a lower decibel alert sound (70db) prior to blast. • Scan area thoroughly before earthmoving equipment is allowed on site. • Equip machines with lights. • Do not operate after dark. • Mark no-go areas with danger tape. 	Prior to blasting Concurrent	
	Hunting of animals	<ul style="list-style-type: none"> • Alert farmers that temporary workers are on site. • Instruct workers to keep off neighbouring properties and that hunting is an offence. • Fence off mining area. 	Concurrent	

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
Groundwater	Dewatering of aquifers	<ul style="list-style-type: none"> • Concurrent rehabilitation of sections. • No opencast sections to be de-watered for more than 18 months or the time period of the de-watering to be kept as short as possible per opencast block. • Groundwater levels will recover once de-watering stops 	Concurrent	
	Contamination of the aquifer mining areas No Impact on the streams	<ul style="list-style-type: none"> • The extent to which potential acid mine drainage will be generated from the pits will be controlled by careful handling of the spoils, and specifically any pyritic material, like the shale, during the operational phase; and by flooding the exposed coal seam at the bottom section of the pits as quickly as possible. • The shale/sandstone that will be stripped above the coal seam will be backfilled to the lowest possible elevation during the roll-over method of mining. This will ensure that the potential poor quality material is flooded as quickly as possible after mining is completed and so reduce the risk of oxidation and acidification. At Rehabilitation: <ul style="list-style-type: none"> • Pits to be backfilled; • Re-vegetated as quickly as possible. This will ensure 	Concurrent	

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
		<p>that the rate of recharge to the pits is minimised as soon as possible.</p> <ul style="list-style-type: none"> • The backfill must be shaped to ensure no ponding on the rehabilitated area. • All clean surface runoff must be diverted away from the pit through a series of cut-off trenches and berms. • Clean runoff must be diverted back into the catchment. • If the mitigation measures discussed above are implemented, it is expected that acid mine drainage from the pits can be minimised and possibly cease after closure. • Furthermore, if water levels can be managed inside the pit and not rise into the perched weathered aquifer as described above, it is not anticipated that potential contamination generated inside the pits will have a significant impact on downstream groundwater users. • The information presented here must be confirmed through the results of the proposed on-going monitoring programme and re-calibration of the numerical transport 		

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
		<p>model.</p> <ul style="list-style-type: none"> The recalibration of the model will be done within 12 months from commencement of mining. 		
	Spillage of oils and liquids can lead to contamination of the aquifers	Storage features should be designed properly and good housekeeping should be in place to prevent accidental spillage.	Concurrent	
Surface water	Soil Erosion	Temporary vegetation and berms must be used to reduce the potential of erosion	Concurrent	R10 000-00
	Surface water pollution	<ul style="list-style-type: none"> Water must be used for dust suppression on access roads. The pollution control dam and trenches will be inspected regularly and silt build up to be removed as and when required to ensure adequate functioning of the dam. 	Daily Monthly	R65 000-00
	Water quantity	The separation of clean and dirty water should be optimally implemented by constructing water diversion structures. All dirty catchment must be as small as possible and clean runoff from the surrounding catchments must be allowed to flow freely to the natural environment.	Concurrent	

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
Wetlands	Destruction of wetlands due to mining	<ul style="list-style-type: none"> • Ensure unpolluted supply of seasonal water flows from drainage ditch to Wetlands and pan. • Keep mining outside the 30m buffer zone around the wetland. • The top of the drainage ditch under the N2 highway must be kept open to allow water flow into the pan. • All facilities that store or process waste must be kept a distance of 150m from the wetland. • Routine monitoring of all water leaving the mine works must be carried out throughout the life of the mine until closure phase. • An environment control officer must be present on site during excavation, blasting and construction phases of the mine. 		

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
Noise and vibration	Increase in noise during operational phase of the opencast pits	<ul style="list-style-type: none"> • Monitor all activities to determine if a noise nuisance/disturbance is created. • All digging faces must have alternate overburden dumps identified, which can be activated should noise levels approach unacceptable levels • Scheduling of equipment within the pit must take into consideration the noise emissions from the equipment in order to spread them out over the interface area. • A noise bund of at least 5m to be erected on the north-eastern boundary of the property. 	Ongoing At Establishment	
	Increase in noise during operational phase of the opencast pits	<ul style="list-style-type: none"> • When blasting the limit for ground vibration should not exceed 10mm/s. • An over pressure limit of 12dB should not be exceeded. • No blasting to take place when there are windy conditions. • Day times of blasting operations to be established. 	Concurrent	

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
Archaeology	Disturbance of graves and other historical infrastructure found on proposed opencast pits	<ul style="list-style-type: none"> A buffer of 20m must be kept between any mining activity and the cemetery. Graves to be relocated when opencast activity extends towards cemetery. In event of relocation of graves, the grave relocations process must be undertaken under NHRA Section 36. 	Relocation of Cemetery	R100 000.00
Visual Impact	Visual intrusion	<ul style="list-style-type: none"> Dust suppression should be implemented during construction of opencast pit. Only the footprint and a small construction buffer zone around the opencast pit should be exposed. Natural vegetation should be retained. All topsoil and subsoil should be placed along the northern, eastern and western edges of the property to act as visual screens. 	Daily	R65 000-00
Social Impact	Water quality in the area	<ul style="list-style-type: none"> The coal stockpile footprints can be minimised and the underlying material compacted to reduce the seepage rates into the underlying material. A Buffer zone can be left towards the non-perennial stream where mining is restricted to the south, away from the non perennial stream. 		

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
	Contamination of surface water in the area	<ul style="list-style-type: none"> • A Buffer zone can be left around these sensitive areas where mining will not occur. • Monitoring points should be established and ongoing monitoring should occur during the operational phases. • Rehabilitation must be done properly upon mine closure 	<p>Bi-annual</p> <p>At Closure</p>	R10 000-00
	Corrosion of equipment near Mining Area	<ul style="list-style-type: none"> • The water used for dust suppression should be investigated. • Water monitoring must be done. 	Bi-annual	R10 000-00
	Impact of Noise and Vibration on the area	<ul style="list-style-type: none"> • The mine should enforce operating hours for heavy vehicles. Operations should also take into consideration important days when there is likely to be more traffic on the roads, such as pension payout days and market days. • The mine should look into installing vibration isolation for mechanical equipment and silencers for fans. • The mine could also re-locate noise sources to areas which are less noise sensitive to take advantage of distances and natural shielding. 	Concurrent	

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
	Impact on dust on the surrounding areas	<ul style="list-style-type: none"> • A Dust management plan must be implemented. • Dust suppression techniques have to be implemented. • With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity. 	Daily	R65 000-00
Northern Pit	Concurrent Rehabilitation	<ul style="list-style-type: none"> • Concurrent rehabilitation to take place • Pits to be backfilled once pit reaches steady production • Backfilling to continue until completion of the northern pits • Final void to be filled with hards and soft material • Final levelling will be done when final void has been completed • Total area to be grassed • Complete mining of North pit: December 2011 • Closure of Final Void #1: February 2012 • Final Levelling of disturbed area: May 2012 • Grassing of disturbed area: July 2012 • Total disturbed area of pit: Approximately 40Ha (please refer to Figure 3 for rehabilitation plan) 	Concurrent	

Impacted area	Activity description and potential impacts on the environment	Management Measures	Frequency	Annual Management Costs
Southern Pit	Concurrent Rehabilitation	<ul style="list-style-type: none"> • Pits designed with a double boxcut in the centre of the pit with mining occurring in both directions • Concurrent rehabilitation to take place • Pits to be backfilled once both sides reaches steady state production (June 2009) • Backfilling to continue until completion of the Southern pit • Final voids to be filled with hards and soft material • Final levelling will be done when final voids has been completed • Total area to be grassed • Complete mining of South pit: September 2010 • Closure of Final Void #1: December 2010 • Closure of Final Void #2: March 2011 • Final Levelling of disturbed area: May 2011 • Grassing of disturbed area: July 2011 • Total disturbed area of pit: Approximately 30Ha (Please refer to Figure 3 for Rehabilitation Plan) 	Concurrent	

Figure 4: Rehabilitation plan for the Ferreira Opencast North and South Pits

6.3.3 Ancillary infrastructures

Ancillary infrastructure refers to the establishment of the following:

- Offices;
- Workshops; and
- Water management.

The ancillary infrastructure is addressed as part of the overall impact tables.

It should be noted that the proposed extension of the north eastern boundary of the existing Ferreira mining right does not include any additional ancillary infrastructure.

6.4 Decommissioning and Closure Phase

The decommissioning phase will commence once the mining operations has reached the end of life.

6.4.1 Opencast section

The open pit areas cover the majority of the reserve and these will be mined using the conventional roll over method. The material from the boxcut will be placed as close to the final void as possible to reduce the work at closure. The strips will be between 30 and 40m wide so as to use the selected equipment efficiently.

The open pit area will be mined using trucks and excavators with other equipment to assist where required. Continuous roll over rehabilitation will take place during the life of mine.

Table 9: Activities, Associated Impacts and Management measures for Decommissioning and Closure of the Opencast

Impacted Area	Activity Description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
Topography	Backfilling and the presence of voids after mining activities.	<ul style="list-style-type: none"> • Due to economic implications associated with double handling, the mine would have undertaken ongoing rehabilitation during the operation phase and some voids will remain. • The voids will be made safe either by fencing or the establishment of berms, planting of indigenous thorny vegetation, as well as safety and warning signs . • All infrastructure will be removed; • Rehabilitated to be free draining; • All slopes and remaining stockpiles will be shaped to fit with ongoing rehabilitation procedure; and • Will be vegetated to ensure they will blend in with surrounding topography. • Inspection of subsidence will occur every 6 months. 	<p>At mine closure</p> <p>At mine closure</p>	See Closure cost
Soils and Land use	Erosion on rehabilitated areas	<ul style="list-style-type: none"> • All structures and infrastructure will be demolished, and all imported materials will be removed. • Compaction will be managed to protect the soil structure. • Rehabilitated areas will be ameliorated and seeded with the recommended seed mix. Growth must be continuously 	At mine closure	<p>See closure cost</p>

Impacted Area	Activity Description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
		<p>monitored.</p> <ul style="list-style-type: none"> The mine commits to assess and investigate the topsoil requirements for rehabilitation purposes and to ensure to utilise the available topsoil efficiently. 		
	<p>During the decommissioning phase the rehabilitation of the mining area will be undertaken. Should the mine not consult with the relevant authorities and stakeholders and come to a mutually agreed decision on the end result of the land use it could result a site not suitable for economical or environmental sustainability.</p>	<ul style="list-style-type: none"> All structures and infrastructure will be demolished, and all imported materials will be removed. Compaction will be managed to protect the soil structure. Rehabilitated areas will be ameliorated and seeded with a recommended seed mix. Growth must be continuously monitored. The mine commits to assess and investigate the topsoil requirements for rehabilitation purposes and to ensure to utilise the available topsoil efficiently. 	<p>At mine closure</p>	<p>See closure costing</p>

Impacted Area	Activity Description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
Ecology	Loss of vegetation due to badly managed rehabilitation	<ul style="list-style-type: none"> • Top soils will be replaced and the effected areas will be rehabilitated using indigenous vegetation common to the area. The rehabilitation of the soils will play a significant role in the rehabilitation of the vegetation. • The mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites. • After closure, rehabilitate and landscape the slopes, dumps and stockpiles remaining to be free draining and to blend into surrounding environment. • Where required, erosion control measures will be implemented up until the rehabilitation of the area proves to be successful. 	At mine closure	} See closure costing
	Activities at the opencast area can encourage the spread of alien invasive species	<ul style="list-style-type: none"> • Naturally occurring (indigenous) species will be used in the rehabilitation process. • To increase diversity, mulch seeded areas with seed bearing hay cut in natural veld areas surrounding property, or incorporate locally harvested seed in initial seed mix used. 	At mine closure	
Groundwater	Recovery of the groundwater levels	Opencast rehabilitation will occur during the operational phase	At mine	

Impacted Area	Activity Description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
		as part of the roll-over method of mining and water will be allowed to recovery in the shortest possible time (see table 8).	closure	
	Contamination of the surrounding aquifers	<ul style="list-style-type: none"> • The mitigation applied during the operational phase (the roll-over method of mining and concurrent rehabilitation) will ensure that the impact from the opencast mining section is limited at closure • Surface infrastructure: Rehabilitation of all surface infrastructure will occur directly after mining activities have stopped. • Proper roll over rehabilitation will minimise rain water infiltrating discard and other sensitive areas. 	At mine closure	
	Decant from the mining area	<ul style="list-style-type: none"> • Opencast pits to be planned so that their perimeters follow the surface contours along the lowest side of the pit and not cut directly across streams. • The rate of flooding of the pit post-closure will be monitored with monitoring boreholes drilled into the spoils. • The location of these borehole are to be drilled in the deepest part of the pits near the topographical low points (these will be confirmed after one year of mining); 	At mine closure	Will be determined once mining has commenced and groundwater model is updated

Impacted Area	Activity Description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
		<ul style="list-style-type: none"> • These monitoring boreholes will be used to determine whether the water level in the pit has risen above the decant elevation, which is usually the lowest topographical elevation at closure, but also depends on the dip of the coal seam. • The water level inside the pits will be kept 3 - 5 m below the decant level to prevent seepage into the shallow aquifer in the subsoil. • The rate and level to which groundwater will rise in the pits is largely determined by the volume of rainwater recharged. The most effective way to control in-pit groundwater levels during post closure is to ensure that the roll-over method of mining is kept up throughout the operational phase.(refer to table 8) • This will significantly reduce the rate of recharge to the pits during and post mining • At decommissioning: <ul style="list-style-type: none"> • Final voids to be backfilled • Final voids will be levelled • Final voids will be topsoiled 		

Impacted Area	Activity Description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
		<ul style="list-style-type: none"> • Final voids will be revegetated. • The backfill will be shaped to ensure no ponding on the rehabilitated area. • All clean surface runoff to be diverted away from the rehabilitated area through a series of cut-off trenches and berms. • Clean runoff must be diverted back into the catchment. • If decant occur, evaporation dams can be constructed within the perimeter of the pit to contain all decant. • This aspect will be planned during the operational phase in terms of dam locality, dam size and lining requirements. • The extent, magnitude and location of decant can be determined with greater confidence once groundwater monitoring information becomes available. • It is recommended that the impact of decant be evaluated one year after mining commence, once monitoring information is available. 		
Surface Water	The existing excavations will capture clean rainfall and stormwater. The loss	The impact on catchment runoff will be mitigated through the process of rehabilitation. The backfilling of open voids on the	At mine	

Impacted Area	Activity Description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
	<p>in surface runoff would be the water falling directly into the excavated pits and return water dams. The reduction in catchment yield as a result of the mining infrastructure could be described as high. The impact is long-term as the opencast workings have been present for many years and will be rehabilitated only after mining on that specific area of the mine has ceased.</p>	<p>mine property will reduce the amount of water captured and retained in these excavations. After rehabilitation, natural runoff and groundwater inflow conditions should return.</p>	closure	
Air Quality	<p>No further impacts are envisaged. The mining and operations area will be rehabilitated, mainly through vegetation, which will suppress dust emanating from the area.</p>			
Noise	<p>During the decommissioning phase the only temporary noise will originate from the trucks and other heavy equipment that will be utilised for earthworks related to the rehabilitation process. If contractors are going to be used for the earthworks, then regular noise quality surveys will be their responsibility.</p>			
Visual	<p>The potential visual impacts are associated with the change in the topography and removal of vegetation due to the opencast nature of mining</p>	<p>Final shaping will be implemented such that the final profile of the rehabilitated mining areas are formed to emulate natural contours of the area i.e. a flat topped profile is not desirable - rather a profile that emulates the nearby hills is proposed..</p>	At mine closure	

Impacted Area	Activity Description and potential impacts on the environment	Management Measures	Frequency	Annual Management Cost
	<p>and the stockpiling of products. These activities are visible from the higher lying areas surrounding the mine, and from residents around the mining property.</p>	<p>The mine will research whether there are alternative uses for the mine infrastructure. If not possible the components will be properly removed.</p>		

6.5 Post Closure Phase

The mine will be required to apply for a Closure Certificate according to Section 43 of the MPRDA. Section 43 (1) of the MPRDA stated that “the holder of a ... mining right ...remains responsible for any environmental liability, pollution or ecological degradation, and the management thereof, until the Minister has issued a closure certificate to the holder concerned”.

It is therefore assumed that all environmental impacts will be successfully addressed and management at this phase. When the decision is taken to decommission the mine, the activities below will be implemented:

- Recovery of all saleable infrastructure;
- Demolition of all buildings and structures;
- Ripping of all compacted areas, which will be followed with amelioration and vegetation should self succession no take place;
- Ensure that the voids of the opencast pits are left in such a manner as to be safe;
- Ensure that all dumps, stockpiles and slopes are sufficiently shaped to blend in with the surrounding environment and to ensure sustainable rehabilitation in the form of self succession;
- Amelioration and vegetation of all disturbed areas where necessary;
- Maintenance of all revegetated areas up until such areas initiate succession and create a sustainable cover;
- Monitoring of key environmental variables (i.e. soils, vegetation, groundwater, surface water and air quality) in order to demonstrate stability of rehabilitated areas;
- Weed management by local people for three (3) years after closure, limited to areas disturbed by mining or included in the mining area; and
- Monitoring will be undertaken for three (3) years after closure or up until such time all areas create a sustainable cover and ecosystem.

Although it is assumed that all impacts will be managed and rehabilitated by the above objectives, some residual impacts will however still be present.

6.5.1 Surface Impacts at Decommissioning Phase

It was indicated that it is the purpose of the surface rehabilitation to re-establish surface drainage to the pre-mining conditions as far as is practical. The rehabilitation will:

- Restore normal infiltration rates to areas where recharge were reduced due to surface compaction;
- The mine will consult with the DMR and DWAF with regards to the best rehabilitation option of the area to leave the remaining water bodies as strategic water source for future generations by maximizing discharge;
- The mine will consult with the DMR, DWAF, MDALA, NDA and other relevant stakeholders with regards to the best post mining land use options after closure;
- The mining area with will be rehabilitated and the disturbed area sloped to be free draining and vegetated with the purposed of maximizing clean runoff.

However, with regards to the opencast pits it will not be practical or cost-effective to backfill these areas. For this purpose effective clean and dirty water measures will be implemented around the opencast pits after the opencast pit slopes have been rehabilitated for a safe environment to ensure that clean water be diverted to the natural watercourses.

6.5.2 Groundwater Impacts at Decommissioning Phase

Please refer to appendix C for the Amendment to the Hydrogeological Assessment

6.5.2.1 Recovery of groundwater levels

The groundwater levels in the mining area will start to recover when the mine dewatering stops. This will lead to the re-establishment of groundwater levels, flow directions and flow gradients to near pre-mining levels. This will re-establish the base flow rates within the zone of influence. However, on the negative side it will enable contamination to migrate away from the mining area, and could possibly lead to decant.

The management of these potential impacts is described in table 10 in the EMP on page 80.

6.5.2.2 Contamination of the aquifers

Due to the recovery of the groundwater flow directions and gradients contamination migration away from the mining area will be re-established. Contamination of the surrounding aquifer system will be caused by:

- Poor quality seepage from opencast pits due to oxidation of back-fill material and exposed coal seams,
- Poor quality seepage from surface infrastructure.

The initial modeling showed that the contamination would migrate approximately 1 000m in 100 years after mining activities have stopped. The updated modeling indicated that the potential contamination will only migrate up to 200m from the mining area within a period of 100 years from the cessation of mining.

6.5.3 Long term post-mining phase

6.5.3.1 Recovery of groundwater levels

Groundwater levels will recover during the decommissioning and post closure phase, due to mine dewatering having ceased.

The simulated rebound and change in groundwater level in the area is shown in Figure 3. The figure shows that the groundwater levels will initially recover at a faster rate, due to higher flow gradients. Over time, as the groundwater level rises and the flow gradient decreases, the recovery rate will decrease. The groundwater levels in close proximity to the previously planned underground workings will stabilise after approximately 20 to 40 years.

The following section looks into the possibility of associated poor quality decant/seepage.

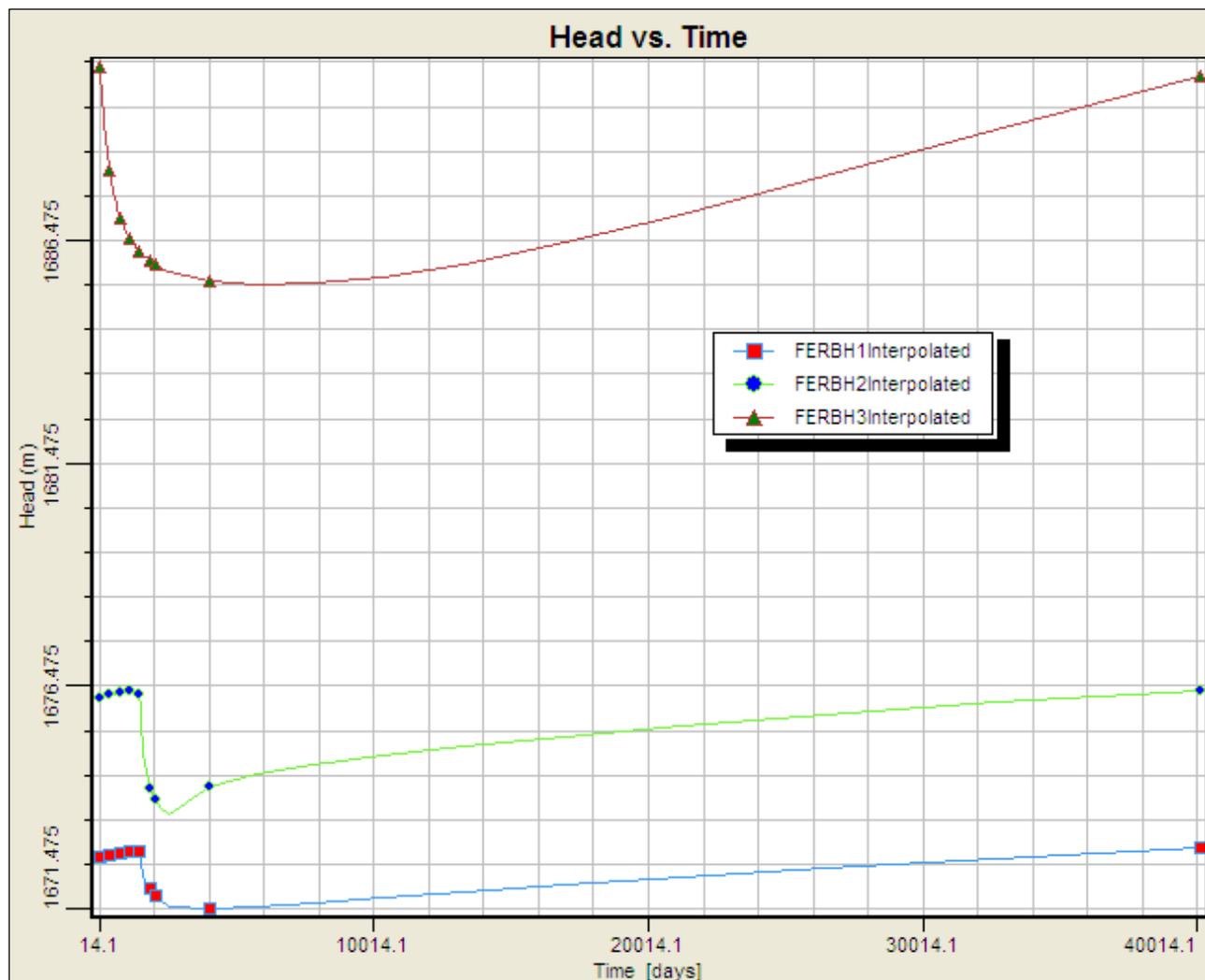


Figure 5: Simulated rebound period from observation boreholes within the Mining Area plume – 100 years after closure

6.5.3.2 Possible Decant

With rising groundwater levels when mine dewatering stops there is an increasing risk of decant from the mining area. Any seepage into the mining area will find its way towards the lowest point in the mine where it will accumulate and the mine void area will start filling. Decant from the proposed mine will be highly unlikely due to the nature of the coal floor.

6.5.3.3 Contaminant Transport Modelling (Acid Base Accounting)

Following the calibration of the flow model, a contaminant transport model was constructed for the mining area. In order to determine the long-term effect of the mining on groundwater quality, the post-operational migration of contamination was simulated. Sulphate (SO_4) was chosen as the parameter to be modeled. Sulphate would

be one of the end-products of acid rock drainage (which the Acid Base Accounting testing shows as a good possibility) and is therefore a chemical of concern and comprises usually about 50% of the Total Dissolved Solids (TDS). To determine the specific input parameters for mass transport modeling, coal seam samples are usually obtained and certain laboratory testing conducted to determine the possible amounts of mass that could leach from the material under recharge conditions.

Due to the recovery of groundwater levels in the post-mining environment, contamination will be able to migrate away from the mining area. This can lead to the contamination of surrounding aquifers.

The numerical model was used to determine how far the contamination will extend from the mining areas, and which flow direction it will use. A starting mass concentration of 2000mg/l was used in order to simulate the worse-case scenario.

Observation points were added to the model grid to determine the breakthrough period (time for SO₄ plume to reach certain observation points) and order of magnitude. These points were located to sensitive areas hydraulic down-gradient of the proposed mining area. Sensitive areas include alluvial stream basins and topographical low points.

During July 2009 updated exploration drilling suggested that the original underground mining plan was not viable and that the coal towards the north and north-west closer to the Witpuntspruit non-perennial tributary as severely burnt due to the occurrence of a dolerite sill. The mine plan was therefore adjusted and a significant smaller underground mining section was suggested. Further investigation and evaluation resulted in Mashala Resources deciding to terminate all possibility of underground mining operations.

The initial modeling showed that the contamination will migrate approximately 1 000m in 100 years after mining activities have stopped. The updated modeling indicated that the potential contamination would only migrate up to 200m from the mining area within a period of 100 years from the cessation of mining. There are currently no private groundwater users in the area that will be impacted on.

The expected contamination plumes are shown graphically in Figure 6 to Figure 11.

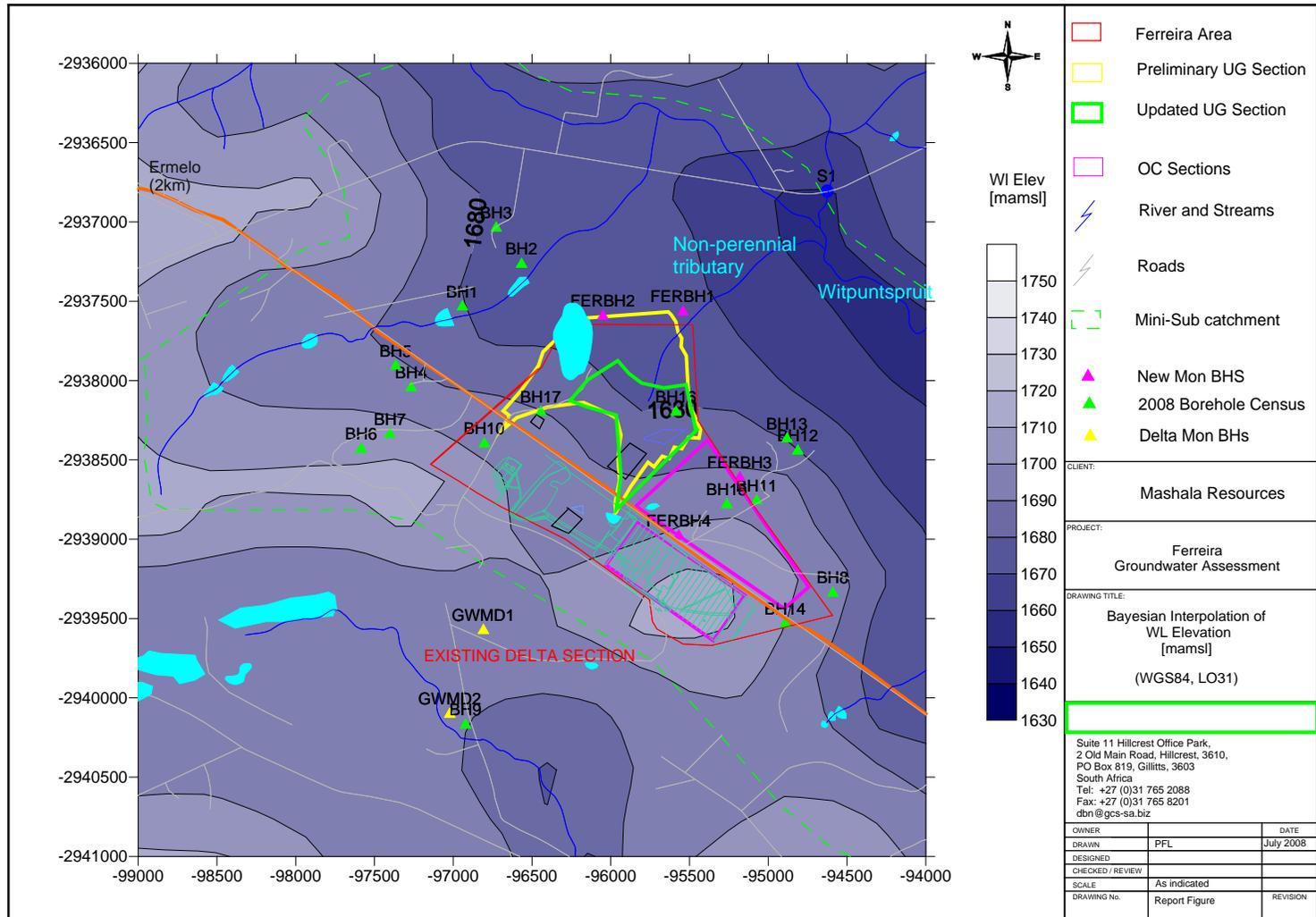


Figure 6: Interpolated groundwater elevation contour map with previously planned underground mining section

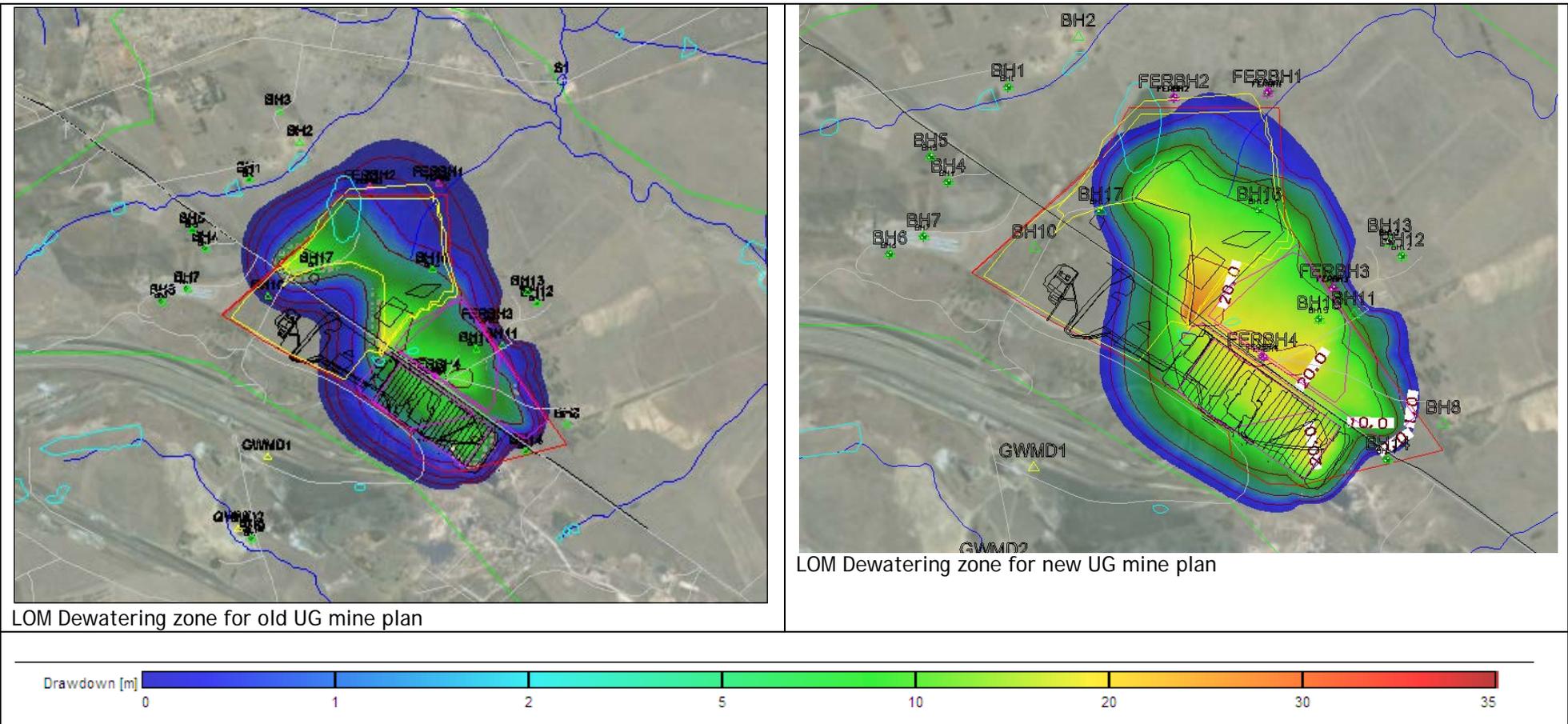
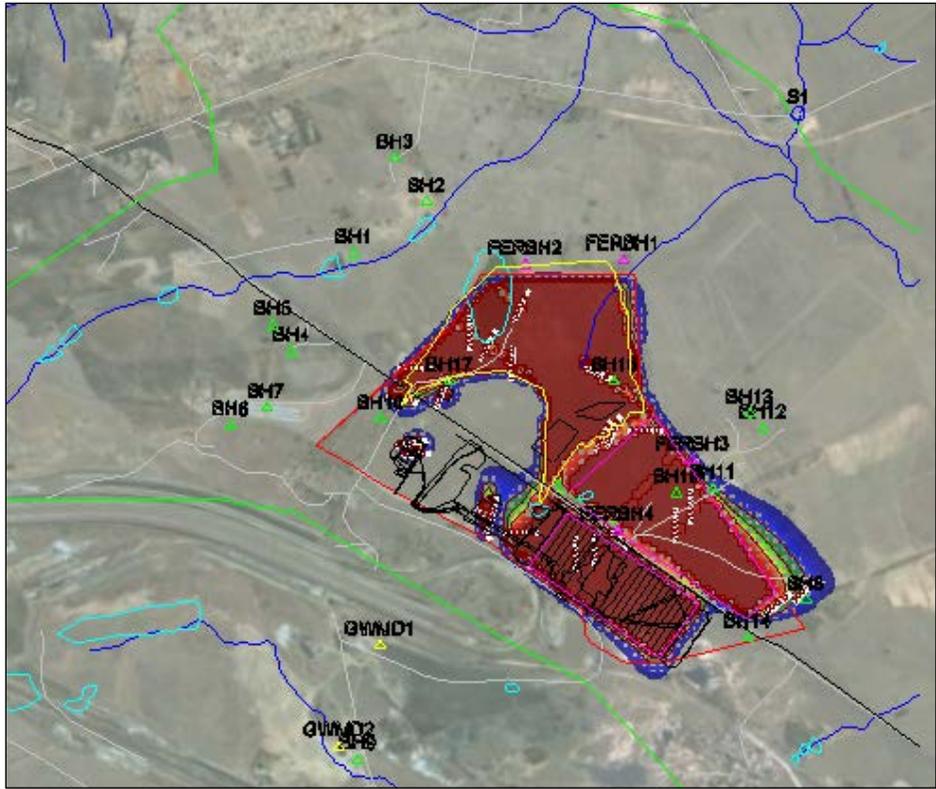
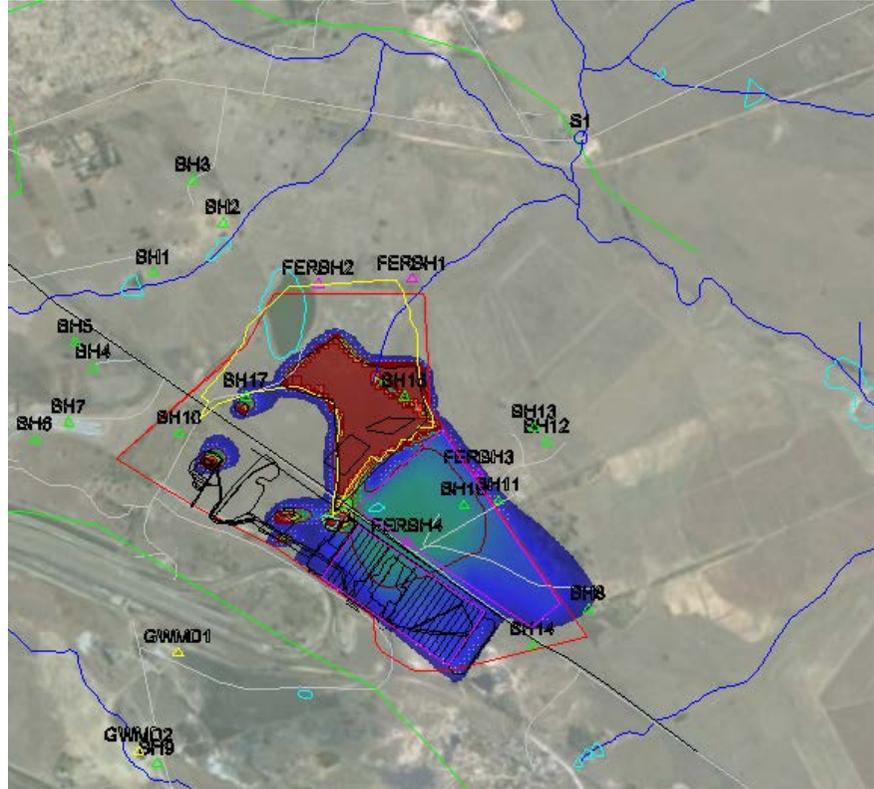


Figure 7: Graphical illustration of the updated zone of de-watering for the Ferreira Mine



10 Year SO₄ plume for old UG mine plan and open-cast section



10 Year SO₄ plume for new UG mine plan and updated open-cast rehab

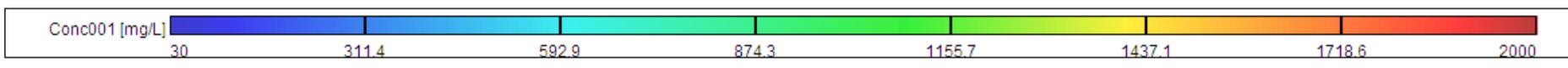
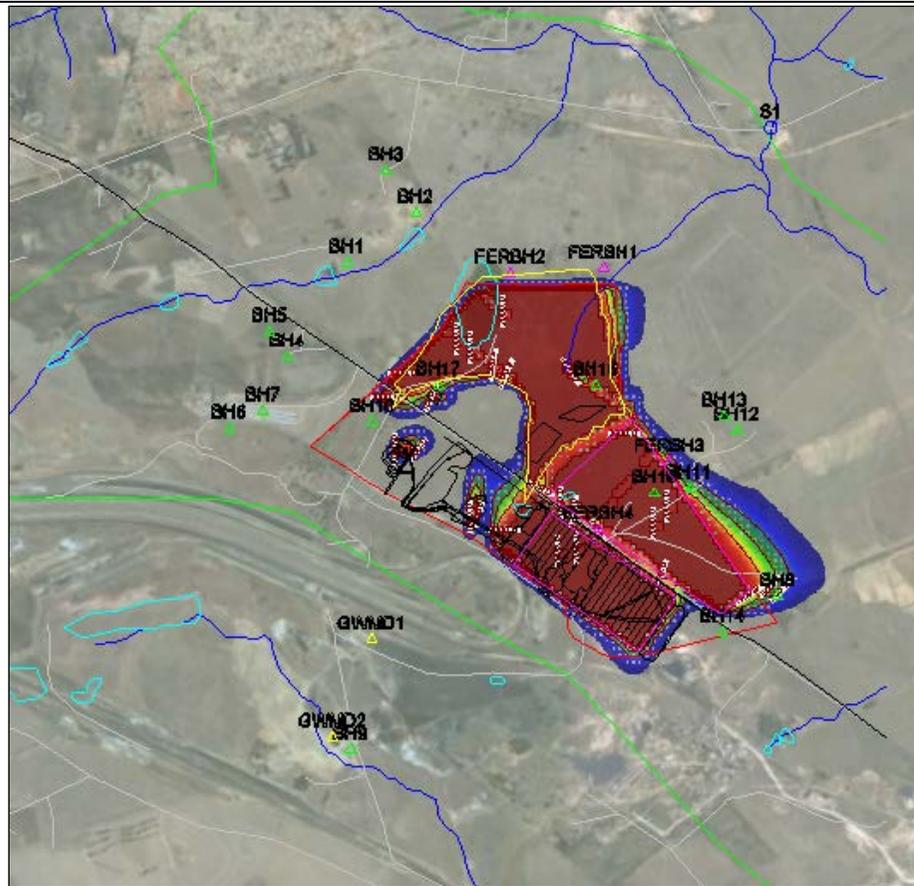
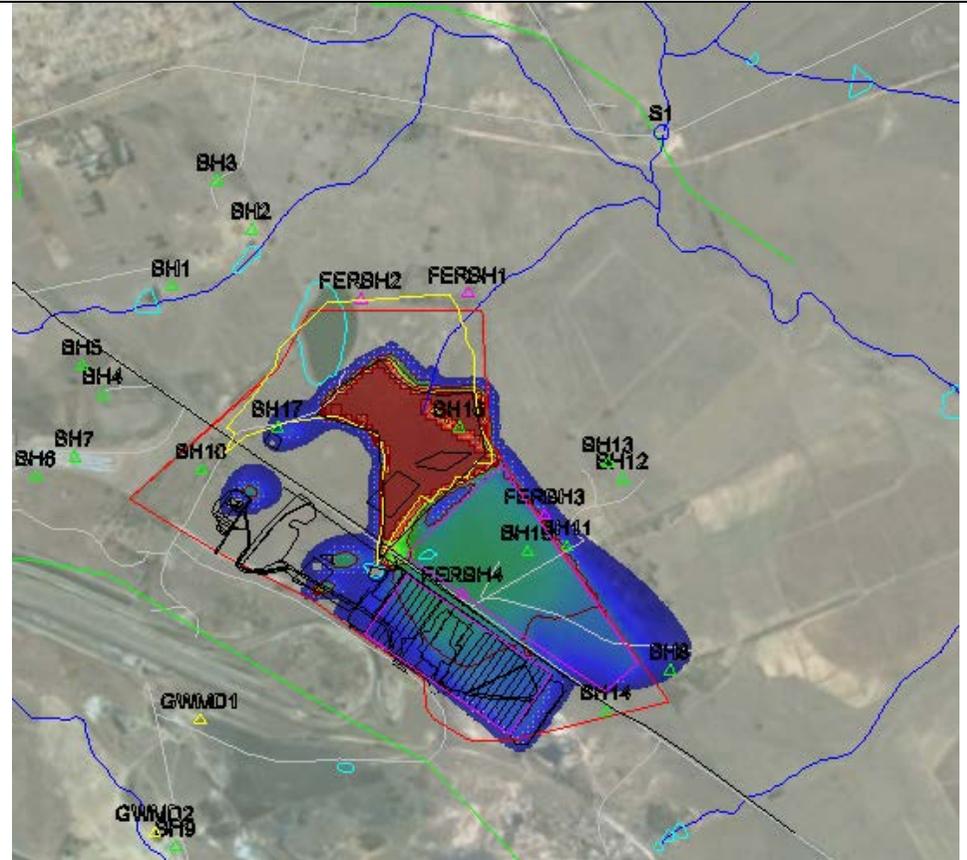


Figure 8: Contamination plume 10 years after closure of the proposed Ferreira mine



20 Year SO₄ plume for old UG mine plan



20 Year SO₄ plume for new UG mine plan and updated open-cast rehab

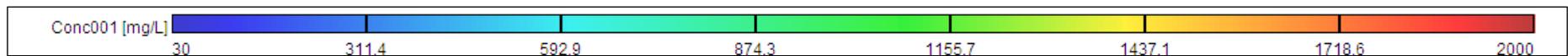
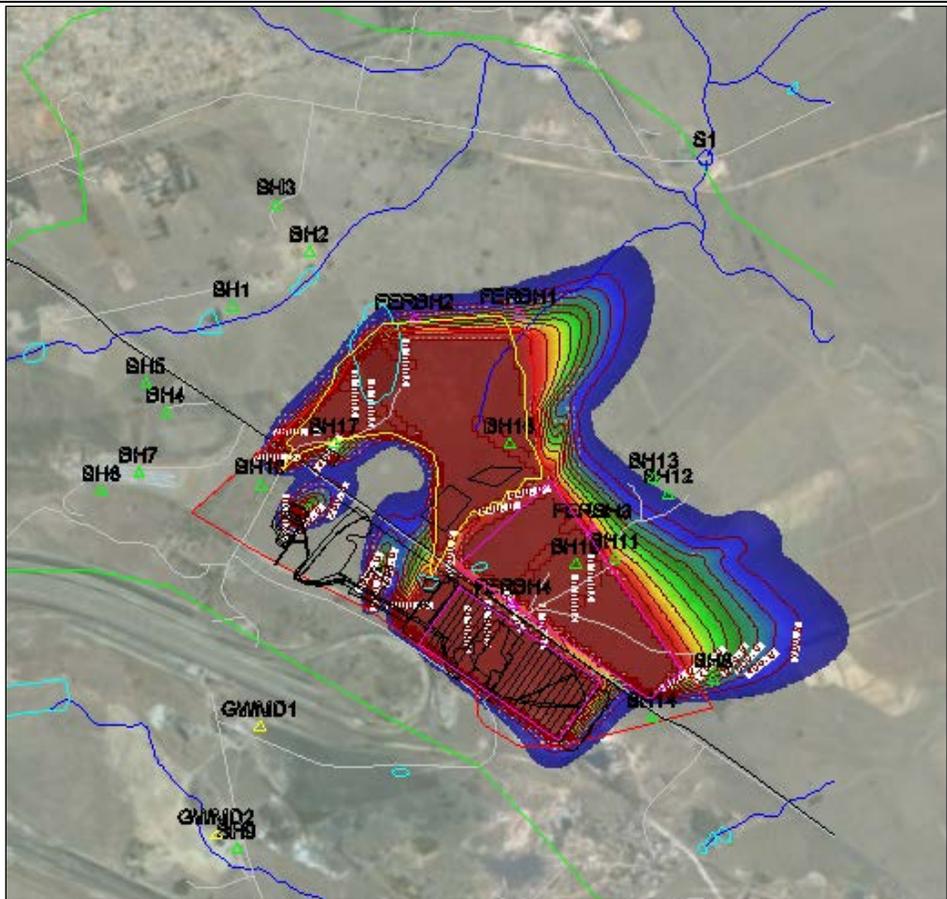
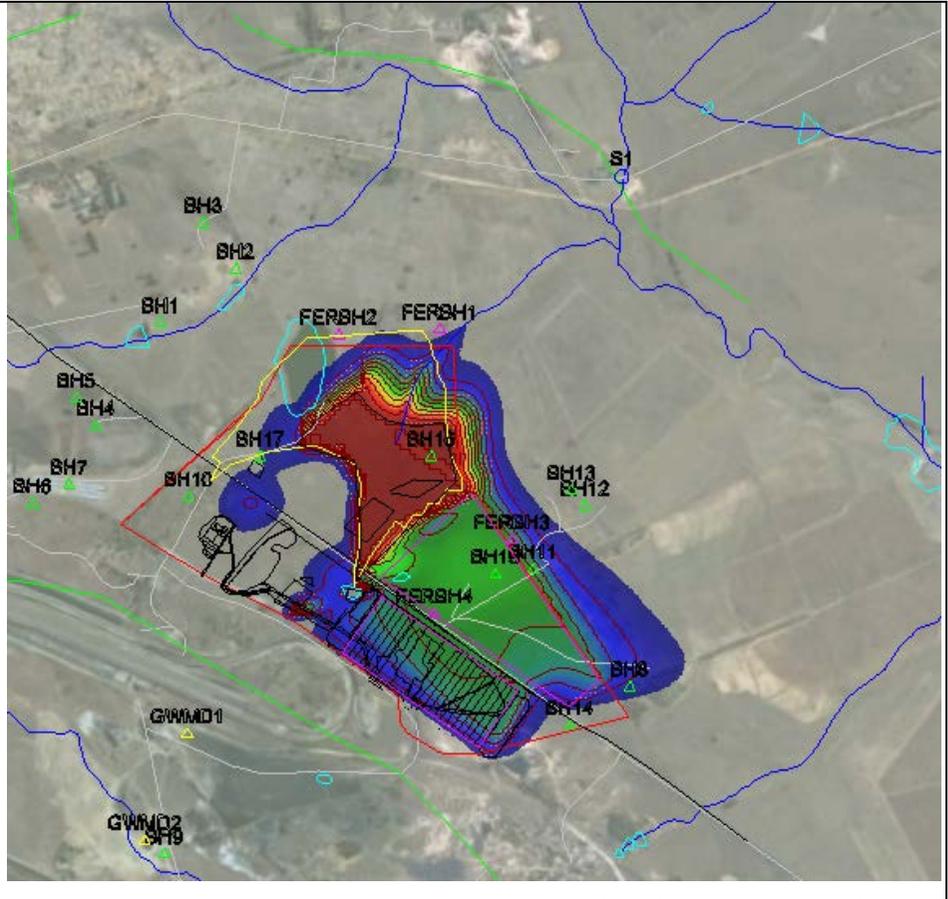


Figure 9: Contamination plume 20 years after closure of the proposed Ferreira mine



50 Year SO₄ plume for old UG mine plan



50 Year SO₄ plume for new UG mine plan and updated open-cast rehab

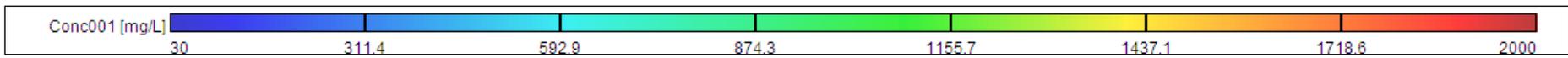
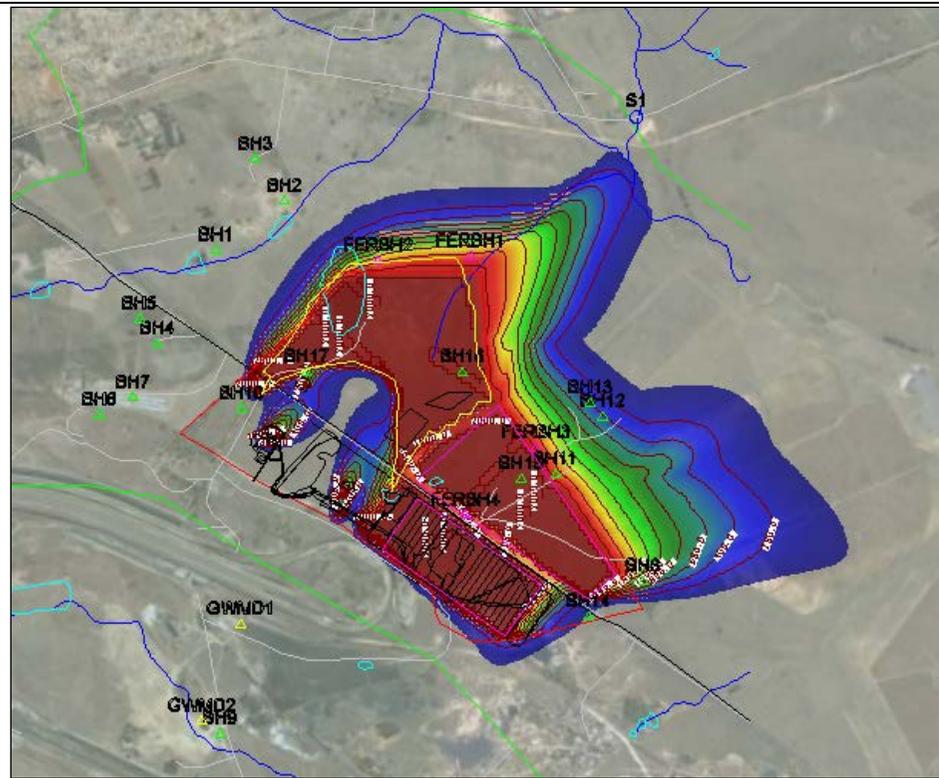
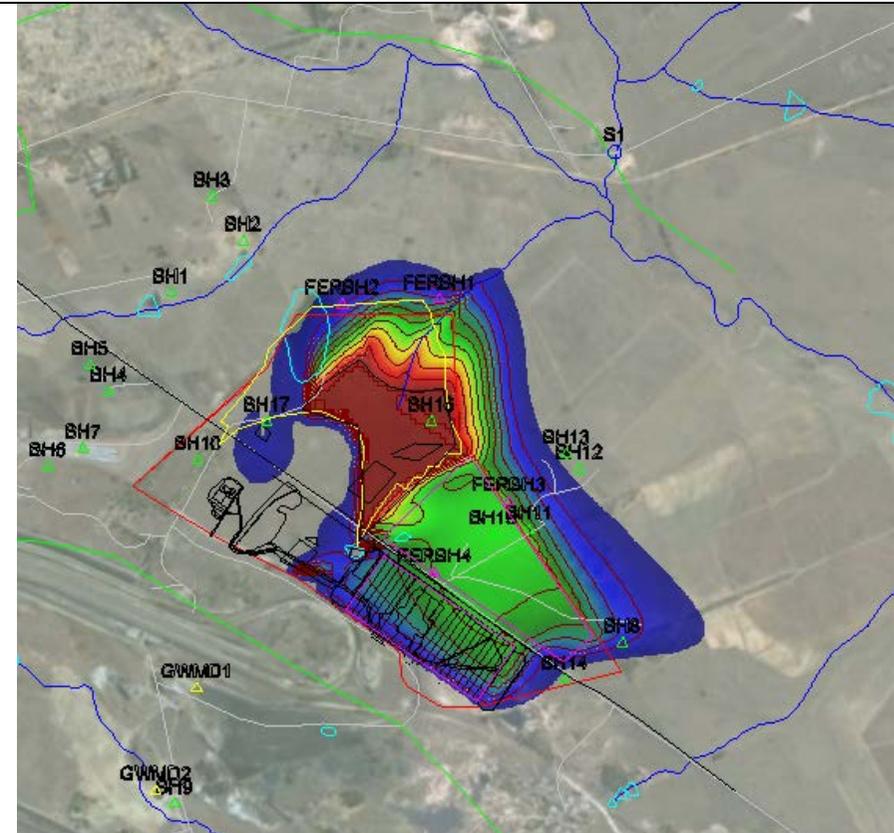


Figure 10: Contamination plume 50 years after closure of the proposed Ferreira mine



100 Year SO₄ plume for old UG mine plan



100 Year SO₄ plume for new UG mine plan and updated open-cast rehab

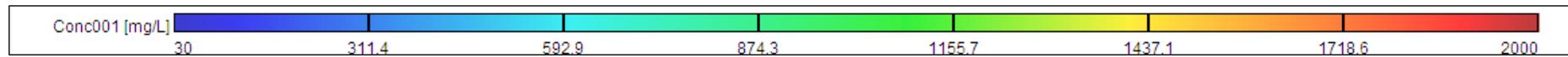


Figure 11: Contamination plume 100 years after closure of the proposed Ferreira mine

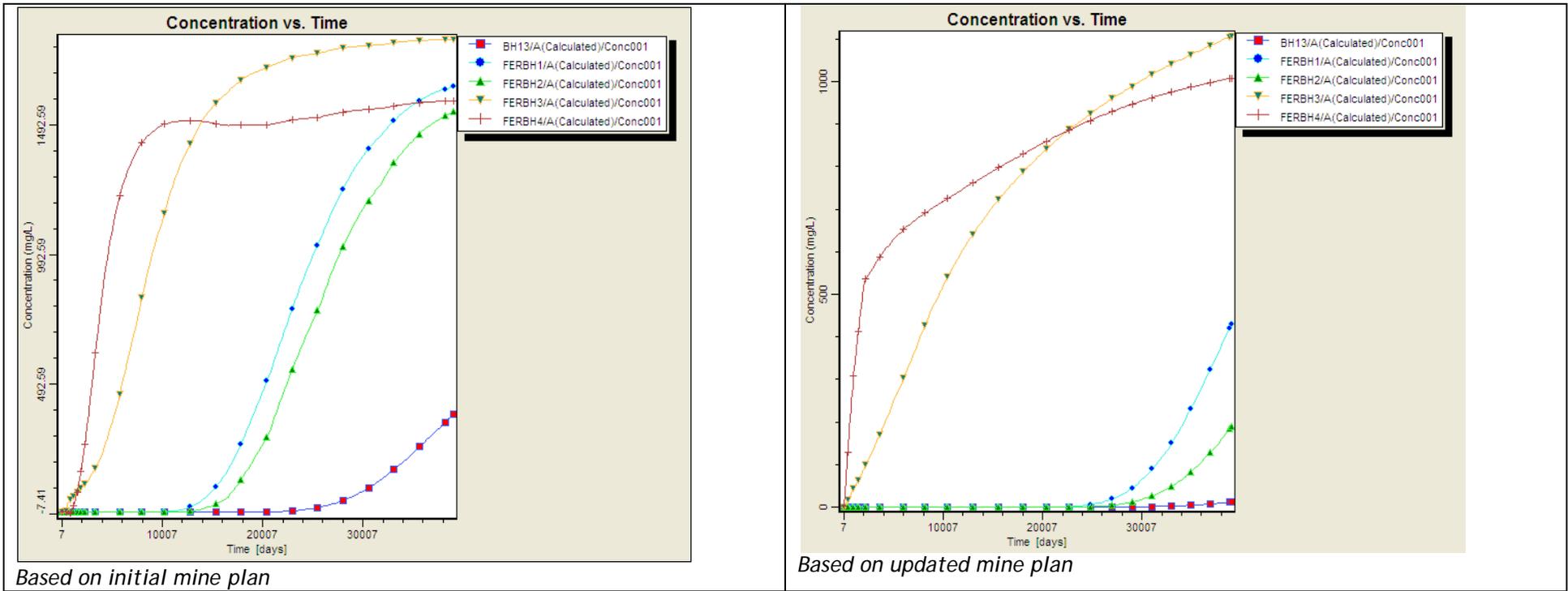


Figure 12: Predicted SO₄ break-through curves for the initial and updated mine scenarios.

At this stage only limited rock samples were submitted to a laboratory for ABA (acid base accounting) purposes. The samples indicate a relatively *high acid generation potential*. However, it must be noted that actual coal seam samples were also submitted for ABA; these will be removed during the opencast operations, only the overburden and footwall material will remain and exposed to oxidize. It can be seen that the shale layer above the coal seam in BH3 indicates a final pH of 1.18 and 3.88 kg/t of SO₄. This can be regarded as a high risk in terms of future and potential long-term acid mine drainage conditions. The test work done during this assessment must be regarded as preliminary and for indication purposes only. It is recommended that follow-up testing work be conducted and more detail be supplied accordingly. A start value of 2000 mg/l SO₄ was applied in the numerical mass transport model based on the kg/ton averages obtained from the ABA.

To ensure that acid mine drainage does not occur during the decommissioning and closure phase the following mitigation measures should be implemented during the life of mine and decommissioning. To obtain additional samples during the beginning stage of mine development (about 3 to 6 months after mining has started), these will be submitted to a lab for more test work and geo-chemical modeling will be done. The data will be applied into the existing numerical groundwater model and management plans structured.

Groundwater monitoring will be implemented as well to confirm aquifer qualities.

The rehabilitation plan of the opencast section will be critical; it is important to dump all high risk material at the bottom of the pit and allow for quick recharge so that limited oxidation can occur, this material will be below the groundwater table and the low risk sandstone at the top and covered with topsoil to allow grass to grow.

At decommissioning proper evaporation dam will be constructed to handle all polluted decant and seepage.

Due to the limited information regarding decanting volumes, the size and cost associated with the evaporation dam can only be determined once opencast mining has commenced, and the ABA has been updated and the mitigation measures regarding decanting have been set in place.

6.5.4 Social Impacts at Decommissioning Phase

Depending on the findings of the Environmental Impact Assessment and decision of the relevant environmental authorities, the proposed project could not proceed. Such an outcome could then result in the actual decommissioning of the mine as the coal production would come to an end over time.

Typical social impacts associated with decommissioning of a mine or issues that should be investigated include:

- Job-losses;
- Significant population changes (exodus of people previously employed by the mine);
- Impact on socio-economic sustainability of Ermelo
- The existence of other sectors that could replace the jobs lost;
- The impact of a high rate of unemployed people in the area;
- The formation of attitudes against the mining company and possible social mobilisation;
- The socio-economic impact of the mine closure on the Msukaligwa Local Municipality;
- The change in community infrastructure;
- Disruptions and nuisance factors associated with the actual decommissioning of the buildings and infrastructure such as noise and visual impacts; and
- Safety factors associated with the decommissioning of the buildings and infrastructure.

It should be noted that the proposed extension of the north eastern boundary of the mining right, if approved, will result in an additional 12 months of life of mine. The social impacts of the ultimate decommissioning phase will then only be realized.

7 MONITORING AND MANAGEMENT PROGRAMME

Ongoing monitoring of the bio-physical and socio-economic environments will continue throughout the life of the project as per the approved EMP and the accepted monitoring programmes. Ferreira will monitor and assess the performance of the EMP on an ongoing basis.

7.1 Monitoring

Monitoring of different environmental aspects/impacts shall take place by means of quantitative and qualitative evaluation techniques in order to determine whether the requirements of the environmental management programme are being complied with.

Monitoring is a continuous data-gathering and control procedure. It may range from routine visual inspections to in-depth investigative monitoring.

Table 10: Monitoring programme

Activity	Period
Dust monitoring	Annual audit reports to be submitted to the DMR.
Surface water monitoring	Annual surface water monitoring reports to be submitted to DWAF.
Groundwater monitoring	Annual groundwater monitoring reports to be submitted to DWAF.

7.1.1 *Groundwater Monitoring*

It is recommended that the flow and mass transport model be calibrated every two years with updated monitoring data. The current mass transport model must be regarded as preliminary due to the lack of proper piezometric data (only two sets of data were available for flow calibration). During the closure process a better understanding of the local aquifer conditions will be developed and more reliable long-term predictions can be made.

It is recommended that the newly drilled monitoring boreholes be monitored on a bi-annual basis. The schedule can be reviewed after a period of two years and maybe

reduced to a twice a year monitoring schedule - to accommodate dry and wet season monitoring at least.

Groundwater levels must be measured on a bi-annual basis.

The quarterly chemical analyses must include:

- EC;
- pH;
- SO₄;
- Ca;
- Mg;
- Na;
- Cl;
- NO₃K;
- F;
- T-Alk;
- Fe; and
- Al.

It is recommended that a specialist Hydrogeologist save the data in a dedicated database and that bi-annual and annual reports are generated for mine management.

7.1.2 Surface water monitoring

The purpose of establishing the monitoring program is to provide timely and accurate water quality data to the Department of Water Affairs and Forestry and to manage impacts caused by this activity. These data are used for a variety of purposes which may be summarized in broad terms as the determination of status and trends in river water quality. Specific objectives of the water quality monitoring program are as follows:

- Determine whether water quality at sampling sites exceeds water quality standards;
- Assess the status of water quality in the surrounding areas;
- Provide analytical water quality information that describes present conditions and changes (trends);
- Provide timely data for other users.

The following chemical parameters are recommended for the analysis:

- TDS/ Electrical Conductivity;
- pH;

- Alkalinity, CaCO₃;
- Magnesium, Mg;
- Calcium, Ca;
- Sodium, Na;
- Potassium, K;
- Sulphate, SO₄;
- Chloride, Cl;
- Fluoride, F;
- Iron, Fe dissolved;
- Manganese, Mn dissolved;
- Aluminium, Al dissolved.

7.1.3 Dust monitoring

The modeled data indicates that a significant increase in ambient PM₁₀ levels in surrounding areas is unlikely to result from the operation of this facility. However, due to the inherent limitations in dust emission modeling and the extremely stressed nature of this airshed it is recommended that every effort be made to limit dust emissions from the active mine areas. In addition, the high ambient levels (>180µg/m³) indicated in the active areas of the pit may translate into unacceptably high levels of airborne dust in the immediate vicinity of the mining machinery.

7.1.3.1 Dust mitigation

A dust management plan that includes some or all of the following mitigation measures is recommended (after Holmes Air Sciences (1998)) :

Table 11: Estimated Control Factors for Various Mining Operations

Activity	Control	Emission reduction
Scrapers on topsoil	Artificial or natural moistening of soil	50%
Dozers on coal or other material	No control	
Drilling	Fabric filters	99%
	Water sprays	70%
Blasting coal or overburden	No control	

Activity	Control	Emission reduction
Loading trucks	No control	
Hauling	Watering (2 litres/m ² /h)	50%
	Watering (> 2 litres/m ² /h)	75%
	Limiting vehicle speed	(see below)
Unloading trucks	Water sprays	70%
Draglines	Minimise drop height	-
Loading stockpiles	Water sprays	50%
	Variable height stacker	25%
	Telescopic chute with water sprays	75%
	Total enclosure	99%
Loading to trains	Enclosure	70%
	Enclosure and use of fabric filters	99%
Unloading from stockpiles	Water sprays	50%
Miscellaneous transfer and conveying	Water sprays with chemicals	90%
	Enclosure	70%
	Enclosure and use of fabric filters	99%

With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity. On its own, the passage of a single vehicle causes a spike in pollution, dependent on speed, which returns to ambient air conditions fairly rapidly. However, under high risk conditions with multiple vehicle passes in a short space of time, entrainment into the air stream will occur, contributing to the regional dust risk. It is important to note that for speeds between zero and 40km / hour, the increase in haul road dust emission is exponential. It is impossible to monitor dust quantitatively in real time, so the following subjective classification of haul road dust defect becomes useful in alerting operators to real time conditions.

Table 12: Classification of Haul Road Dust Defect.

Dust defect degree descriptions for PM ₁₀ dust emissions per haul truck pass at 40km /hour (mg.m ⁻³)				
Degree 1 <3.50	Degree 2 3.51 to 23.50	Degree 3 23.51 to 45.00	Degree 4 45.01 to 57.50	Degree 5 >57.51
Minimal dust	Dust just visible behind vehicle	Dust visible, no oncoming vehicle driver discomfort, good visibility	Notable amount of dust, windows closed in oncoming vehicle, visibility just acceptable, overtaking difficult	Significant amount of dust, windows closed in oncoming vehicle, visibility poor and hazardous, overtaking not possible.

It is further recommended that an ongoing ambient dust monitoring be implemented with dust monitors concentrated to the east of the site.

Experience shows that in establishing a dust mitigation strategy for a future facility, it is impossible to foresee exact dust emission occurrences. Rather, it is imperative that personnel on the site are educated and empowered to establish a dust management regime. All dust management involves the adaptation of one of two variables - agitation of the surface (wind, earth moving, vehicular entrainment) and particle size (usually a function of moisture content). So, to mitigate against dust, personnel should either decrease surface agitation or increase particle size.

Mechanical surface agitation - This is activity specific but usually revolves around minimising mechanical entrainment of dust through minimising vehicle speed or decreasing drop height when unloading. Minimising unnecessary earth moving activity is also central to this.

Wind entrainment - By minimising wind speed over surfaces the likelihood of fugitive dust entrainment is minimised. It is here that the rounding of dump edges and the creation of wind breaks are important. The vegetation of dump sites is an excellent medium to long term solution.

Particle size increase - Particle size can be increased by adding moisture or a chemical dust retardant to exposed areas. This is particularly valuable on dust road areas.

7.2 Performance Assessment

- All procedures (emergency, environmental awareness, rehabilitation strategies, etc.) will continuously be updated;
- All information as required by the various government departments should be captured and be readily available for submission when required;
- A Ferreira annual report will be submitted to the DMR;
- Surface water monitoring occurs on an annual and is undertaken by outsourced specialists
- Groundwater monitoring occurs on an annual basis and is undertaken by outsourced specialists.
- The Groundwater levels will be monitored on monthly bases and will be presented in the form of piezometric maps, from which changes can be determined through time.
- An Environmental Management Programme Performance Assessment will be undertaken every two years as required by the MPRDA and will be submitted to the DMR; and
- The financial provision (method and quantum) will be updated every two (2) years as part of the Environmental Programme Performance Assessment.

8 FINANCIAL PROVISION FOR CLOSURE

8.1 Method for Financial Provision

The financial provision for the environmental rehabilitation and closure of any mine and its associated mining operations forms an integral part of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). Sections 41 (1), 41(2), 41(3) and 45 of the MPRDA deals with the financial provision for mine rehabilitation and closure.

The “Guideline document for the evaluation of financial provision made by the mining industry” has been developed by Golder Associates Africa, in order to empower the personnel at Regional DMR offices to review the quantum determination for the rehabilitation and closure of mining sites.

The closure cost was formulated by utilising this universal guideline document in order to comply with the DMR requirements. It should be noted that no detailed or surveyed information, except for the existing infrastructure has been available during the estimation of the bill of quantities and broad estimations were assumed.

The financial provision for the environmental rehabilitation and closure of any mine and its associated mining operations forms an integral part of the Minerals and Petroleum Resources Development Act (Act 28 of 2002). Sections 41(1), 41(3) and 45 of the Act deals with the financial provision for mine rehabilitation and closure.

The financial provisions required by the holder of the mining right must be provided for by one or more of the following methods in order to achieve the total quantum of rehabilitation and remediation of environmental impacts and damage as well as final closure:

- Approved dedicated trust fund;
- Financial guarantee from a South African registered bank or any other approved financial institution;
- Cash deposit to be deposited at the office of the Regional Manager; and
- Any other manner determined by the Minister.

With the determination of the quantum for closure it must be assumed that the mine infrastructure has no salvage value. This is necessary as it is often difficult to

determine the salvage value for the infrastructure. However, salvage value can be off-set if the mine can demonstrate to the Regional Director of the Department of Mineral and Energy that a formal arrangement exists covering demolition of the mine infrastructure and the payment to be received.

The Mine is required to annually assess the total quantum of environmental liability for the mining operation and ensure that financial provision is sufficient to cover the current liability (in the event of premature closure) as well as the end-of-mine liability. As per Government Legislature, the mine is required to ensure full financial cover for the current liability at any point in the life of the mine. Pecuniary provision must be made for the shortfall between the existing trust fund balance and the premature closure or current environmental rehabilitation liability.

It must be made very clear that this estimation is premature and will need revision once the information is available and will only then be included in any documentation to be submitted to the DMR as part of the Mining Right Application.

8.1.1 Background of the Financial Provision

The financial provision for the environmental rehabilitation and closure of any mine and its associated mining operations forms an integral part of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA). Sections 41 (1), 41(2), 41(3) and 45 of the MPRDA deals with the financial provision for mine rehabilitation and closure.

The financial provision for the environmental rehabilitation and closure of any mine and its associated mining operations forms an integral part of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) under Sections 41(1), 41(3) and 45 of the Act.

The financial provisions required by the holder of the mining right must be provided for by one or more of the following methods in order to achieve the total quantum of rehabilitation and remediation of environmental impacts and damage as well as final closure:

- Approved dedicated trust fund;
- Financial guarantee from a South African registered bank or any other approved financial institution;
- Cash deposit to be deposited at the office of the Regional Manager; and
- Any other manner determined by the Minister.

With the determination of the quantum for closure it must be assumed that the mine infrastructure has no salvage value. This is necessary as it is often difficult to determine the salvage value for the infrastructure. However, salvage value can be off-set if the mine can demonstrate to the Regional Director of the Department of Mineral and Energy that a formal arrangement exists covering demolition of the mine infrastructure and the payment to be received.

For the 2008 assessment, the ratings as per the Ferreira Closure Cost Estimation, and where necessary the DMR Master Rates have been utilised to ensure consistency.

8.2 Cost Estimate Summary

A summary of the estimated closure costs is provided below. Refer to Appendix A for detailed breakdowns of the closure cost assessments.

“Clean Closure Cost” estimate, refer to summary sheet in Appendix A:

Sub Total 1	R 4 135 464.79(excluding VAT)
Sub Total 2	R 4 797 139.15 (excluding VAT)
Sub Total 3	R 5 468 738.64 (including VAT)

The “Clean Closure Cost” estimates are in accordance with the DMR guidelines and include the following (Sub Total 3):

- Preliminary and general (P&G) = 6% of Total 1;
- 10% Contingency; and
- 14% VAT.

Note: It should be noted that the cost estimate summary, should the extension of the north eastern boundary application be approved, will require revision. This revision will then be submitted to DMR for approval.

9 UNDERTAKING BY CLIENT

An undertaking of agreement to the management strategies as proposed in the Environmental Management Programme (EMP) as well as an undertaking of approval of the EMP is provided on the following page.

UNDERTAKING

I, _____ the undersigned and duly authorised thereto by MASHALA RESOURCES (Pty) Ltd, have studied and understand the contents of this Environmental Management Programme (EMP) and duly undertake to adhere to the conditions as set out therein, unless specifically or otherwise agreed to.

Signed at _____
on this day _____ of 2011

Signature of MASHALA representative

I, _____ the undersigned and duly authorised thereto by DEPARTMENT OF MINERALS AND ENERGY have studied and approved the contents of this Environmental Management Programme (EMP).

Signed at _____
on this day _____ of 2011

Signature of Director: Mineral Development

10 CONCLUSION

Mashala Resources (Pty) Ltd (“Mashala”) has applied for a mining right in respect of coal reserves on Portion 19 of the farm Witbank 262 IT which is approximately 264ha in size, situated approximately four (4) kilometers, south east of Ermelo adjacent to the N2 national road. It is the intention of Mashala to develop an opencast coal mine on the above mentioned property. The project falls within the Msukaligwa Local Municipality which covers 830 957ha within the Gert Sibande District Municipality.

The proposed mining method to be used is conventional opencast mining, making use of the roll-over method. Rehabilitation will take place on an ongoing basis.

The amendment of this document (Ferreira Mine EIA) is in accordance with Section 102 of the Mineral and Petroleum Resource Development Act (Act No. 28 of 2002) (MPRDA) for the application for the extension of the North eastern boundary of the existing mining right. The proposed extension of the existing mining boundary (through this Section 102 application process) involves the inclusion of Remaining extent 0 of Farm 538 IT (formerly known as portions 25 of Witbank 262 IT) and portion 27 of Witbank 262IT.

Project Description

A Mining Right Application (MRA) was submitted to the Department of Mineral Resources(DMR) on 25 August 2008. Acceptance of this application was received on 10 October 2008. Following the acceptance by DMR a Scoping Report and an Environmental Management Programme (EMP) is required to be compiled and submitted. The Scoping Report was submitted to the relevant authorities on 30 October 2008 and made available to the public on 31 October 2008 for a review period of 30 days. The EMP was submitted to the relevant Authorities and the public on 24 December 2008. The EMP has been compiled in terms of Section 39(1) and Regulation 51 of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). An Environmental Impact Assessment (EIA), undertaken in terms of Regulation 50 of the Act, is a necessary pre-requisite for the EMP. The EMP must be submitted to the Regional Director of Mineral Development at the DMR for approval. It is a requirement that the approved EMP is implemented throughout the life of the mine until closure is granted. The DMR will be the lead authority with regard to the above-mentioned applications.

The proposed mining method to be used is conventional opencast mining, making use of the roll-over method. Rehabilitation will take place on an ongoing basis.

The open pit areas cover a vast majority of the reserve and they will be mined using the conventional roll over method. The material from the boxcut will be placed as close to the final void as possible to reduce the work at closure. The strips will be between 30 and 40m wide so as to use the selected equipment efficiently.

The proposed mine infrastructure within the mining area for Ferreira includes the following:

- Opencast workings;
- Pollution control dams;
- Topsoil Stockpiles;
- Existing access routes and haul roads;
- Storm water control trenches;
- Dewatering infrastructure;
- Water pipelines; and
- Offices, change rooms, store rooms and workshops, diesel storage and other ancillary infrastructure.

However the following infrastructure from the Delta plant will be utilized by the Ferreira project:

- Wash plant;
- Stockpiles; and
- Storage of Diesel fuel.

Public Participation Process

The identification and registration of I&APs have been an ongoing activity during the course of this project. I&APs, as listed as part of Ferreira, were contacted at the start of the project. During the consultation with the I&APs as well as with the mine, additional parties were identified and were included within the existing database to provide an updated database. Numerous I&APs were notified by word of mouth. Parties who responded to the notifications placed were included within the database.

GCS has developed and will maintain an electronic database for the duration of the project where stakeholder details are captured and automatically updated as and when information is received from I&APs.

Site notices were placed at the entrance to the Mashala Delta Plant and the Proposed Ferreira site.

Advertisements regarding the project background and the assessment process being followed were placed in the Highvelder and the Highveld Tribune during 16-19 September 2008.

A Background Information Document or BID was sent to all I&APs by means of e-mail, fax and/or post. The BID included details of the proposed project, as well as the purpose for compiling an EMP, requirements of the MPRDA and the EMP process. The BID also included relevant contact details and a comment/registration sheet for I&APs to complete. I&APs were invited to register and send responses by fax, telephone or e-mail to GCS.

Throughout the Scoping Process the I&APs were invited and encouraged to communicate their concerns and/or views on the proposed project to GCS.

The public raised concerns over the potential for:

- The influx of migrant workers and the associated concerns which arise from that;
- Water quality in the area and the implications of a decline in the water quality;
- Erosion and deterioration of the gravel roads;
- Corrosion of farm/agricultural equipment.
- Dust from trucks travelling along the road to the existing Mashala Delta Plant entrance as well as potential dust from the proposed opencast mining operations.
- Noise and vibration generated by the proposed mining operation.
- Further pollution of the water in the area.
- Theft and security; and
- Effect of mining on the surrounding agricultural area

The opportunity to contribute to the Scoping and EIA phase of the Section 102 amendment application, to register as an I&AP and to participate in the proposed project has been widely announced to the I&APs, to ensure fair and equal access to information. Applicable IAP's registered during the original Ferreira Mine right application were included as well as those respondents from the advertisement.

The opportunity to participate in the Scoping and EIA was announced in May 2011 in English as follows:

- A notice/advertisement was published in the Hoefelders newspaper on Friday 27 May 2011.
- The Background Information Document/letter (BID) of invitation to participate in the Scoping and EIA, was personally addressed and sent via email transmission to all registered IAP's accompanied by a map of the project area, and a registration and comment sheet for further I&APs to register for the EIA process and/or to provide comment.

Site notices have been erected at four locations along the property boundary.

Specialist studies conclusions

The conclusions of the various specialist studies conducted are summarised below.

Geohydrological

Local Aquifer characteristics:

Available groundwater level data indicates piezometric heads of 1710mamsl in the south (in the area of the N2 national road) to 1680 mamsl (further to the north and lower topographical settings) for the proposed mining area and coal floor depths around 1672 to 1695mamsl.

Aquifer parameters; hydraulic conductivity / transmissivity, piezometric levels, gradients, etc, were obtained from the assessment work, available data and relevant literature. By making use of these values, a proper conceptual model (for the hydrogeological environment) for the mining area was developed.

Analytical calculations indicate slow groundwater movement and poor aquifer condition. Any pollutants generated by the mining activities (SO₄ content usually) will therefore migrate according to these flow rates. However, it must be noted that dewatering activities, during the operational phase, will cause a cone of depression towards the opencast areas and groundwater flow tends to flow back towards these areas. This will limit mass transport to the surrounding aquifers during operations. Mass transport will increase after the rebound of water levels during the decommissioning phase and after.

A constant source of contamination was assumed for the opencast area. This is not always realistic but can be regarded as the **worst case scenario**. It must be noted that the exposed coal seams within the mined out areas will be filled with groundwater

again after the rebound period. This will minimise and reduce oxidation and the associated creation of AMD.

Hydro-chemistry:

The groundwater generally has a good quality with sodium and bi-carbonate dominant character. It is recommended that follow-up samples be obtained to confirm the metal concentrations for the newly drilled boreholes.

Available data from the Delta Plant area indicates similar water qualities with increased SO_4 concentrations.

Hydrological

The Hydrological investigations included catchment hydrology, catchment analysis, Risk assessment and sizing of pollution control dams.

The Witpuntspruit flows in a southerly direction on the north eastern side of the study area. This river is approximately 1.24km from the boundary of the mining area. The Witpuntspruit confluence with the Humanspruit is approximately 6km downstream of the study area. The Witpuntspruit flows through the Camden community next to Camden power station, the G10 military base and the farm Mooiplaats.

Any impacts on the water quality of the Witpuntspruit and the Humanspruit will have an impact on the Vaal River.

There is a natural pan on the northern boundary of the farm Witbank 262 IT. There is also a farm dam near the proposed location of the South Western Opencast pit.

Wetland

Based on the terrain unit and soil indicators and vegetation, the map units of the project area may be classified according to the temporary, seasonal and permanent wetland zones. Unit FP has been classified as a permanent/seasonal zone because of uncertainty: it is not known whether the pan is covered by free surface water throughout most years or possibly dries out seasonally during dry periods.

In the project area, map unit FA1q (temporary wetland zone) had been affected seriously by human impact due to past sand quarrying. The other wetland areas are largely natural with few modifications on the Present Ecological Status (PES) scale. The present ecological conditions also reflect the past grazing pressure and fire regime history of the area. The tar road has also had a limited impact on the condition of the

wetland downslope notwithstanding concentration of runoff through two culverts causing slight erosion and deposition of sediments in the valley bottom area as well as probably inhibiting subsurface flow of water through footslope soils.

The wetlands provide a suite of environmental services to the upper Vaal catchment. The most important of these are flood attenuation, stream flow regulation, sediment trapping and biodiversity maintenance. The seasonal and temporary zones on the valley bottom and footslopes map units FKa1 and FA1 have the highest scores for these services. The pan is important for flood attenuation and as a habitat for a large number of waterfowl, waders and possibly amphibians. It must be noted that due to its size the condition of temporary wetlands on FA1 unit shall determine the ecological status of the seasonal wetland FKa1 unit downstream. The two units should ideally be managed as one to maximise the ecosystem services to the catchment both on and off the site.

The proposed expansion of the Ferreira mine through the Section 102 process will not directly affect the wetland zones along the Witpuntspruit and the 2 tributaries to the north and south. However, the northern edge of the proposed mining area intersects a section of a temporary hill slope wetland.

Soil and Land capability

Several soil map units were identified. A description of the most important soil characteristics of each unit, such as the dominant soil form and family, soil depth, topsoil texture and underlying material, is given in the soil legend.

In general, the soils are shallow to moderately deep, grey-brown to yellow-brown, light-textured soils, with no significant degree of structure. Shallower soils, with ferricrete outcrops in places, also occur, as well as some areas of disturbance. The soils in the lower-lying positions are darker brown to black, with a slightly heavier texture and signs of wetness lower in the profile.

The analysis shows that most of the survey area comprises soils of limited agricultural potential, due mainly to their limited rooting depth, coupled with the underlying impermeable cemented ferricrete.

The only unit with a high arable potential is the dCv unit, which occupies a small area in the east of the area.

Both the **pan** and the **Ka** unit comprise wetlands (the **pan** being a permanent wetland and the **Ka** unit a temporary/seasonal one), and these should, as far as possible be left undisturbed

The **Dist** map unit comprises areas where excavations have occurred, presumably to mine the underlying ferricrete. In some instances, there has been replacement of topsoil, but there are also significant areas where the excavation has been left with very little topsoil, and in some cases with the ferricrete outcropping at the surface. Due to the uneven distribution of these areas, the increased compaction of the soils in places and the subsequent significant reduction in available soil depth, this map unit has a very low potential for agriculture.

With regard to the proposed expansion of the Ferreira mine boundary:

It was found that 44.81% (17.08 ha) of the proposed mining area consist of well-drained, yellow brown soils with **arable** land capability and moderate to high agricultural potential, dominated by the Clovelly soil form, symbolized as soil types Cv. It was also found that 48.99% (18.67 ha) of the proposed mining area consist of shallow, well drained, yellow brown soils and grey, imperfectly drained soils with **grazing** land capability and low agricultural potential, dominated by Dresden and Longlands soil forms symbolized as soil types Dr and Lo. Results also showed that 6.2% (2.36 ha) of the proposed mining area consist of grey, imperfectly to poorly drained soils of which the land capability were classified as a temporary **wetland zone** with low agricultural potential, dominated by the Wasbank soil form, symbolized as soil type Wa. No soils or areas were classified as wilderness land.

Ecology

There are a wide variety of functioning ecosystems on the site, containing and providing habitat for a diversity of plant and animal life. The north western section is rated as "highly significant" for its faunal diversity, however it has a lower floral biodiversity compared to other sections that were previously classified as areas of "least concern". Several small mammal species have burrows in the centre of the site and small antelope graze in the vlei area. The resident birds are highly dependent on the pan, whilst the vulnerable African Grass Owl (*Tyto capensis*) was found residing in the vlei area during the dry season (REMS 2008a). There are also many other migratory and nomadic birds that range over the site during the year the most important of these are critically endangered Rudds Lark (*Heteromira fra ruddii*), endangered Botha's Lark (*Spizocorys fringularis*), and vulnerable, Barrows Korhaan (*Eupodotis barrowi*) and Southern Bald Ibis (*Geronticus calvus*).

Most of the area zoned for opencast mining are upland grasslands. There are portions of the wetland habitat that have been included in this mining activity. From a biodiversity perspective the most important part of this area is the *E. chloromelas* - *C. compacta* community on the valley bottom, it contains both seasonal and temporary wetlands and has high species richness. The following Red Data species are found within this community *Nemisia fruticans*, *Impomea bathycolpos* and *Khadia carolinensis* and these plants *Brunsviga radulosa* (found nowhere else on the site), *Cyrtanthus brevifolia* and *C. contractus* are protected by Mpumalanga's provincial legislation. The wetland grasslands also provide the most substantial ecosystem services on the site (REMS 2008b). This community grades into the *H. lanatus* - *J. oxycarpus* community downstream in the wetland which also has *N. fruticans* and *I. bathycolpos*. Both communities are bordered by the *E. chloromelas* - *S. vulgaris* grassland which contains more upland plants. Two other plant communities are affected by open cast mining; these are the *T. triandra* - *T. leucothrix* community which is on the extreme south eastern portion of the site. The latter community has several endemic plants such as the vulnerable, *Eucomis* spp and the vulnerable mesem *Khadia carolinensis*.

Heritage

During the survey six sites were found of which one has higher heritage significance value. During a subsequent assessment (April 2011) of the proposed properties included in the Section 102 application, one building of heritage value was identified and assessed and is referred to as Site 7.

Site 1-4 and 6

Consist of recent historic structures and homesteads of low heritage significance. Nor further action is required on these structures.

Site 5

The site consist of 5 unmarked graves aligned east-west.

Graveyards can either be exhumed or fenced of, and the historic structures and homestead which are present are not of significant enough concern to warrant a choice either way. SAHRA permits will be required for the removal of the grave sites.

Site 7

The sandstone milking shed falls within the proposed Ferreira mine expansion area on portion 27 of the Farm Witbank 262 IT. The structure is older than 60 years and it is, therefore, protected by Section 34 of the National Heritage Resources Act, No.25 of 1999. Before the expansion of the mine into the farmstead area as proposed; a destruction permit with the South African Heritage Resources Agency (SAHRA), Built Environment and Landscape Office, will be required. To get a permit with the SAHRA BELCOM (Built Environment & Landscape Committee) a Heritage Impact Assessment (HIA) study of the proposed mining expansion area would need to be conducted or at least an archival study will be required. The work on the site for the destruction permit will include among other things: A scaled layout sketch (require thorough measurements) and Documentation of the whole structure by means of photography; this will require paying special attention to historic architectural features on the shed, techniques and angles. In conclusion all this recommended work will serve as means of positive heritage conservation for the: the recording, documentation and mapping of the site.

Noise

The proposed Ferreira's Coal project will take place on partially agricultural land and vacant land covered with natural vegetation. The N2 Freeway separates the area in two sections. The ambient noise level in the vicinity of this road is 67.0dBA for the daytime and 64.2dBA for the night-time period. The ambient noise level along the Northeastern boundary is 44.1dBA for the daytime and 41.1dBA for the nighttime period at the opencast mining area and 42.0dBA and 37.1dBA for the day-night period at the boundary of the previously planned underground mining area.

On the South-western boundary the ambient noise level is 58.5dBA and 55.5 dBA for the day/night period at the opencast mining area and 53.4dBA and 56.4dBA for the day-night period of the previously planned underground mining area respectively. This is because this side abuts the railway loop, which is used at the existing mining activities to the Southwest of the proposed mining activities.

The noise impact will be the most on the North-eastern boundary because there are no additional intrusive sounds i.e. traffic which could raise the prevailing noise level as experienced on the Southwestern boundary. There is already a shift in the prevailing ambient noise levels due to the impact of high traffic volumes and noise from other mining activities in the region.

This district can by no means be classified as a rural district according to the definition of table 2 of the SANS 10103 of 2004. There is the N2 Freeway, which runs through the proposed mining area, an increase of mining and/or train activities with the result that there is more traffic (heavy-duty vehicles), which is the biggest contributor to the higher prevailing ambient noise level.

The residents in the vicinity of the N2 Freeway are already exposed to the indifferent and higher ambient noise levels, which are created by the existing mining activities, train noise and traffic to and from Ermelo.

This is a typical open cast mine operation with some blasting, which will impact on the environment, 10 seconds at the most during blasting. The other activities are some distance from the identified noise sensitive areas and noise reduction will take place by means of the distance from the source, topographical barriers and ground conditions, which will enhance the reduction of noise as it propagates from the source.

The overpressure level which is synonymous with blasting must at all times be controlled in order to minimize the impact on the environment and the people living in the vicinity of such an activity. The ambient noise level is exceeded for a very short time during a blast and this noise is similar to a highveld thunderstorm.

The mining activity will create a shift in the prevailing ambient noise levels on the Northeastern side of the proposed mining area and at times this will be a temporary shift of the ambient noise level. The noise intrusion can however be controlled by means of state of the art equipment, proper noise management principles and compliance to the International Health and Safety Guidelines.

Air Quality

The proposed activities will result in dust emissions, both from mining activities and fugitive emissions from the large areas of previously vegetated land that will now be exposed. Provided sufficient mitigation measures are instigated, it is unlikely that these emissions will result in the exceedance of South Africa's guidelines for particulate emissions.

The activity within the pit area is likely to be the primary sources of emissions.

Visual

Visual impacts would result from the construction, operation and closure phase of the proposed Ferreira open cast mine. Specifically, impacts would result from the open cast

mining activities being seen from sensitive viewpoints (i.e. impacts of views from residences) and the negative effects (relating primarily to visibility and intrusion) on the scenic quality and sense of place of the landscape of the proposed site.

Impacts to some sensitive sites are rated high because these views are from the farmsteads directly east and north of the site and the N2 road which runs through the site. Other sensitive views (surrounding farmsteads and informal settlement) are either fully or partially screened by vegetation and other buildings and the visual impact is moderate to high for these views. As indicated by the viewshed, the screening effect of the topography should also be taken into consideration when assessing the visual impacts. Judging by the viewshed results, less than half of the study area within a 5km radius of the site would have clear views towards the Ferreira open cast mining activities. This is mainly due to the hill on the southern side of the proposed site.

It was determined that the intensity of the visual impact of the proposed Ferreira open cast mine would be **MODERATE** to **HIGH** and that the significance of this impact would be **MODERATE NEGATIVE**. With successful mitigating measures the significance can be reduced to **MODERATE** to **LOW**

Motivation for the project

Although the project will only create a small addition to the existing employment opportunities, the project will ensure:

- A mining operation with a sustainable life of mine;
- Provision of sustainable employment (retention);
- Ongoing economic input into the area;;
- Provision of a regional socio-economic benefit;
- Economic injection into the region in terms of small business enterprises (e.g. community services);
- Ongoing supply of export and local coal;
- Supply of coal to ESKOM when needed;
- Improved environmental management commitments; and
- Less impact on the environment due to the utilisation of the Delta plant.

Potential impacts identified during the specialist studies

Specialist studies listed the main environmental impacts as the following:

Geohydrological

- Impact on surrounding aquifer levels due to mine de-watering activities;
- Impact the catchment dam and non-perennial tributary stream due to loss in base-flow due to mining de-watering activities;
- Impact on mine safety and overall water balance (during the operational phase) due to groundwater seepage into the pits;
- Impact on surrounding groundwater quality;
- Impact on the Witpuntspruit in-stream water quality; and
- Identification of sensitive areas for long-term poor quality seepage due to mine decant.

Hydrological

Soil erosion

- During this phase the land profile will be changed due to stripping of vegetation;
- Due to an increased percentage of bare surfaces, there is a high potential for erosion; and
- Vegetation will be changed due to the activities.

Surface water pollution

- The type of material used during this phase may impact negatively on the runoff quality;
- Dust from moving construction plant will have a significant impact on the surface runoff;
- Contaminated water will be stored in pollution control dams. Unlined or overflowing pollution control dams impacts negatively on the water resources; and
- Contaminated soil on the mining area will pollute clean surface runoff during rain events.

Water quantity

- Due to vegetation clearance, the runoff coefficient of the opencast area will increase and therefore higher volumes of water will be produced during rain events; and
- Pre-development runoff will not reach the Witpuntspruit because contaminated runoff from the opencast will be contained.

Wetland

- Impact on the wetland from opencast mining; and
- Impact on threatened wetland vegetation.

Ecology

The following impacts/ issues were identified that could affect the floristic attributes of the study area adversely:

- Destruction of threatened/protected species and habitat;
- Destruction of sensitive/pristine habitat types;
- Changes in the local and regional biodiversity; and
- Impacts on surrounding habitat and species.

The fauna study indicated the following impacts:

- Loss and degradation of pristine faunal habitat;
- Impact on avifaunal breeding grounds;
- Road deaths of animals on access roads;
- Disruption of ecological connectivity and migration routes as well as territorial infringement;
- Increase in poaching, snaring and trapping of animals;
- Chemical compounds from the operation to the animals; and
- Effect on hearing abilities of waterfowl due to blasting.

Heritage

The HIA study for the proposed Ferreira Mine Project revealed the following types and ranges of heritage resources:

- Historic structures and homesteads; and
- Graveyard.

Graveyards can either be exhumed or fenced off, and the historic structures and homestead which are present are not of significant enough concern to warrant a choice either way. SAHRA permits will be required for the removal of the grave sites.

Noise

- The increase in the ambient noise levels due to the opencast mining operations and associated blasting activities;
- The increase in the ambient noise levels due to the ventilation shafts;
- The increase in the ambient noise levels due to the necessary transportation of coal to the Eskom Power stations; and
- Impact of blasting activities on surrounding properties.

Air Quality

- Dust and associated emissions during building and decommissioning phases, particularly associated with blasting, loading and offloading of material, dumping of overburden

and waste rock, and the transport of the coal via truck or conveyor, as well as bulldozer activity on either coal or overburden;

- Fugitive dust emissions associated with the wind entrainment of large areas of exposed earth, dumped material and coal that will be created during the project; and
- Vehicle emissions associated with the building, operation and decommissioning phases.

Visual

Visual impacts would result from the construction, operation and closure phase of the proposed Ferreira open cast mine. Specifically, impacts would result from the open cast mining activities being seen from sensitive viewpoints (i.e. impacts of views from residences) and the negative effects (relating primarily to visibility and intrusion) on the scenic quality and sense of place of the landscape of the proposed site; and

Impacts to some sensitive sites are rated high because these views are from the farmsteads directly east and north of the site and the N2 road which runs through the site.

Identification of Gaps

At the date of submission of this revised EIA/EMP no comments had yet been received from the authorities regarding the Scoping Report.

11 REFERENCES

GCS (Pty) Ltd, March 2010. Environmental Impact Assessment Report for Ferreira Coal Mining Project. Ref. No. 00078/000/00/08-111

APPENDICES:

Appendix A: Financial Closure Costing

Appendix B: Agreement with SANRAL

Appendix C: Amendment to the Hydrogeological Assessment.

Appendix D: Rock Engineer Appointment Letters