Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Decrease in wetland area downstream of the opencast pits due to concentration of flows.	There is no way to mitigate against the decrease in flow volumes within the valley bottom systems and streams. Water diverted around the opencast mines should be released in such a manner as to aid dispersion across most of the width of the downstream wetlands. Well designed and constructed clean and dirty water management systems must be enforced to reduce the potential of erosion, siltation and compaction. The volumes of storm water run off should be minimized by limiting the area of impermeable surfaces and compacted soils. Where possible storm water should be conveyed through grassed swales, rather than concrete channels to aid infiltration and reduce run off volumes. Should storm water be discharged into wetlands, gabions should be constructed to contain erosion (this should be done in consultation with an appropriate wetland and storm water specialist. The gabion structures should include measures to dissipate energy of flows and to disperse flows over a greater area.	During operational phase	Included in operational costs. Groundwater monitoring R100 000

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
	Underground	The alteration of topography and associated alteration of wetland should subsidence occur.	The underground operations should be designed in such a manner to reduce the possibility of subsistence by incorporating the necessary pillars and/or other designs. Surface monitoring should be undertaken to determine the effectiveness of the underground structures. Should subsidence occur, the area should be rehabilitated to be free draining.	During operational phase	Included in operational costs. Groundwater monitoring R100 000
Mining Related Infrastructure	Conveyors	Decrease in water quality due to spillages from the train trucks.	During induction and ongoing the importance of not having spillages should be explained and enforced. The surface water quality of surrounding streams must be monitored continuously. Should the contamination of the wetland and surrounding water resources be detected and action plan should be enforced immediately to rehabilitate the situation.	During operational phase	Included in operational costs. Groundwater monitoring R100 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Oil and Diesel Storage	The potential contamination of wetlands due to the possible spillage of hydrocarbons or other chemicals.	No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area. All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 110% of the volume stored within. A spill contingency plan should be available and enforced. Spill clean up kits should be available at each area where hydrocarbons are being utilised. During induction and ongoing all employees must be trained in how to rehabilitate contaminated spill areas. MSDS sheets should be available where hydrocarbons or other chemicals are stored. There will be an incident management system including procedures and training for dealing with incidents. Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected	During operational phase	Included in operational costs. Spill Kits R120 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		A detailed waste management strategy will be established and implemented Best waste management practices should be emphasized during the induction phase and on ongoing basis. Waste should be removed by licensed waste disposal companies. The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs. Waste Management Cost R372 000
Generation of Domestic and Hazardous Waste	The potential contamination of wetlands due to the possible uncontained disposal of domestic and/or hazardous waste.	A comprehensive waste management plan must be available and enforced on site. Best waste management practices should be emphasized during the induction phase and on ongoing bases. Waste should be removed by licensed waste disposal companies. The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs. Waste Management Cost R372 000
Sewage	The potential contamination of wetlands due to the unforeseen discharge of sewage.	Where chemical toilets are being utilised it should be removed by a licensed disposal company. The sewage pipelines must be inspected and/or monitored on an ongoing basis. The mine must adopt the cradle to grave principle.	During operational phase	Included in operational costs. Waste Management Cost R372 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Water Storage Facilities	Erosion within the valley bottom wetlands due to the release of storm water at discharge points	Well designed and constructed clean and dirty water management systems must be enforced to reduce the potential of erosion, siltation and compaction. The volumes of storm water run off should be minimized by limiting the area of impermeable surfaces and compacted soils. Where possible storm water should be conveyed through grassed swales, rather than concrete channels to aid infiltration and reduce run off volumes. Should storm water be discharged into wetlands, gabions should be constructed to contain erosion (this should be done in consultation with an appropriate wetland and storm water specialist. The gabion structures should include measures to dissipate energy of flows and to disperse flows over a greater area.	During operational phase	Included in operational costs.
	Deterioration of water quality due to release of storm water into the wetlands.	Well designed and constructed clean and dirty water management systems must be enforced to reduce the potential of erosion, siltation and compaction. Dirty water should not be allowed to enter the clean storm water system. Should contaminated water enter the wetlands due to spillages or other unforeseen circumstances a	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		wetland or water quality expert should be consulted regarding implementation of suitable mitigation and/or rehabilitation measures.		
Plant and RoM Stockpiles Related Activities	Deterioration of water quality due to oxidation and leaching of pyretic material during storage on site, releasing low pH, high netal and sulphate rich discharges into the surface water wetlands	A waste characterization test should be undertaken prior to the disposal of any coal material. The surface of the disposal area should be compacted to reduce the potential of infiltration. Berms/drainage channels and cut off trenches should be constructed both below and above stockpiles to enable the separation of clean and dirty water. Contaminated water (if of acceptable quality) may be utilised for dust suppression. Groundwater monitoring boreholes must be placed strategically around all disposal sites. Should a pollution plume be detected an action plan should be enforced immediately to pump and treat the polluted water. The surface water quality of surrounding streams must be monitored continuously. Should the contamination of the wetland and	During operational phase	Included in operational costs. Waste Management Cost R372 000 Groundwater monitoring R100 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		surrounding water resources be detected and action plan should be enforced immediately to rehabilitate the situation.		

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Workshops and other Buildings	The potential contamination of wetlands due to the possible spillage of hydrocarbons or other chemicals.	No activities associated with hydrocarbons and or chemicals (i.e. washbays etc.) may be undertaken outside of an effectively designed contained area. All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 110% of the volume stored within. A spill contingency plan should be available and enforced. Spill clean up kits should be available at each area where hydrocarbons are being utilised. During induction and ongoing all employees must be trained in how to rehabilitate contaminated spill areas. MSDS sheets should be available where hydrocarbons or other chemicals are stored. There will be an incident management system including procedures and training for dealing with incidents. Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture. Appropriate remedial measures will be implemented in consultation with these regulatory authorities. If spills do occur and soils become contaminated, the appropriate remedial measures will be identified in consultation with an appropriate qualified specialist. If necessary, the polluted soils will be classified as waste and will be discarded at an appropriate permitted waste site. After the removal of the contaminated soils, the affected	During operational phase	Included in the operational costs Spill Kits R120000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Diesel and Chemical Storage	The potential contamination of wetlands due to the possible uncontained disposal of domestic and/or hazardous waste.	A comprehensive waste management plan must be available and enforced on site. Best waste management practices should be emphasized during the induction phase and on ongoing bases. Waste should be removed by licensed waste disposal companies. The mine must adopt the cradle to grave principle. No activities associated with hydrocarbons and or chemicals (i.e. washbays etc.) may be undertaken outside of an effectively designed contained area. All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 120% of the volume stored within. A spill contingency plan should be available and enforced. Spill clean up kits should be available at each area where hydrocarbons are being utilised. During induction and ongoing all employees must be trained in how to rehabilitate contaminated spill areas. MSDS sheets should be available where hydrocarbons or other chemicals are stored.		

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Salvage Yard	The potential contamination of wetland due to the uncontained storage of old equipment, machinery etc.	A clear material separation guide should be available at the storage area. Records of the inflows and outflows should be available at all times. All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 110% of the volume stored within. A spill contingency plan should be available and enforced. Spill clean up kits should be available at each area where hydrocarbons are being utilised. During induction and ongoing all employees must be trained in how to rehabilitate contaminated spill areas. MSDS sheets should be available where hydrocarbons or other chemicals are stored.	During operational phase	Included in operational costs. Waste Management Cost R372 000 Spill Kits R120000
Water Pipeline	Erosion at the pipeline crossing point.	The water pipeline should not be buried at wetland crossing, but rather that brackets be used to anchor the pipeline to the existing road bridge.	During operational phase	Included in operational costs. Waste Management Cost R372 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Co disposal Facility	Deterioration of water quality due to oxidation and leaching of pyretic material during storage on site, releasing low pH, high metal and sulphate rich discharges into the surface water wetlands	A waste characterization test should be undertaken prior to the disposal of any coal material. The surface of the disposal area should be compacted to reduce the potential of infiltration. Berms/drainage channels and cut off trenches should be constructed both below and above stockpiles to enable the separation of clean and dirty water. Contaminated water (if of acceptable quality) may be utilised for dust suppression. Groundwater monitoring boreholes must be placed strategically around all disposal sites. Should a pollution plume be detected an action plan should be enforced immediately to pump and treat the polluted water. The surface water quality of surrounding streams must be monitored continuously. Should the contamination of the wetland and surrounding water resources be detected and action plan should be enforced immediately to rehabilitate the situation.	During operational phase	Included in operational costs. Waste Management Cost R372 000

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Coal Product Supply	Coal Product Stockpiles	Deterioration of water quality due to oxidation and leaching of pyretic material during storage on site, releasing low pH, high metal and sulphate rich discharges into the surface water wetlands			
	Railway Line	Erosion upstream and downstream of culverts leading to increased sediment load in the wetlands.	Culverts should be spaced along the entire width of the wetland to reduce the concentration of flows taking place. Culvert discharges should include a rock packed mattress to prevent gully erosion. This mattress should be delta shaped, spreading from the culvert at 45 degrees to both sides, and extent for approximately 6m from the culvert opening. Energy dissipaters should be included on this mattress. Upslope of the culverts drop down weirs should be incorporated in the construction of the culverts to prevent the formation of head cuts. The walls of the drop down weir should be cast from cement and be impermeable to prevent leakage. The floor of the drop down weir should be level with the floor of the culvert, the mattress and the level of the downstream wetland surface.	During operational phase	Included in operational costs. Spill Kits R120000
		Reduction in the wetland extent downstream of the crossings.			

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Decrease in water quality due to spillages from the train trucks.	During induction and ongoing the importance of not having spillages should be explained and enforced. The surface water quality of surrounding streams must be monitored continuously. Should the contamination of the wetland and surrounding water resources be detected and action plan should be enforced immediately to rehabilitate the situation.	During operational phase	Included in operational costs. Monitoring R50 000 and R100 000
	The potential of concentrating flows on the upslope side of fills when crossing contours obliquely, with drying out on the downslope side.	Where possible the railway line should cross all wetland and rivers perpendicular to the direction of flow. Where this is not practically possible, sufficient culverts should be placed along the crossing to ensure flows remain spread across the width of the wetland.	During operational phase	Included in operational costs.
	Interception of perched groundwater causing local desiccation.	No mitigation is possible		

3.2.8 *Air quality*

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining of Coal	Opencast	The increase in dust dispersion with the blasting activities and associated coal resource removal.	A dust management plan that includes some of the following mitigation measures must be implemented on the mine: Drilling operations must be accompanied by fabric filters (potential 99% reduction) and water sprays (70% reduction). The drop heights of drag lines should be minimised and water sprays should be utilised. Blasting activities should be limited to days with limited wind where possible. Dust suppression must employed where possible. Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site. When any burning areas within a stockpile or dump or the mining area may develop the area will be excavated and re-compacted immediately.	During operational phase	Included in operational costs. Waste Management Cost R372 000 Spill Kits R120000 Dust suppression R432 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining Related Conveyors Infrastructure	The potential dispersion of dust due to the transportation of coal from the opencast pits to the remainder of the processing and transportation activities.	A dust management plan that includes some of the following mitigation measures must be implemented on the mine: The conveyors should be covered if dust limits are exceeded. Water sprays should be utilised in the uploading of trucks (70% reduction). Water prays with chemicals could reduce the emissions by 50% in the miscellaneous transfer and conveying of coal. If the emissions still exceed levels enclosures (70% reduction) or enclosure and use of fabric filters (99% reduction) should be considered. Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site.		

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Plant and RoM Stockpiles Related Activities	The increase in dust dispersion around the RoM stockpiles and associated activities	A dust management plan that includes some of the following mitigation measures must be implemented on the mine: Water sprays must be used in the loading of stockpiles (50% reduction). Variable height in stackers should also be implemented (25% reduction). Telescoping chute with water sprays could reduce the emission by 75%. Should emissions continue to exceed the guidelines the enclosure to the loading stockpiles should be investigated. Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. Erosion control measures should be employed and maintained at all dumps and stockpiles. Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site.	During operational phase	Included in operational costs. Waste Management Cost R372 000 Spill Kits R120000 Dust suppression R432 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Co-disposal facility	The increase in dust dispersion around the co-disposal facility and associated activities	A dust management plan that includes some of the following mitigation measures must be implemented on the mine: Water sprays must be used in the loading of stockpiles (50% reduction). Variable height in stackers should also be implemented (25% reduction). Telescoping chute with water sprays could reduce the emission by 75%. Should emissions continue to exceed the guidelines the enclosure to the loading stockpiles should be investigated. Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. Erosion control measures should be employed and maintained at all dumps and stockpiles. Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site.	During operational phase	Included in operational costs. Waste Management Cost R372 000 Spill Kits R120000 Dust suppression R432 000

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Coal Product Supply	Coal Product Stockpiles	The increase in dust dispersion around the coal product stockpiles and associated activities	A dust management plan that includes some of the following mitigation measures must be implemented on the mine: Water sprays must be used in the loading of stockpiles (50% reduction). Variable height in stackers should also be implemented (25% reduction). Telescoping chute with water sprays could reduce the emission by 75%. Should emissions continue to exceed the guidelines the enclosure to the loading stockpiles should be investigated. Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. Erosion control measures should be employed and maintained at all dumps and stockpiles. Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site.	During operational phase	Included in operational costs. Waste Management Cost R372 000 Spill Kits R120000 Dust suppression R432 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Railway Line	The increase in dust dispersion from and around the railway line and associated activities	A dust management plan that includes some of the following mitigation measures must be implemented on the mine: The drop heights of drag Water sprays should be utilised in the uploading of trucks (70% reduction). If required the loading to trains must take place in an enclosed structure (70% reduction), by implementing water sprays as well the emissions levels may be reduced by 99%. Where vehicles are used the limited of vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity should be enforced. Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site.	During operational phase	Included in operational costs. Waste Management Cost R372 000 Spill Kits R120000 Dust suppression R432 000

3.2.9 *Site of Historical and Cultural Importance*

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
Mining of Opencast Pit 1 Coal	Impact on graves due to the commencement of opencast operations (GY01)	If graveyards must be exhumed and relocated The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police. The necessary permits and/or authorisations must be obtained from the SAHRA. A consultation process of 60 days must be adhered to for graves older than 60 years. A forensic archaeologist or reputed undertaker who is acquainted with the administrative procedures and relevant legislation must be involved whenever human remains are exhumed and relocated.	During operational phase	Included in operational costs. Waste Management Cost R372 000 Spill Kits R120000 Dust suppression R432 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
	The impact on historical houses due to the commencement of opencast operations (HH01 and HH02).	The historical farmsteads may not be affected by the proposed mining development before the Mpumalanga Provincial Heritage Resources Authority (Mpumalanga PHRA) has approved such alterations. An archaeologist or historical architect accredited with the Associated for Professional Archaeologists (ASAPA) has to subject the farmstead complexes to a Phase 2 investigation prior to their destruction. The results of the Phase 2 investigation have to be published in a report which must be preserved in the Mpumalanga PHRA's databank. An archaeologist or historical architect accredited with the ASAPA must apply for a permit from the Mpumalanga PHRA which would authorize that the farmstead complexes with their associated remains may be destroyed.		
	The impact on a reservoir due to the commencement of opencast operations (R01).			
	Impact on the trough due to the commencement of opencast operations (T01)			

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
	The impact on enclosures due to the commencement of opencast operations (E01)			
	The impact on a short elongated shaft due to the commencement of opencast operations (SES01).	No management measures required. The site has been identified with no historical significance.	During operational phase	Included in operational costs. Dust suppression R432 000
Opencast Pit 2	Impact on a dairy due to the commencement of opencast operations (D01).	The historical farmsteads may not be affected by the proposed mining development before the Mpumalanga Provincial Heritage Resources Authority (Mpumalanga PHRA) has approved such alterations. An archaeologist or historical architect accredited with the Associated for Professional Archaeologists (ASAPA) has to subject the farmstead complexes to a Phase 2 investigation prior to their destruction. The results of the Phase 2 investigation have to be published in a report which must be preserved in the Mpumalanga PHRA's databank. An archaeologist or historical architect accredited with the ASAPA must apply for a permit from the Mpumalanga PHRA which would authorize that the farmstead complexes with their associated remains may be destroyed.	During operational phase	Included in operational costs. Waste Management Cost R372 000 Spill Kits R120000 Dust suppression R432 000

Activity	Potential Impact	Management Measures	Frequency	Annual management Cost
General Mining Area	The possible impact on site of historical and cultural significance.	Should any graves or other sites with potential historical and/or cultural importance be identified, all activities in that vicinity must cease immediately. The mine environmental and safety and health office must be informed. The area must be cordoned off. An archaeologist should be informed immediately to investigate and inspect the site to determine the importance. Should a grave be found, the SAHRA should be informed as well.	During operational phase	Included in operational costs.
Co-disposal facility	The possible impact on site of historical and cultural significance.	Should any graves or other sites with potential historical and/or cultural importance be identified, all activities in that vicinity must cease immediately. The mine environmental and safety and health office must be informed. The area must be cordoned off. An archaeologist should be informed immediately to investigate and inspect the site to determine the importance. Should a grave be found, the SAHRA should be informed as well.		
Railway Line	The possible impact on site of historical and cultural significance.			

3.2.10 Noise

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining of Coal	Opencast	The increase in the ambient noise levels due to the opencast mining operations and associated blasting activities at both Opencast Pit 1 and 2.	Blasting Limit of ground vibration should not exceed 10mm/s during blasting. Air over pressure limit of 134dB should not be exceeded generally and should not exceed 128dB near schools or churches. No blasting is to take place during windy conditions. The blasting schedule and location and number of blasts should be made available to all surrounding landowners and should be amended when changes take place and be redistributed. An effective blasting design should be implemented. Vibration monitoring should be undertaken. Equipment Select equipment with lower sound power levels. Install suitable mufflers on engine exhausts and compressor components. Equipment utilised must be in good working condition and be maintained continuously.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		The scheduling of equipment within the opencast pits must take into consideration the noise emissions from the equipment in order to spread tem out over the interface area. Noise barriers Noise barriers (such as overburden dumps, trees etc.) must be established on the eastern, western and southern boundary of the property (i.e. at the farmers house on the eastern boundary, opposite the Impilo Primary School and at the farmers house on the western boundary), to reduce the noise impact. Communication Open channel of communication should be established by the mine with the surrounding landowners.	During operational phase	Included in operational costs. Waste Management Cost R372 000 Spill Kits R120000 Dust suppression R432 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining Related Ventilation Infrastructure	The increase in the ambient noise levels due to the ventilation shafts.	Equipment utilised must be in good working condition and be maintained continuously. Fans should be ducted and the outlet of such fans to be lined with sound absorbing material. The Fans should be faced away from the noise sensitive areas. Install silencers for fans. Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding where necessary.	During operational phase	Included in operational costs.
Conveyors	The increase in the ambient noise levels due to the conveyor lines.	The conveyor belt will have to be closed to the one side (direction to affected parties). The conveyor has to be placed as low as possible to the ground level (preferably lower than ground level where possible)	During operational phase	Included in operational costs.
Transportation of Coal via road when absolutely necessary	The increase in the ambient noise levels due to the necessary transportation of coal to the Eskom Power stations.	Vehicles utilised must be in good working condition and be maintained continuously. Open channel of communication should be established by the mine with the surrounding landowners.	During operational phase	Included in operational costs.
Railway line	The increase in the ambient noise levels due to the railway line.	Equipment utilised must be in good working condition and be maintained continuously. Open channel of communication should be established by the mine with the surrounding landowners.	During operational phase	Included in operational costs.

3.2.11 Blasting

Activity	Potential Impact	Management Measures	Frequency	Annual ManaOpeegement Cost
Mining of Coal Opencast and underground	Impact of blasting activities on surrounding properties.	Surrounding property owners will be informed of the blasting procedures and schedules. An exclusion zone of 500m will be in place for the life of mine. Scheduled blasting times will be planned in advance and will be clearly indicated on the mining area. Blasting boards, at the access routes to construction areas, will be updated 24 hours prior to the blast, displaying time and date of blast. Employees and outside contractors will be informed of the blasting procedures and the associated safety measures during induction. Prior to the blasting, all vehicles and machinery will be removed from the blast area and parked at a designated site, as determined by the responsible manager. All possible access roads will be blocked by personnel with red flags. The mine will undertake monthly blasting monitoring to determine whether the blasting activities remain under acceptable levels (see Blasting specialist report).	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual ManaOpeegement Cost
		The mine will implement a temporary testing model during initial blasting phase. Should the results indicate it necessary (vibrations above or on impact level), permanent monitoring stations will be implemented in order to establish whether any potential impact could result due to the blasting activities. The areas of most influence as identified by the temporary seismic monitoring stations will be equipped with permanent seismic monitoring stations.		

Activity	Potential Impact	Management Measures	Frequency	Annual ManaOpeegement Cost
		Installation of electronic crack monitors will also be undertaken if it is requested by surrounding property owners. These monitors employ a single sensor that measures both weather-induced micrometer changes in crack width and those produced by habitation and ground motion-induced vibrations. The mine will establish an open channel of communication in order to ensure that all issues and concerns are known and are addressed.	During operational phase	Included in operational costs.

3.2.12 Visual

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Mining of Coal	Opencast and Underground	Visual impact of mining activities, opencast and underground infrastructure on surface	Very little mitigation is possible during operational phase, but several management measures can be put in place to minimise the overall effect, and to make rehabilitation easier. To restore the visual quality of the landscape, it is suggested that a comprehensive rehabilitation plan be developed, based on the principles of ecological restoration. Light pollution will be seriously and carefully considered and kept to a minimum wherever possible as light at night travels great distances. Harsh, steep engineered slopes will be avoided as these could impose an additional impact on the landscape by contrasting with existing natural topographic forms and because it is difficult to sustain vegetation on steep slopes in the long term. During operational phase of the mine, haulage roads must be serviced with non-polluting chemicals that will retain moisture in the road surface, to minimise dust. Visual barriers (i.e. indigenous trees) could be planted to reduce the visual impact on surrounding	During operational phase	Included in operational costs.

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
			areas. Avoid construction material with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds. Ensure, wherever possible, that all existing natural flora is retained and incorporated into the site design.	During operational phase	Included in operational costs. Dust suppression R432 000
Mining Related Infrastructure	Ventilation; Conveyors; Oil and Diesel Storage; Generation of Domestic and Hazardous Waste; Sewage; and Water Storage Facilities	Visual impact of mining activities, the ventilation shafts, oil and diesel storage, generation of mine waste, generation of domestic and hazardous waste, sewage and water storage facilities.	Very little mitigation is possible during operational phase, but several management measures can be put in place to minimise the overall effect, and to make rehabilitation easier. During operational phase of the mine, haulage roads must be serviced with non-polluting chemicals that will retain moisture in the road surface, to minimise dust. Visual barriers (i.e. indigenous trees) could be planted to reduce the visual impact on surrounding areas. Avoid construction material with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds.	During operational phase	Included in operational costs.

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
			Ensure, wherever possible, that all existing natural flora is retained and incorporated into the site design.		
Plant and Related Activities	RoM Stockpiles; Workshops and other Buildings; Diesel and Chemical Storage; Salvage Yard; and Water Management Facilities	Visual impact of mining activities, the RoM stockpiles, workshops and buildings, diesels and chemical storage, the salvage yard and water management facilities..	To restore the visual quality of the landscape, it is suggested that a comprehensive rehabilitation plan be developed, based on the principles of ecological restoration. Light pollution will be seriously and carefully considered and kept to a minimum wherever possible as light at night travels great distances. Shaping of dump and stockpiles will be implemented such that the sides of the dumps are articulated in a fashion that create areas of light and shadow interplay. Shaping will be implemented such that the profile of the dump and stockpiles is formed to emulate natural contours of the area. Harsh, steep engineered slopes will be avoided as these could impose an additional impact on the landscape by contrasting with existing natural topographic forms and because it is difficult to sustain vegetation on steep slopes in the long term. During operational phase of the mine, haulage roads must be serviced with non-polluting chemicals that	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		will retain moisture in the road surface, to minimise dust. Visual barriers (i.e. indigenous trees) could be planted to reduce the visual impact on surrounding areas. Avoid construction material with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds. Ensure, wherever possible, that all existing natural flora is retained and incorporated into the site design.		
Co-disposal facility	Visual impact of mining activities and the Co disposal facility.	Very little mitigation is possible during operational phase, but several management measures can be put in place to minimise the overall effect, and to make rehabilitation easier. To restore the visual quality of the landscape, it is suggested that a comprehensive rehabilitation plan be developed, based on the principles of ecological restoration. Shaping of dump and stockpiles will be implemented such that the sides of the dumps are articulated in a fashion that create areas of light and shadow interplay. Shaping will be implemented such that the final	During operational phase	Included in operational costs.

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
			profile of the rehabilitated dump and stockpiles is formed to emulate natural contours of the area. Harsh, steep engineered slopes will be avoided as these could impose an additional impact on the landscape by contrasting with existing natural topographic forms and because it is difficult to sustain vegetation on steep slopes in the long term. Visual barriers (i.e. indigenous trees) could be planted to reduce the visual impact on surrounding areas. Avoid construction material with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds.		
Coal Product Supply	Coal Product Stockpiles	Visual impact of mining activities, the coal product stockpiles, the rapid load out facility and the railway line.	To restore the visual quality of the landscape, it is suggested that a comprehensive rehabilitation plan be developed, based on the principles of ecological restoration. Light pollution will be seriously and carefully considered and kept to a minimum wherever possible as light at night travels great distances. Shaping of dump and stockpiles will be implemented such that the sides of the dumps are articulated in a fashion that create areas of light and shadow interplay.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		Shaping will be implemented such that the profile of the dump and stockpiles is formed to emulate natural contours of the area. Harsh, steep engineered slopes will be avoided as these could impose an additional impact on the landscape by contrasting with existing natural topographic forms and because it is difficult to sustain vegetation on steep slopes in the long term. During operational phase of the mine, haulage roads must be serviced with non-polluting chemicals that will retain moisture in the road surface, to minimise dust. Visual barriers (i.e. indigenous trees) could be planted to reduce the visual impact on surrounding areas. Avoid construction material with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds. Ensure, wherever possible, that all existing natural flora is retained and incorporated into the site design.		
Rapid Load Out Facility	Visual impact on Landscape Quality			

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Railway Line	General Visual impact			

3.2.13 *Socio Economic*

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Changes in Population Characteristics	Population change	Environmental impacts and social conflict associated with an influx of people to the area.	The use of local labour should be maximised to limit the negative impact on the existing infrastructure, services and resources. Housing and other infrastructural needs should pro-actively be discussed with the Emalahleni Local Municipality to ensure that the additional requirements for the population increase can be met over time. DCM to formulate a housing policy which would also cater for the increase in employees (Ideally the contractors should participate in this). The focus of the housing policy should be on housing subsidies, and not housing allowances. Housing allowances often stimulate the growth of informal settlements adjacent to the mine. Keep the union informed of the employment process - particularly the employment of specialist from other areas. Implement education and skills development programmes to ensure an effective skills match between local people and mine requirements, Focus on also creating employment opportunities for the youth and women.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		Ensure safe and secure public transport access points. Ensure effective safety and security measures.		

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
		Inflow of temporary workers	Maximise the usage of local service providers. Use local workforce. Ensure safe and secure public transport access points. Implement education and skills development programmes to ensure an effective skills match between local people and mine requirements (seeing as the proposed mine is an open cast mine, whilst the labour force has experience on underground mining). Focus on also creating employment opportunities for the youth and women.	During operational phase	Included in operational costs.
Impact on community and institutional structures	Attitude formation	Possible action group formation against mining activities in the area and focused actions against the mining company.	Mining company should strive to achieve best practice Guidelines of EMP should be strictly followed. Ongoing and transparent communication with community leaders, landowners and spokespersons. Possible establishment of a Management and Monitoring Committee consisting of representatives of the mining company (TCSA DCM), Emalahleni Local Municipality, community leaders and landowners to monitor mining activities over the long term.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Impact on local municipality	Economic benefits and spin-offs from proposed development and additional income base of Municipality.	Determine the impact of the mining activities and expansion (positive and negative) on the financial and institutional resources of the Emalahleni Local Municipality. Put pro-active measures in place to manage the additional pressure on the infrastructure and services as a result of the influx of additional permanent employees to the area. Implement comprehensive traffic impact assessment. Ensure safe and secure public transport access points. Implement access control. Ensure effective safety and security measures. Monitor the condition of local roads used as transport linkages. Implement road maintenance and upgrade programmes in collaboration with the municipality. Institute a joint municipal coordinating committee to support the municipal local economic and social develop needs and requirements, where feasible.	During operational phase	Included in operational costs.

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
	Impacts on infrastructure development and maintenance	Increased pressure on health and road infrastructure.	Ensure that a proper emergency plan that fits with the municipal Disaster Management Plan is in place. Such a plan should be developed by the Emalahleni Local Municipality together with DCM. DCM to pro-actively liaise with the Emalahlenii Local Municipality regarding their additional infrastructural and housing requirements. Additional electricity supply requirements should be fed into the Electricity Master Plan to ensure pro-active planning in this regard.	During operational phase	Included in operational costs.
Impacts on Occupational and Community Resources	Economic Contribution and Revenue creation	Regional economic spin-offs and benefits; Continued economic benefits for those businesses dependent on the mine and the employees' buying power (Ga-Nala).	Local goods and services should be used as far as possible. Implement contractual requirement for contractors to use local goods and services as far as possible.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Impact on Job Opportunities	Ongoing purchasing power of those employed by the mine. Indirect benefits to businesses. Increased tax base for local municipality.	The use of local labour should be maximised. Ensure an equitable process whereby minorities and previously disadvantaged individuals (women) are taken into account. Skills development and training focused on the employees and youth should take place during the life of mine. Skills training and capacity building programmes should be linked to the Emalahleni Municipality's Education and Training Skills Strategy. Local SMME should be allowed the opportunity to become involved in e.g. maintenance, security services, garden services, cleaning and catering services, transport services and as input suppliers. The existing skills base should be developed by providing all employees at DCM to become functionally literate and numerate. Training should ensure that employees obtain portable skills that could be used in non-mining sectors once the life of mine has come to an end. Employers should adhere to labour legislation and regulations; ensure fair labour practices; ensure an equitable process whereby minorities and previously disadvantaged individuals (women) are taken into account.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Impact on Property values	Indirect negative economic impacts on landowners affected by blasting. Possible housing shortage.	Crack surveys should be undertaken on a continuous basis Ensure affordable housing for the mine employees by means of housing subsidies or other measures. Take care to implement the aspects indicated in the EMP, with a specific focus on water (surface and underground) and dust management) during the operational phase of the mine. Implement a consistent and constructive communication process with adjacent landowners, to address issue and concerns before these becomes unmanageable.	During operational phase	Included in operational costs.
Local Procurement	Local Economic Development and Capacity Building.	Provide support and encouragement to small businesses in the area. Continue to provide technical advise to small businesses in the area Actively pursue local SMME links. Provide opportunities for local businesses to become involve at the start of the procurement process and by allowing them to form part of the tender process.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Social Development and Social Services Support	Improvement of livelihood, improved education facilities and general social development.	Involvement in upliftment programmes should be done according to the needs identified as part of the IDP Focus on the expansion of local economic development programmes (LED). Implement a baseline study to determine LED opportunities. Implement a regular and formalised consultation process with local government to ensure synergy between the mine's social development and LED focus and that of the local municipality.	During operational phase	Included in operational costs.
Capacity Building and Skills Training	Improving quality of life of employees and their families through the provision of capacity building and skills training programmes formalise and implement learnership programmes ensuring statutory compliance, recognition of prior learning and certification according to the SAQA process and requirements.	N/A		

Activity		Potential Impact	Management Measures	Frequency	Annual Management Cost
Individual, Community And Family Level Impacts	Impacts on daily living and movement patterns	Further intrusion and sense of place impacts associated with other developments in the area. Possible impact of borrow pits required for additional roads.	Frequent and ongoing monitoring of boreholes is critical to address the concerns with regards to the impact on the water quality and quantity. Gravel roads should be sprayed to minimise dust creation. Ensure effective consultation and cooperation with local law enforcement agencies to ensure legal and regulatory compliance. Proactively inform municipality and local resident of roads closures and diversions. Ensure access points comply with standards and are well marked and indicated.	During operational phase	Included in operational costs.
	Impact on Social Networks	Indirect economic impacts if people would leave the area in search of land or employment.	The use of local labour would mitigate possible social conflict between outsiders and existing residents. Maximise the usage of local service providers, maintenance, etc. Should the mine not continue, the negative psychological impact on the surrounding communities should be sensitively dealt with.	During operational phase	Included in operational costs.
	Health Impacts	Environmental problems and subsequent health impacts due to mismanagement or disasters.	Continue and extend the current HIV/AIDS awareness and support programmes. Ensure effective monitoring of water (surface and underground) and air quality and ensure regulatory compliance.	During operational phase	Included in operational costs.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Safety Impacts	Increase in accidents due to mining activity in the area.	Access to the mining area shouldbe controlled to avoid animals or people entering the area without authorisation. Mining vehicles should be in good working order and be inspected regularly. Mining vehicles should keep to speed limits and penalties for not adhering to the safety measures should be implemented. Ensure safe and healthy working practices.	During operational phase	Included in operational costs.
	Impacts on daily living and movement patterns with regards to construction of railway line	Further intrusion and sense of place impacts.	Ensure that access routes are coordinated with adjacent farmers and maintained. Ensure strict access control. Inform adjacent landowners before any maintenance activities or access of the areas. Ensure safe operating environment. Adhere to safety requirements ands regulations.		

3.3 Decommissioning and 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.

3.3.1 Rehabilitated land

Management Objective

The general mining area includes the areas of cultivated land, and grass land. The continuous rehabilitation program will attempt to restore the area to an acceptable standard as close to its original state as is possible.

Management criteria

The following management measures are required:

- The area will be fenced, and all animals kept off the area until the vegetation is self sustaining;
- Newly seeded/planted areas will be protected against compaction and erosion;
- Traffic will be limited were possible until vegetation is self-sustaining;

- Vegetation will be watered (if required) and weeded regularly;
- Ongoing monitoring for pests and diseases will be undertaken at least once every two (2) weeks and vegetation will be treated if necessary;
- Unhealthy or dead plant material will be replaced if necessary;
- A general application of potassium, nitrate and phosphorous fertilizer should be applied at a rate of 400kg/ha, where self succession does not establish. Small quantities should be applied at regular intervals across the site so as not to affect the surface and groundwater environments;
- Any damage caused by erosion will be rehabilitated and the necessary erosion control measures will be maintained;
- Annual inspections of rehabilitated areas will be undertaken for the first three (3) years after rehabilitation or until such time that the areas are self-sustaining.

3.3.2 Water pollution control structures

Management Objective

The continuous rehabilitation program and the demolishing and/or maintenance of water pollution control structures will attempt to restore the area to an acceptable standard being free draining.

Management criteria

Cut off trenches

Cut off trenches must remain where necessary and should be maintained by continuous inspections. The cut off trenches should be clean at all time, ensuring that they contain no obstacles. The cut off trenches will only be demolished should the area proof to be free draining with no pollution potential after rehabilitation.

Culverts

Culverts will be maintained and be kept clean to ensure that no obstructions occur should a 1:100 year flood occur. The culverts will only be demolished should the area proof to be free draining with no pollution potential after rehabilitation.

Berms

Berms will be maintained. This will be undertaken by vegetating all berms to ensure that they are stable. The berms will also be inspected to ensure that there are no cracks, which could cause leakage. The berms will only be demolished should the area proof to be free draining with no pollution potential after rehabilitation.

All pollution control and return water dams (i.e. lined and earthed)

All pollution control and return water dams will be maintained to ensure that no leakages occur. Overflow pipes will be kept clean. Sumps will be kept clean and all pumps will be maintained. The dams will only be demolished should the area proof to be free draining with no pollution potential after rehabilitation.

However, it should be noted that all clean and dirty water systems in and around the co-disposal facility and around the opencast pits should be maintained, whilst these mining infrastructures remain.

3.3.3 *Rehabilitated residue deposits*

All stockpiles and dumps will be continuously covered or vegetated up to 1 m from the top throughout the life of mine.
All topsoil stockpiles will be constructed with 1.5 m lifts, but will be removed during the decommissioning phases to serve as part of the rehabilitation strategies.
Re-vegetated areas will be maintain by means of regular watering, weed controls and cattle-grazing exclusion until the vegetation has settled to ensure that it is stable and that erosion does not occur.
All stockpiles will be established in such a manner to be stable.

3.3.4 *Infrastructure removal and rehabilitation*

3.3.4.1 *Buildings*

All infrastructure will be removed and rehabilitated, should no alternative use be found for the structures.
Foundations will be removed to a depth of 1m below surface.
An alternative use for the brick structures will first be sought i.e. they can either be sold/donated to the post-mining landowner on sale of the land. If an alternative use cannot be found, the buildings will be demolished.
All material recovered from the demolition of buildings and/or structures will either be transported to a permitted disposal site, sold as scrap or made available to the local community as building materials (provided they are in a satisfactory condition following demolition).

3.3.4.2 *Linear infrastructure*

Linear infrastructure constructed by the mine (i.e. roads, conveyors, railways and power lines) will be removed if it proves to inhibit land use at decommissioning. Where possible infrastructure will remain for social investment opportunities, this will be decided in conjunction with Integrated Development Plan (IDP) of the area and the local authorities (i.e. municipality). The soils and land capability will be rehabilitated to near pre-mining conditions.
All haul roads will be rehabilitated by ripping these structures to a depth of 500mm.
All fences erected around the mine will be dismantled and either disposed of at a permitted disposal site or sold as scrap (provided these structures will no longer be required by the post-mining land owner).
Fences erected to cordon-off dangerous excavations will remain in place and will be maintained as and when required.
The overland conveyors and rapid load out facility will be disassembled and the components removed from the site. The material can either be sold (as a unit) or the components sold as scrap.

3.3.4.3 Dams

All containment dams will be maintained to ensure that no leakages occur. Overflow pipes will be kept clean. Sumps will be kept clean and all pumps will be maintained. The containment dams will only be demolished should the area proof to be free draining with no pollution potential after rehabilitation. However, it should be noted that all clean and dirty water systems in and around the co-disposal facility and around the opencast pits should be maintained, whilst these mining infrastructures remain.

3.3.4.4 Mine Residue Disposal

Co-disposal Facility

Throughout the life of a dump it is necessary to consider closure and post-closure care of the facility. It is not possible at this stage to formulate a rigorous closure plan. However, a general outline of the likely closure requirements has been defined. This should be considered to be preliminary and will depend on the requirements of the final design, actual tonnages placed, dump construction and legislative requirements at the time of closure. Therefore, the detailed closure plan will be developed during the life of the mine. The purpose of preparing a conceptual closure plan is to ensure that the dump design and construction procedures are compatible with the achievement of final closure and rehabilitation to accepted environmental standards and at a reasonable cost.

The co-disposal dump will be engineered and constructed in such a way to remain stable upon closure. The facility will further be constructed to blend in with the surrounding environment.

Topsoil will be stripped to a depth of 300mm approximately or until hard rock is reached. During stripping operations, topsoil will be separated from trees and brush and stockpiled for future rehabilitation measures. Topsoil stockpiles will have limited height, will be graded to specified slope angles and will not be compacted during storage. These stockpiles will be contoured so as to blend with the natural environment and stabilized with vegetation.

The required final surface geometry will be achieved by the control of deposition during the life of the facility, particularly during the final years, and by subsequent limited earthworks. It is intended that the upper surface of the residue disposal facility will be shaped to manage surface run-off and thus to prevent the erosion of the outer slopes and the discharge of polluted solids to the natural streams. The outer slopes will be reshaped to ensure structural stability and to limit erosion damage. It will be advantageous to commence rehabilitation during the operating life of the facility and, for this reason; it is possible that deposition may be controlled during the last few years to allow the closure of sections of the co-disposal facility prior to final decommissioning.

It is proposed that the facility be covered with a 150mm thick layer of topsoil. This will be required over the top surface only as it is intended that the downstream slope of the impoundment wall will be progressively vegetated during operation in order to reduce erosion and visual intrusion.

A system of diversion canals to prevent storm water runoff from entering the residue disposal area will be included in the final closure plan.

Coal and RoM Stockpiles

All coal and RoM Stockpiles will be removed. The surface areas will be rehabilitated by ripping these structures to a depth of 500mm. The area will be shaped to be free draining and will be covered with a 400mm thick layer of topsoil and will be vegetated should self succession not take place.

3.3.4.5 Opencast mining areas

Due to the cost associated with double handling it will not be possible to backfill the opencast pits. During the life of mine (operational phase) the ongoing backfilling will be undertaken where possible to limit the volume of the voids which will remain after closure.
At closure, any opencast pits that remain, will be made safe by a combination of fencing and planting of thorny indigenous vegetation around the pit perimeter to restrict access to the pit.

3.3.4.6 Underground Mining infrastructure

All shaft adits will be made save by sealing this infrastructure.

3.3.5 Final rehabilitation

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 DME 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 DME, DWAF, MDALA, NDA and other relevant stakeholders with regards to the best post mining land use options after closure;
- The co-disposal facility will be rehabilitated;
- 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.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
Co-disposal facility and opencast areas	Groundwater Impacts Decanting once groundwater level stabilises	Management measures must be implemented to prevent excessive run-off formation through the co-disposal facility and surrounding areas into the open pits that could contribute to contamination in the form o suspended matter. Implement measures to prevent or minimise seepage to groundwater through dirty water areas which may contribute to groundwater contamination. The proposed return and storm water dams have been designed to contain any water during the construction and operational phases; these dams have not made provision for the volumes of decanting during the decommissioning phase. As this area is not characterised as a water scarce area, the option to utilised these dams to cater for the decant volumes may not be feasible, however, further studies needs to be undertaken in this regard. Should this not be possible other options may include wetland treatment, water treatment plant, and/or the planting of *Combretum erthrophyllum* (River bushwillow), *Ficus sp. Salix mucronata* (Natal Willow), *Ficus sp. Salix subserrata* (Safsaf Willow) or any other endemic tree or plant species for this purpose.	Annual Management Cost (maandae)	Part of the financial provision - SouthAfrica Rwandean

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	Geological impacts, at rehabilitation, after mining complete	All the unweathered spoils (overburden and topsoil) must be replaced at the bottom of voids, the voids will not be filled up completely, thus will slopes in voids be sloped and management measures will be implemented to minimise seepage into groundwater, and the contamination of the receiving groundwater source.	During the decommissioning phase	Part of the decom. provision, see financial provision from each magazine.
	Upon closure of the mine, all mine infrastructures will be demolished and removed, while the mined out areas will be closed as far as possible, landscaped and rehabilitated. If not properly controlled, these activities could lead to destruction of wetland vegetation and compaction of wetland soils in the remaining wetlands adjacent to the mining infrastructure footprint.	All activities linked to the closure of the mine and the removal of mine infrastructure should be limited to the footprint of the mining activities. Should any damage be done to surrounding wetlands during this time, a suitably qualified wetland rehabilitation specialist should be employed to lead the rehabilitation process.	During the decommissioning phase	Part of the decom. provision, see financial provision.
	Acid Mine Drainage (AMD) After mine closure, the old opencast pits and underground mines will start filling with water and eventually start decanting water. Decanting water will probably have a low pH, high metal and be sulphate rich. It is likely to discharge into the surface waters and wetlands adjacent to the mining area.	It is very difficult to mitigate against AMD. To reduce the amount of rain water infiltrating into the old opencast pits and underground workings of the mine and thus reduce the amount of decanting mine water. During rehabilitation of the opencast pits, an impermeable layer must be created within and/or just below the topsoil. The impermeable layer should vary in depth across the site from about 1m	During the decommissioning phase	Part of the decom. provision, see financial provision each Groundwater monitoring R100 000

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		below the surface to just over 2m below the surface and could be created using for example fly ash. .This will allow the formation of a perched water table which not only prevents rain water infiltrating into the old mine works, but also helps re-create a mosaic of soil wetness across the site, increasing the diversity of habitat types and vegetation within the rehabilitated landscape. Alternatively spoil returned to the opencast areas could be limed and returned and compacted in layers. This will serve two purposes : It will reduce the voids and hence limit volumes of water that can infiltrate the backfilled areas The liming will facilitate neutralization The compacted penultimate layer will serve as an aquiclude which will limit the infiltration of rainwater into the compacted fill.		
Removal of Infrastructure	The co-disposal facility is located on a lower area at a height of 1612masl. The slope of the facility will be steeper than the existing natural environment. This will increase the time of concentration and velocity of the water. This will contribute to high soil erosion. After rehabilitation, infiltrating water on the facility will be contaminated.	Surface water runoff from the co-disposal facility must be free draining and be able to flow over all slopes naturally. Erosion control measures must be implemented. Free flowing drainage will reduce erosion. Profiling of the landscape will take place to ensure the area is rehabilitated as close to its natural state as possible. Former DTM's will be used to establish what	During the decommissioning phase	Part of the decom. provision, see financial provision. Surface water monitoring

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
		contours were present prior to mining taking place. Additional debris and soil will be brought in if required. The landscape will be profiled to ensure that surface water runs off freely and does not pond anywhere. Slopes must not exceed 1:3. The co-disposal facility must be rehabilitated such that the side slopes links with the topography of the surrounding area. Contour berms must be placed at intervals that would be able to reduce the velocity of runoff. All water management measures must be maintained, to prevent water from being contaminated. Water will be encouraged to flow off the rehabilitated surfaces, as clean surface flow, as quickly as possible without causing erosion. Monitoring will continue to ensure that the rehabilitated mine site is not polluting the watercourses. All pollution control dams will remain until such time that monitoring proves that surface water qualities are adequate thus allowing surface water to be released directly into the watercourses.		
	The Product and RoM coal stockpile areas will impact negatively on surface runoff because of	All areas must be rehabilitated to/close to the original state. All areas must show a decline in time.	During the decommissioning	Part of the decom.

Activity	Potential Impact	Management Measures	Frequency	Annual Management Cost
	the polluted soil.	All coal must be removed from the area, the areas must be ripped, ameliorated and fertilized to ensure the establishment of new vegetation.	phase	provision, see financial provision.
	Water quality; During mining period the neighbouring farmers may have experience impacts on their water supply.	After decommissioning a 3 year programme for water control must be maintained to monitor water quality around mine. Especially where farmers get water from the mine.	During the decommissioning phase	Part of the decom. provision, see financial provision
	Demolition activities could increase the spreading of weeds and alien investigation.	A plan to eradicate al invasive alien species must be established on site. See Appendix 1 of Appendix B-1 of EIA for the Alien Invasive Eradication Plan.	During the decommissioning phase	Part of the decom. provision, see financial provision

4 MONITORING AND MANAGEMENT PROGRAMME

4.1 Water Monitoring

4.1.1 Surface Water Monitoring

Various perennial and not-perennial rivers characterize the area of the DCM. In specific, the Olifants River must be mentioned.

The mine has, however adopted a no-discharge policy, which will ensure that all dirty water on the mine property will remain within the mining area. Due to the mines commitment on not pollution the surrounding water in the area, the mine will reuse dirty water contained within the dirty water systems (i.e. pollution control dams).

Water monitoring points will be surveyed and indicated on a map with every monitoring report. Table 4.1 and 4.2 indicates the recommended positions and parameters to be monitored.

Table 4.1: Surface Water Monitoring Points

Point number	Point name	Location	Comment
MP1	Western tributary of the Olifants river located on the farm Welstand	29.34 E -26.17 S	Pollution from the PIT 2 and co-disposal facility will be detected on this point
MP2	Eastern tributary of the Olifants river located on the farm Welstand	29.34 E -26.18 S	Pollution from the PIT 1will be detected on this point
MP3	Bridge upstream of the old Transvaal Navigation Colliery (NTC)	29.34 E -26.14 S	This point will show quality upstream of the mining area
MP4	Confluence of the tributaries with the Olifants river	29.34 E -26.16 S	This point will indicate the diluted quality of the Olifants and the tributaries of the Olifants near the study area
MP5	Downstream TNC	29.36 E -26.77 S	This is a point further downstream which should be compared to MP3
MP6	Pond	29.31 E -26.18 S	This point is for the current water quality of a pond that will be mined out.

Table 4.2: Surface Water Parameters to be monitored

Sampling point	Parameter	Frequency	Constituents

MP1 MP2 MP3 MP4 MP5	Chemistry	Monthly	Total dissolved solids Suspended solids Nitrate (NO_3 as N) Chlorides as Cl Total Alkalinity as $CaCO_3$; Flouride as F Sulphate as SO4 Total Hardness as $CaCO_3$ Calcuim Hardness as $CaCO_3$ Magnesium Hardness as $CaCO_3$ Calcium as Ca Magnesium as Mg Sodium as NA Potassium as K Iron as Fe Manganese as Mn Conductivity in mS/m pH-value at 25°C pHs at 21°C Langelier Saturation Index Ortho-Phosphate PO_4 in P Total Chromium as Cr Bicarbonate HCO3 as $CaCO_3$ Aluminium as Al Sodiium Absorption Ratio Free and Saline Ammonia NH3 as N Total-coliform bacteria/100ml Faecal coliform per 100ml Het_Plate Count PER 1,0ml

Refer to Figure 4.1.

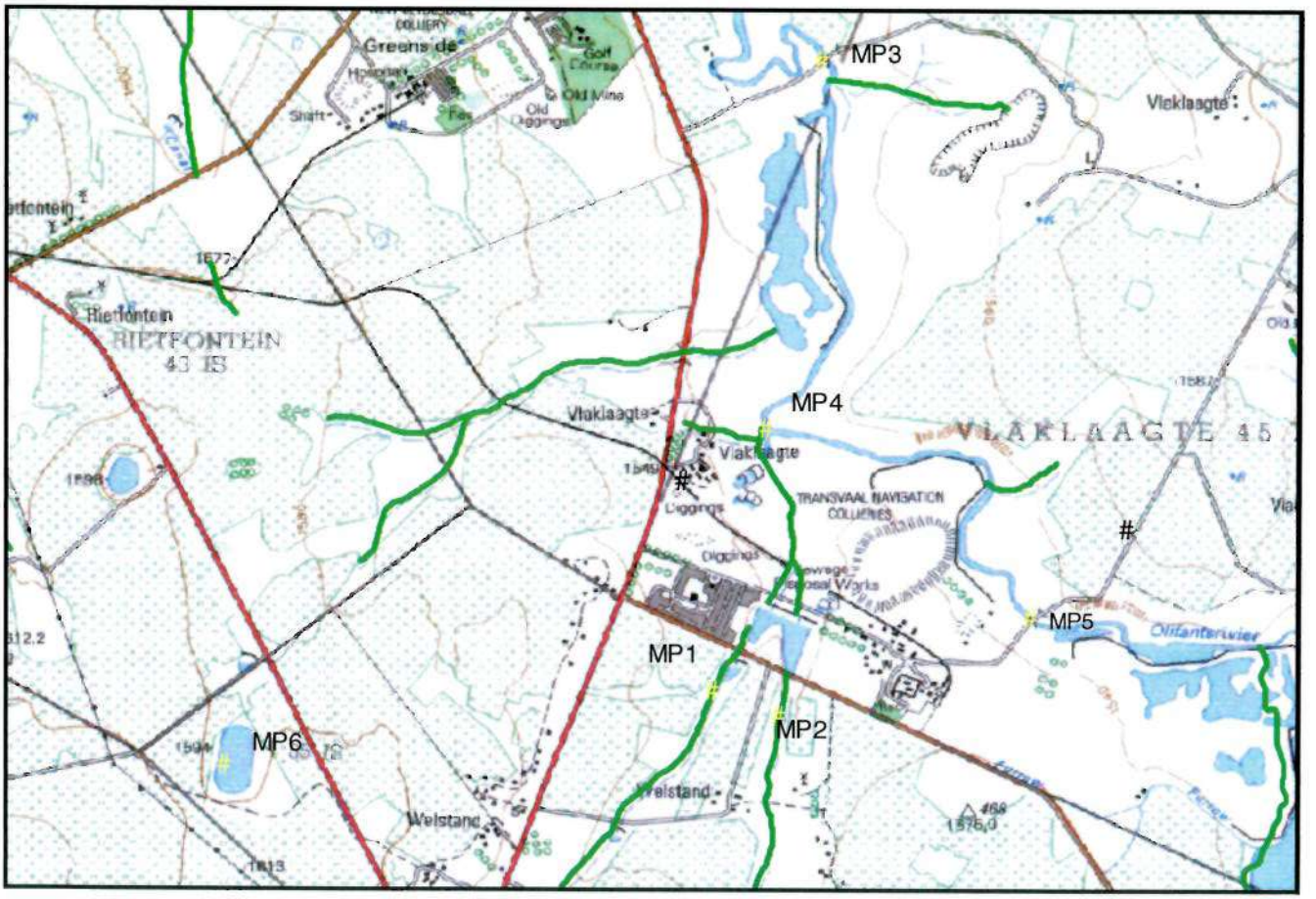

Figure 4.1: Surface Water Monitoring Locations

4.1.2 Groundwater Monitoring

A detailed groundwater monitoring programme will be implemented. Samples will be analysed for chemical and physical constituents normally associated with iron ore mining and expected impacts at specific areas as determined during risk assessments.

Water samples will be taken around the mining area as well as at the co-disposal facility, coal stockpile areas and other pollution control facilities on a quarterly basis.

The monitoring program be expanded to incorporate the newly drilled monitoring boreholes, as well as selected privately owned boreholes as outlined in **Table 6.1.** Boreholes that must be included in the monitoring program are: DFTNM1-13, DFTNH1, DFTNH3, DFTNH6, and springs DFTNS1 and DFTNS2. The boreholes should be included in the monitoring immediately as any pre-mining sampling will help to build to the reference database for later reference;

Such monitoring program will have to be designed in conjunction with a geohydrologist and with the approval of the regional director of the DWAF.

The monitoring schedule is summarised in Table 4.3. The boreholes that have been included in the monitoring program are monitoring boreholes and fall within the proposed mining area. New monitoring boreholes will be drilled outside the mining area as recommended by geohydrologist.

Table 4-3: Groundwater parameters

Parameter	Observation Points	Frequency	Constituent
Groundwater Quality	DFTNM1-13, DFTNH1, DFTNH3, DFTNH6, DFTNS1, DFTNS2	Quarterly	**(mg/l)** TDS SS EC (mS/m) pH Hardness Ca - Hard Mg - Hard Ca Mg Na K Cl SO_4 Alkalinity NO_3 as N F Fe Mn Pb Zn Co Cu Al $CaCO_3$ HCO_3
Groundwater level	DFTNM1-13, DFTNH1, DFTNH3, DFTNH6	Quarterly	Depth to groundwater level (m)
Spring flow rate	DFTNS1, DFTNS2	Quarterly	Flow rate (l/s or m^3/day)

4.1.3 Surface and Groundwater Monitoring Reporting and Management

Reporting

Reporting on surface and groundwater quality and quantity conditions will be included in the annual report.

The quarterly report will be an update of the database with time-series graphs, statistical analysis (average, maximum, minimum, 5, 50 and 95 percentile values as well as linear performance). Laboratory results will be analysed against the target water quality guidelines for domestic use, livestock watering and irrigation (according to the South African Water Quality Guidelines, 1996: DWAF). The strictest value between the target water quality objectives or objectives through a reserve determination will be used. In terms of flow, all water uses and discharges will be measured on an ongoing basis. The flows include:

- Make-up water,
- Volumes of groundwater pumped out for mine dewatering purposes,
- Volumes of water pumped from the plant as part of slimes,
- Volumes of contaminated water that is recovered and used in the plant or for dust suppression, and
- Volumes of water in terms of the internal water flow processes.

An annual detailed water quality audit report on the surface and groundwater quality will be prepared that will analyse the water quality situation in detail to investigate trends and non-compliance. The report will be submitted annually to the relevant authorities. Should the monitoring data indicate that the groundwater conditions are adversely affected, additional studies will be undertaken if it is deemed necessary.

Data Management

Monitoring results would be entered into an electronic database as soon as results are available, and at no less than one monthly interval, allowing:

- Data presentation in tabular format;
- Time-series graphs with comparison abilities;
- Statistical analysis (minimum, maximum, average, percentile values) in tabular format;
- Graphical presentation of statistics;
- Linear trend determination;
- Performance analysis in tabular format;
- Presentation of data, statistics and performance on diagrams and maps; and
- Comparison and compliance to South African Water Quality Guidelines and any other given objectives.

As far as possible, the same monitoring points will be used from the construction phase through the operational and decommissioning phases to after mine closure to develop a long term data record and enable trend analysis and recognition of progressive impacts with time.

4.2 Dust Monitoring

4.2.1 Monitoring

An air quality network will be established for the mine. The dust fallout network will be based on all the potential air pollutants inherent to an opencast coal mining operation and associated processing plant. The network will be established by the use of directional and non-directional dust fallout samplers. The sampling methodology and analysis for the dustfall must be according to the ASTM D 1739 method. Dispersion modelling will be also used to estimate the level of air pollution that can be expected at DCM, as well as to provide information to inform the air quality network to be established.

The proposed dust fallout network can be used to meet various objectives, such as:

- Compliance monitoring;
- Validate dispersion model results;
- Use as input for health risk assessment;
- Assist in source apportionment;
- Temporal trend analysis;
- Spatial trend analysis;
- Source quantification; and
- Tracking progress made by control measures.

The prominent air pollution parameters to be measured on site include: particulate matter, dust, PM_{10}, wind speed and emissions inherent to the coal processing plant, opencast mining areas and the co-disposal facility.

Non-directional dust buckets must be placed around the opencast pits and around the co-disposal facility, as well as on properties to the northeast and northwest of the mine. Directional dust buckets must be placed in the predominant wind direction and according to the climatology information, the directional dust buckets must be place to the northwest, north and north east of the Expansion Project area, and will form part of the dust monitoring programme.

4.2.2 Dust Monitoring Reporting

A monthly report must be compiled detailing the outcomes of the dust monitoring programme. This report must be kept on the mine and must be available for the surrounding public and/or government agencies on request.

4.3 Soil and Vegetation Monitoring

Vegetation monitoring

The areas where ongoing rehabilitation will be taking place during the operational phase are the co-disposal facilities and as the opencast pits are mined out. The mining infrastructure, plant and associated infrastructure will be rehabilitated during the decommissioning phase. A monitoring program will be implemented during the operational phase to monitor the rehabilitation of the co-disposal facilities and as the opencast pits. During decommissioning this same programme will be implemented at the other sites to ensure rehabilitation is taking place according to the EMP commitments.

The establishment of good vegetation cover is essential for rehabilitation, and it is essential that both the soil properties and the vegetation are monitored annually. Should there be deficiencies in the soil, the establishment of vegetation will be difficult and succession will not take place. The purpose of monitoring the soil is to establish its suitability for vegetation and to make recommendations for its improvement. Aspects like soil depth, structure, fertility and areas of erosion will be investigated. The vegetation will be monitored to ascertain species richness and biodiversity.

An alien invader plants and weeds monitoring plan must be in place to insure that, where possible, all alien invader plants and weeds will be eradicated. A monitoring and management plan has been developed for DCM and Forzando mine in January 2007. The monitoring and management plan will also be sufficient to use on the Expansion project area. The plan is included as Appendix A in the Ecological study, in Appendix B-2 of the EIA.

Soil Sampling

During the rehabilitation exercise preliminary soil sampling should be carried out to determine the fertilizer requirements.

Additional soil sampling should also be carried out annually until the levels of nutrients required have been achieved.

Once the desired nutritional status has been achieved, it is recommended that the interval between sampling be increased. An annual environmental audit should be undertaken. If growth problems develop, *ad hoc*, sampling should be carried out to determine the problem.

Sampling should always be carried out at the same time of the year and at least six weeks after the last application of fertilizer.

All of the soil samples should be analysed for the following parameters:

- pH (H_2O);
- Electrical conductivity mS/m;
- Calcium mg/Kg;
- Magnesium mg/Kg;
- Potassium mg/Kg;
- Sodium mg/Kg;
- Cation exchange capacity;
- Phosphorus (Bray I);
- Zinc mg/Kg;

- Clay % and;
- Organic matter content (C%).

4.4 Noise Surveys

Noise monitoring from the DCM Expansion Project should be conducted monthly.
The following three (3) primary variables should be considered when designing acoustic screening measures for the control of sound and/or noise:
The source - Reduction of noise at the source;
The transmission path - Reduction of noise between the source and the receiver; and
The receiver - Reduction of the noise at the receiver.

4.4.1 Blasting and Vibration

The air over pressure level and vibration, (audible and the inaudible - concussion - noise), to be monitored and controlled during the blasting operation. The standards implemented by the USA Bureau of Mine Standards, RU 8507, are used as a guideline to monitor and control blasting operations in South Africa:

- The limit for ground vibration should not exceed 10mm/s;
- An over pressure limit of 134 dB should not be exceeded;
- Near schools and churches not to exceed 128 dB; and
- No blasting to take place when there are windy conditions.
- The Regulations under the Mines Health and Safety Act requires the owner of the operation to ensure that the health and safety of employees and people will not be affected during blasting. Blasts must be designed in such a manner that ground vibration and over pressure levels are adhered to. In order to comply with the above, the following measures should be implemented:
- A scheme of vibration and air over pressure monitoring to be implemented;
- A scheme by which air over pressure is controlled;
- Days and times of blasting operations to be established;
- Ensure that the correct design relationship exists between burden, spacing and hole diameter;
- Ensure the maximum amount of explosive on any one day delay interval, the maximum instantaneous charge, is optimized by considering:
- Reduce the number of holes per detonator delay interval;
- Reduce the instantaneous charge by in-hole delay techniques;
- Reduce the bench height or hole depth;
- Reduce the borehole diameter.

Always attempt to minimise the resulting environmental effects of blasting operations and to recognize the fact that the perception of blasting events occurs at levels of vibration well below those necessary for the possible onset of the most cosmetic of damage; but nevertheless at levels that can concern occupants abutting the mining area;

Be aware that relatively small changes in blast design can produce noticeable differences in environmental emissions and that it is very often in response to changes in these emissions rather than their absolute value that complaints may be made.

Scheme of vibration monitoring may include the following:

- The location and number of monitoring points;
- The type of equipment to be used and the parameters to be measured;
- The frequency of monitoring;
- The method by which such data are made available to management;
- The method by which such data are used in order to ensure that the site vibration limit is not exceeded and to mitigate any environmental effects of blasting.

Monitoring of the vibrations will be done continuously during the opencast operations, and when required as the mining face underground approaches dwellings overhead. Vibration sensing equipment will be used, which should be placed near residential dwellings (near communal land border and at the nearest commercial farmer's homestead) to record blast over pressure and vibration. No specific blasting designs are proposed since available equipment may vary, however, the blasting constraints will be considered as the limiting criteria. Proposed criteria would be a maximum peak particle velocity of 12.5mm/s at frequencies of 4 to 15Hz, higher frequencies as per the USBM RU 8507 graph. Air blast recordings at the residential houses should not exceed 128dB, with no more than a maximum of 4 occurrences in excess of 128dB per calendar month, but no more than 134dB. In the event of a transgression, the mining concern to proactively communicate corrective action to the DME.

Recommendations would include:

- Semi permanent vibration monitoring stations (with active SMS notification);
- Performing a Signature Trace Analysis (determine accurate charge mass distances);
- Photographic surveys prior to any blasting activities (within ~60days);
- Electronic mini-weather station on site to record weather conditions at the time of blasting;
- Mounted blast siren (audible to the surrounding community) linked to scheduled blast times (preferably mid-day);
- Comprehensive blast block controls and procedures with corresponding data records;
- Regular blast audits; and
- Monthly meetings to discuss post blast results and remain proactive with blast designs in order to ensure compliance to the vibration and air blast limits.

Provided the correct blast controls are applied, active monitoring takes place, audible siren prior to blasting etc., the impact by blasting on the surrounding community will be minimal (mild). The only reservations regarding air blast (over pressure) will be the impact of the weather conditions at the time of the blast and may require rescheduling of the blast. Ultimately, wind direction, speed and cloud cover will be the deciding factors.

A report will be compiled using the data collected by the vibration sensors and submitted to management to ascertain compliance with any relevant standards.

4.5 Periodic Mine Environmental Audit

A register of environmental monitoring and auditing results will be available for inspection. This will also include compliance with environmental legislation.

In order to ensure compliance with the environmental management programme and to assess the continued appropriateness and adequacy of the environmental management programme, the DCM commits to:

- Conduct the monitoring on an ongoing basis;
- Conduct the performance assessments of the environmental management programme every two years or as agreed by the Minister in writing;
- Compile and submit a performance assessment report to the Director: Mineral Development of the environmental management programme,

The above will be undertaken according to the Regulations (No.26275) of the Minerals and Petroleum Resources Development Act of 2002.

The mine further undertakes to:

- Appoint a responsible person(s), in writing, who will monitor all environmental aspects of the site on a regular basis. A copy of this letter of appointment including the relevant emergency numbers will be supplied to the Director: Mineral Development of the DME; and
- The appointed person will communicate, on a regular basis, with the local interested and affected parties identified with regards to the project and will report on the progress made with regards to implementation of the mitigation measures. Any complaints, with regards to the mining activity, will be reported to the appointed person and be recorded in the complaint register;
- Compile a report with regards to the following issues, which will be submitted to the DME on a yearly basis:

Quantities processed to be recorded on a monthly basis,

- Percentage of disturbed area rehabilitated (rehabilitation figures) - recorded on a three monthly basis. A six monthly report to be compiled,
- Water quality results,
- Water levels of identified boreholes, and
- A copy of the complaints register.

5 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.

5.1 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 radio's, pagers or telephones, must be placed around the mine. 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 Ga-Nala.

The checklist includes:

- fire department;
- police;
- emergency health services such as ambulances, paramedic teams, poisons centres;
- hospitals, both local and further a field, 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 organisations.

DCM has, as a result of a few incidences on the mine, established a Crisis Management Plan. Below is a summary of the mine procedures, to be carried out in the event of any accident or incident.

5.1.1 *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 casevac 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 casevac 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 in the underground environment, 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, 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.

5.1.2 Emergencies, Procedures and Remedial Action

Table 5.1 is a list of numbers of emergency units to contact, which is provided around the mine site.

Table 5.1: Safety and Health Contact Numbers

	Name	Telephone number
Occupational Nurse	Marian Simms	082 789 5902
Ga-Nala Emergency Services		017)648-3838

Paramedics (Ga-Nala)		10177
Fire Brigade (Ga-Nala)		(017)648-2341
Mine Rescue Services	T N Fourie	(017)632-4671
		082 852 4046
		(017)632-2683
	J P Wessels	(017)632-4671
		082 852 4052
Ambulance Services		082 124
Police (Ga-Nala)		(017)648-2267

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.

5.1.2.1 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, Ga-Nala or Witbank.

5.1.2.2 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.

5.1.2.3 Major Hydrocarbon Spill

Hydrocarbons such as diesel, petrol, and oil will be kept on site as fuel for the mine machinery. 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 Hasmat clean up 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 specialised clean up 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 clean up operations.

5.1.2.4 *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, 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 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.

5.1.2.5 *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 freebord 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.

5.1.2.6 Explosions

Explosions can occur underground with the presence of methane gas, or they 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:

- A Proto Team should be ready and deployed for assisting with the evacuation of employees working underground;
- 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.

5.1.2.7 Subsidence

Subsidence underground can result in injuries to human life and damage to property.

Procedure:

- Alternative evacuation and access routes should be identified and used, should the way in or out be blocked;
- A Proto Team should be ready and deployed for assisting with the location and extraction of employees trapped underground;
- There should be alternative air supply routes should the air supply become damaged in the rock fall; and
- All relevant emergency response units must be notified and hospitals informed of incoming patients.

5.1.2.8 Dump Failure

The dump could fail as a result of too much water being stored on it resulting in the slumping and collapse of a side.

Procedure:

Rescue, evacuation and medical assistance, where necessary, to any persons affected by the incident;

Efforts will be directed to the containment and neutralisation of the influx and prevention of further injury; and

It is essential to assess the extent of damage/pollution as soon as possible after the event. This will best be accomplished by:

- Communication
- Site Controller;
- Media Controller;
- Media Consultant;
- Green Groups;
- Incident Controller;

- Political Representatives;
- Chief Inspector of Mines;
- Department of Environmental Affairs;
- Department of Water Affairs;
- Transitional Local Council; and
- Any other relevant or statutory authority.

6 ENVIRONMENTAL AWARENESS PLAN

Environmental Awareness Plan attached as Appendix A.

7 FINANCIAL PROVISION FOR CLOSURE

Refer to Appendix B

7.1 Method for Financial Provision

7.1.1 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 MPRDA. Sections 41(1), 41(2), 41(3) and 45 of the MPRDA deal with the financial provision for mine rehabilitation and closure.

In order to derive the financial provision GCS was supplied with the bill of quantities for the proposed project by TCSA.

For the purpose of this project the following are included:

New plant and associated infrastructure;

Opencast operations;

Expansion of the underground operations;

Discard Dump;

Transportation (i.e. roads and conveyors);

Water supply;

Power supply;

Sewerage treatment;

Railway line and associated power requirements to transport coal to the RBCT; and

Pipeline transporting water from the old TNC mine to the plant.

No additional infrastructure will be required.

In order to determine the closure cost the Guideline Document for the Evaluation of Financial Provisions made by the Mining Industry (Report no. 5863-5900-2-P, Rev 1.6), Department of Minerals and Energy, 7 September 2004 were utilised. Where relevant, the Master Rates were amended according to industry standards.

Two costs are provided. Firstly, the cost should the mine undertake rehabilitation themselves. The second option is based on the assumption that a third party will be employed to undertake the necessary rehabilitation and remedial work, should the mining operation close prematurely.

The mine infrastructure is assumed to have no salvage value when determining the quantum for 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 DME offices to review the quantum determination for the rehabilitation and closure of mining sites.

The following principles have been adopted by the guideline document:

Legal standing

The guideline document is to be used by the Regional Office personnel as a tool to assess the accuracy and legitimacy of the quantum of financial provision submitted to the DME by the mining industry. The

guideline document does not have any legal standing. The guideline document does therefore not obviate in any way the holder of a mining right from the legal requirement to annually assess his or her environmental liability and increase his or her financial provision to the satisfaction of the Minister.
GCS has therefore amended the Master Rates to be more specific to the iron ore mining industry. GCS has further ignored the request for contingencies as per 3rd party closure as per request from the client.
Generic nature
The guideline document is generic in nature and cannot answer all possible questions or deal with all scenarios relating to financial provision, rehabilitation and mine closure.
Standardised approach
The guideline document provides a universal standard approach to the determination of the quantum for financial provision by the DME. The guideline document covers the "standard" closure components that are generally required for the closure of a mine site.
Complete picture
The guideline document ensures that the financial provision assesses the complete picture associated to the proposed project.
Two costs are provided for the purposed of this project:
Firstly, the cost, should the mine undertake rehabilitation themselves.
The second option is based on the assumption that a third party will be employed to undertake the necessary rehabilitation and remedial work, should the mining operation close prematurely.
It should be noted that the infrastructure associated with this project is assumed to have no salvage value when determining the quantum for closure.

7.1.2 Methodology

The rehabilitation methodology associated with the proposed project is provided within Section 3 of this report.
The DME guidelines require a "clean closure" cost assessment, meaning that the mine infrastructure has no salvage value in accordance.

The following steps have been utilized to derive the quantum:

Step	Description	DME Table Applicable	Outcomes
1	Determine primary mineral and saleable mineral by-products	Table B.12	Mineral : Coal
2	Determine Risk Class	Table B.12	Primary Risk Class: A (Large mine encompassing mine, mine waste, plant and plant waste)
3	Determine the Area Sensitivity	Table B.4	Medium
4.1	Determine the level of information	N/A	Extensive information is provided herewith (detailed EIA and EMP)
4.2	Determine the closure components	Table B.5	See Section Table 7.1 of this report
4.3	Determine the unit rates for closure components	Table B.6	See Table 7.1 and of this report The multiplication factor for all components

			is 1.00, except for the opencast rehabilitation where it is 0.52, processing wastes where it is 0.80 and water management where it is 0.67.
4.4	Determine and apply the weighting factors	Table B.7 Table B.8	Weighting factor 1 (Nature of the terrain): 1 (generally flat terrain) Weighting factor 2 (Proximity to urban area): 1 (Urban, very close to Kathu and the existing Sishen Iron Ore Mine)
4.5	Identify areas of disturbance	N/A	See Appendix 1 of this report
4.6	Identify closure costs from specialist studies	Table B.9	The outcomes of the specialist studies have indicated that no significant residual impacts will take place as part of the construction activities. This is specific to this stage of the operation where the mine is in its construction phase - during future annual assessments this must be reviewed based on the monitoring data of the mine
4.7	Calculate Closure Costs	Table B.10	See Section 7.2, as well as Table 7.5 of this report.

It should be noted that for the calculation of the closure cost GCS made use of the DME Master Rates were applicable, however in some instances more specific master rates were obtained from contractors and were utilized as for the closure costs supplied with the DCM Seam 4 Bulk Sample EMP Amendment. All rates have been escalated with CPIX.

Table 7.1 below summarizes the unit rates for closure components as specified in the DME Guideline Document and indicates which rates were used by GCS in the assessment.

Table 7.1.: Master Rates Utilised

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005 (3.9%)	DME Master Rate 2006 (4.6%)	DME Master Rate 2007 (6.5%)	DME Master Rate 2008 (8.6%)	DME Master Rate 2009 (12.1%)	Rates used 2009	GCS Comments
1	Dismantling of processing plant and associated structures	m^3	R 6.82	R 7.09	R 7.41	R 7.89	R 8.57	R 9.61	R 26.00 R 8.57	R26.00 has been obtained as an industry standard for the removal of infrastructure of approximately 15m in height. For conveyors the DME master rate (R8.57) has been utilized.
2(A)	Demolition of steel buildings and structures (including floor slabs)	m^2	R 95.00	R 98.71	R 103.25	R 109.96	R 119.41	R 133.86	R 150.00	The DCM Master rate (R150.00) was used with the assumption that the buildings are 15m in height.
2(B)	Demolition of reinforced concrete buildings and structures including Processing Plant and related structures - including all admin and mine buildings and sewage facilities.	m^2	R 140.00	R 145.46	R 152.15	R 162.04	R 175.98	R 197.27	R 648.00	The DCM Master rate (R648.00) was used with the assumption that the infrastructure has a medium concrete thickness between 750 and 250mm.
3(A)	Rehabilitation of access roads	m^2	R 17.00	R 17.66	R 18.48	R 19.68	R 21.37	R 23.96	R 52.00	The DCM Master rate (R52.00) was used assuming the removal and disposal of low grade tar roads.
4(A)	Demolition of electrified railway lines	m	R 165.00	R 171.44	R 179.32	R 190.98	R 207.40	R232.50	R 324.00	The DCM Master rate (R324.00) was used
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	R 90.00	R 93.51	R 97.81	R 104.17	R 113.13	R 126.82	N/A	N/A
5	Demolition of housing and facilities (including floor slabs)	m	R 190.00	R 197.41	R 206.49	R 219.91	R 238.83	R267.73	R 298.00	The DCM Master rate (R298.00) was used.

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005 (3.9%)	DME Master Rate 2006 (4.6%)	DME Master Rate 2007 (6.5%)	DME Master Rate 2008 (8.6%)	DME Master Rate 2009 (12.1%)	Rates used 2009	GCS Comments
6	Opencast rehabilitation (including final voids and ramps)	ha	R 99,600.00	R 103,484.40	R 108,244.68	R 115,280.59	R 125,194.72	R 140,343.00	R 140,343.00	The DME Master rate (R140,343.00) was used.
7	Sealing of shafts, adits and inclines (including concrete cap)	m^3	R 51.00	R 52.99	R 55.43	R 59.03	R 64.11	R71.88	N/A	This activity has not been included as TCSA will be utilizing the box cuts of the opencast pits as access into the underground workings. By rehabilitating the opencast areas the underground mining accesses will be rehabilitated.
8(A)	Rehabilitation of overburden and spoils	ha	R 66,400.00	R 68,989.60	R 72,163.12	R 76,853.72	R 83,463.14	R93,562.18	N/A	This activity has not been included as TCSA will be utilizing the box cuts of the opencast pits as access into the underground workings. By rehabilitating the opencast areas the underground mining accesses will be rehabilitated.

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005 (3.9%)	DME Master Rate 2006 (4.6%)	DME Master Rate 2007 (6.5%)	DME Master Rate 2008 (8.6%)	DME Master Rate 2009 (12.1%)	Rates used 2009	GCS Comments
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	R 82,700.00	R 85,925.30	R 89,877.86	R 95,719.92	R 103,951.84	R 116,530.01	R 116,530.01	The DME Master rate (R116,530.01) was used. It should be noted that the entire area of 102ha has not been provided for as the mine will undertake ongoing rehabilitation. The mine commits in providing for the area that will be utilised in the first 10 years. It should be noted that the annual assessment of the quantum will be undertaken. Should areas change during these assessments, the necessary adjustments will be incorporated and funded for.
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	R 240,200.00	R 249,567.80	R 261,047.92	R 278,016.03	R 301,925.41	R 338,458.38	R 338,458.38	The DME Master rate (R338,458.38) was used.
9	Rehabilitation of subsided areas	ha	R 55,600.00	R 57,768.40	R 60,425.75	R 64,353.42	R 69,887.81	R 78,344.24	N/A	N/A
10	General surface rehabilitation, including grassing of all denuded areas - this has made provision for the opencast areas, and co-disposal facility.	ha	R 52,600.00	R 54,651.40	R 57,165.36	R 60,881.11	R 66,116.89	R 74,117.03	R 74,117.03	The DME Master rate (R74,117.03) was used.
11	River diversions	ha	R 52,600.00	R 54,651.40	R 57,165.36	R 60,881.11	R 66,116.89	R 74,117.03	N/A	N/A

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005 (3.9%)	DME Master Rate 2006 (4.6%)	DME Master Rate 2007 (6.5%)	DME Master Rate 2008 (8.6%)	DME Master Rate 2009 (12.1%)	Rates used 2009	GCS Comments
12	Fencing	m	R 60.00	R 62.34	R 65.21	R 69.45	R 75.42	R 84.55	R 58.00	The DCM Master rate (R58.00) was utilized assuming the re-erection of fencing.
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required) – this makes provision for 25% of the quantity of the general rehabilitation as presented in No. 14.	ha	R 20,000.00	R 20,780.00	R 21,735.88	R 23,148.71	R 25,139.50	R 28,181.38	R 28,181.38	The DME Master rate (R28,181.38) was used.
14	Two to three year maintenance and aftercare	ha	R 7,000.00	R 7,273.00	R 7,607.56	R 8,102.05	R 8,798.83	R 9,663.49	R 9,663.49	The DME Master rate (R9,663.49) was used.

7.2 Cost Estimate Summary

A summary of the estimated closure costs is provided below. Refer to Table 7.5 for detailed breakdowns of the closure cost assessments.

"Clean Closure Cost" estimate, refer to summary sheet in Table 7.5:

Sub Total 1	**R 39,165,080.71** (excluding VAT)
Sub Total 2	**R 47,781,398.47** (excluding VAT)
Sub Total 3	**R 54,470,794.25** (including VAT)

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

Preliminary and general (P&G) = 12% of Total 1 (6% if larger than R100 million; 12% if smaller than R100 million);

10% Contingency has been included.

14% VAT.

7.2.1 Provision of the Funds

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 Resource 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.

The following requirements must be considered in developing a pecuniary provision strategy:

The closure cost estimate to cover the current environmental liability in the event of premature closure = **R 54,470,794.25** (including VAT).

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.

TCSA has an approved rehabilitation trust fund in place. The DCM has been included into this fund, therefore the additional activities as per this report will be incorporated into this fund by means of a bank guarantee.

8 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, Alan Stonall

the undersigned and duly authorised thereto by TOTAL COAL SOUTH AFRICA - DORSTFONTEIN COAL MINE (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 Roebank on this day 14th
of August 2009

Signature of Applicant

I, _____

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

Signed at Emalahleni on this day 15th
DAY of December 2009

~~Signature of Director: Mineral Development~~
Acting Regional Manager : Mpumalanga Region

9 CONCLUSION

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

The EMP is a legal document, which commits the applicant to comply with all management measure, monitoring programmes and other plans as presented herein.

As part of the EMP, detailed monitoring programmes have been provided to manage and control areas including surface water, groundwater, air quality and soils. In addition to this, a comprehensive environmental awareness plan and environmental preparedness programme has been included to ensure the effective management and associated environmental awareness within the DCM.

Provided below is a summary of the main potential impacts and management measures (but this is not limited to):

Geology

Main Impacts

In terms of geology very little can be done to avoid an impact on the geological strata. The following main impacts identified include but is not limited to the fact that:

The mining operations will result in a definite loss in the geological resource, which will be permanent;

The underground mining operations could lead to the occurrence of subsidence if not managed correctly.

Main Management Measures

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

The mining operations should be limited to the mining area;

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

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

Topography

Main Impacts

The following main impacts identified include but is not limited to:

The construction of infrastructure and the associated cut and fill of the ground level will have an impact on the topography for a long term;

The establishment of the co-disposal facility will have a permanent impact on the topography of the area; and

The formation of the opencast pits will have a very long term to permanent impact on the topography of the area

Main Management Measures

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

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

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

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

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

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

Soils, Land Use and Capability

Main Impacts

The following main impacts identified include but is not limited to:

The loss of the soil resource due to the establishment of infrastructure, opencast pits and other mining related infrastructure;

The compaction of soil due to the establishment of infrastructure and the undertaking of mining operations; and

The physical and chemical degradation of the soil resource.

Main Management Measures

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

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

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

Effective erosion control measures will be implemented;

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

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

Ecology

Main Impacts

The following main impacts identified include but is not limited to:

Removal and the associated destruction of flora due to the establishment of infrastructure;

Potential impact on the growth of surrounding plant and crops due to increase in dust dispersion;

The potential spread of invader species;

The disturbance to habitat; and

The potential of the poaching of animals.

Main Management Measures

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

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

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

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

The potential for dust will be kept to a minimum;

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

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

Wetlands

Main Impacts

The following main impacts identified include but is not limited to:

The proposed mining activities, consisting of opencast and underground mining, are expected to have various significant impacts on the wetlands, including the permanent destruction of the hillslope seepage wetlands within the footprint of the opencast mining operations. This will result in the loss of high quality water currently derived from these systems, while acid mine drainage (associated with the discard dump, and decanting mine water after mine closure) will result in further deterioration of the water quality within the Olifants River. Several other impacts will also impact negatively on the wetlands within and adjacent to the proposed mining area; and

The proposed railway line will be built predominantly on an existing rail way foundation, reducing the significance of additional impacts of the railway on the affected wetlands, as existing crossings will be used, the exception being the start and end of the railway line, where new foundations will need to be built. This will also result in the partial loss of two hillslope seepage wetlands.

Main Management Measures

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

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

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

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

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

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

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

A low berm, approximately 1m high by 2-3m wide must be established prior to the commencement of opencast operations, between the opencast workings and the valley bottom wetlands, and where possible outside the wetland boundary, to intercept flows containing suspended soils and create a depositional environment;

Water diverted around the opencast mines should be released in such a manner as to aid dispersion across most of the width of the downstream wetlands; and

Well designed and constructed clean and dirty water management systems must be enforced to reduce the potential of erosion, siltation and compaction.

Surface Water

Main Impacts

The following main impacts identified include but is not limited to:

Due to increased bare surfaces, the runoff coefficient of the area will increase and therefore higher volumes of water will be produced during rain events;

In addition to this the changing of the land profile could increase erosion and contribute to the siltation of water courses;

Dust from equipment or vehicle movement could impact on the surface water quality;

The type of material used during the construction activities may impact on the surface water quality;

The establishment of infrastructure will limit reduce the catchment area; and

Spillages of hydrocarbons or any other chemical could lead to surface water pollution.

Main Management Measures

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

Clean and dirty water systems should be implemented prior to the commencement of construction activities and must be designed for a 1 in 50 year storm event;

No activities are to be allowed within the 1 in 100 year flood line without the necessary approval;

Vegetation establishment in disturbed areas will be undertaken as soon as practically possible to reduce to potential of erosion and associated siltation. Where disturbed areas cannot be re-vegetated during the life of operations, appropriate erosion control measures (i.e. dust allying agent, terraces, rock cladding, etc.) must be implemented. The mine will ensure that all erosion controls are included in the designs of all linear infrastructure and points of water discharge. Areas where erosion control measures have been implemented must be inspected on a weekly basis to determine the effectiveness;

All activities must remain within the dedicated footprints of the infrastructure within the mining area;
No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area. All hydrocarbons and other chemicals should be stored in bunded area with a capacity of 110% of the volume stored within;
A spill contingency plan should be available and enforced. Major spillage incidents will be reported to the DME, DWAF, MDALA and the Department of Agriculture;
A detailed waste management strategy will be established and implemented; and
All employees will be made aware of all environmental issues during induction, and must continuously be updated of all new issues. Mitigation measures and operational procedures in case of any environmental emergency must be communicated.

Groundwater

Main Impacts

The following main impacts identified include but are not limited to:
Little impacts are expected during the construction phase with the most significant being the localised dewatering from the box-cut construction;
During the operational phase the groundwater level will be depleted by approximately 30m at the West Mine, and 45m at the East Mine. The zone of impact will extend up to 1 000m from the mining area. Groundwater dewatering volumes will range between 75 and 950m^3/day in the West Mine (Block C), and 200 to 700 m^3/day in the East Mine (Blocks A & B) depending on the depth of mining, mined out area, and locality relative to already dewatered areas. The average groundwater dewatering volumes for the western and eastern resource areas are 470 and 485 m^3/day respectively. This correlates well with the dewatering volumes at the current DCM workings;
It is not expected that the will be significant impacts on the surrounding groundwater quality. Due to mine dewatering the groundwater flow directions will be towards the mining area, thereby effectively preventing any contamination migrating away from the mining area;
In the post-mining environment the groundwater levels will recover to near pre-mining levels.
Groundwater flow directions away from the mining area will be re-instated and contamination will migrate way from the mining area (up to 1 000m). The contamination will impact on the unnamed tributaries to the Olifants River and Steenkoolspruit; and
Decant will take place from both the West Mine and East Mine. Decant volumes will be in the range of 130 and 170m^3/day at the West Mine and East Mine respectively. Decant will start approximately 30 to 40 years from the end of mining depending on rehabilitation and recharge.

Main Management Measures

Management measures identified include but are not limited to the following which should be undertaken:
Ongoing groundwater monitoring in terms of water levels and quality will be undertaken prior to the construction activities and throughout the life of mine;
The pollution control dams will be lined to reduce the potential of dirty water seeping to the groundwater;

Should the mine impact on the groundwater and if this has been determined by an external and independent groundwater specialist, the mine will negotiate with the farmer to provide the farmer with water; and

Studies will be undertaken to determine how the decant will be managed. This could include the utilisation of the existing pollution control dams (depending on the capacity), the implementation of a wetland treatment programme, the establishment of a water treatment plant or the planning of trees which have the capability to withdraw the polluted water.

Noise

Main Impacts

The following main impacts identified include but are not limited to:

The increase on the ambient noise due to the blasting activities and associated mining operations.

Main Management Measures

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

Equipment with lower sound power levels will be selected and suitable mufflers must be installed on engine exhausts and compressor components;

Acoustic enclosures for equipment causing radiating noise will be installed;

The scheduling of equipment within the opencast pits must take into consideration the noise emissions from the equipment in order to spread tem out over the interface area;

During the design operations make use of the natural topography of the area as a noise buffer where possible. Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding where necessary;

All digging faces on the eastern and western side of the mine must have alternate overburden dumps or other means of attenuating the noise, which can be activated should the noise levels approach unacceptable levels;

Limit the hours of operation for specific equipment and mobile sources with high sound power outputs; and

Open channel of communication should be established by the mine with the surrounding landowners. Develop a mechanism to record and respond to all complaints.

Visual

Main Impacts

The following main impacts identified include but are not limited to:

The mining activities, opencast and underground infrastructure on surface, as well as the RoM stockpiles, workshops and buildings, diesels and chemical storage, the salvage yard and water management facilities may pose a impact on the visual nature of the environment; and

The co-disposal facility will create a long term visual impact in the area.

Main Management Measures

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

To restore the visual quality of the landscape, it is suggested that a comprehensive rehabilitation plan be developed, based on the principles of ecological restoration;

Light pollution will be seriously and carefully considered and kept to a minimum wherever possible as light at night travels great distances;

Harsh, steep engineered slopes will be avoided as these could impose an additional impact on the landscape by contrasting with existing natural topographic forms and because it is difficult to sustain vegetation on steep slopes in the long term;

Visual barriers (i.e. indigenous trees) could be planted to reduce the visual impact on surrounding areas; and

Avoid construction material with bright colours with high reflection values. Grey to olive green colours in a matt finish contribute to the assimilation of features with natural backgrounds.

Archaeological Status

Main Impacts

The following main impacts identified include, but is not limited to:

The removal of a graveyards and other sites of heritage importance.

Main Management Measures

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

If the grave yards can be preserved in situ, they must be demarcated with brick walls or with fences. The mine will remain responsible for their future unaffected existence and maintenance. Controlled access to these graved must exist for any relative or friends; and

If graveyards must be exhumed and relocated permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police. The necessary permits and/or authorisations must be obtained from the SAHRA.

Air Quality

Main Impacts

The following main impacts identified include, but is not limited to:

The result in air borne dust as a result of site clearing and construction vehicles travelling on gravel roads;

The potential dispersion of dust due to the transportation of coal from the opencast pits to the remainder of the processing and transportation activities;

Dust could lead to the increase problems relating to the growth and seed formation of maize and soya due to the worsening of the dust layer on the leaves; and

The increase in dust dispersion with the blasting activities and associated coal resource removal.

Main Management Measures

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

Ongoing ambient and PM10 monitoring must be implemented with dust monitors concentrated to the wets of the site;

Effective dust management practices should be employed (dust allaying products, etc.);

A dust management plan must be implemented on the mine; and

When any burning areas within a stockpile or dump or the mining area may develop the area will be excavated and re-compacted immediately.

Vibration

Main Impacts

The following main impacts identified include but are not limited to:

Impact of blasting activities on surrounding properties.

Main Management Measures

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

Surrounding property owners will be informed of the blasting procedures and schedules;

An exclusion zone of 500m will be in place for the life of mine, it this in not possible the necessary approvals will be applied for;

Scheduled blasting times will be planned in advance and will be clearly indicated on the mining area. Blasting boards, at the access routes to construction areas, will be updated 24 hours prior to the blast, displaying time and date of blast;

The mine will undertake monthly blasting monitoring to determine whether the blasting activities remain under acceptable levels (see Blasting specialist report);

The mine will implement a temporary testing model during initial blasting phase. Should the results indicate it necessary (vibrations above or on impact level), permanent monitoring stations will be implemented in order to establish whether any potential impact could result due to the blasting activities. The areas of most influence as identified by the temporary seismic monitoring stations will be equipped with permanent seismic monitoring stations;

Installation of electronic crack monitors will also be undertaken if it is requested by surrounding property owners. These monitors employ a single sensor that measures both weather-induced micrometer changes in crack width and those produced by habitation and ground motion-induced vibrations; and

The mine will establish an open channel of communication in order to ensure that all issues and concerns are known and are addressed.

Socio-Economic Conditions

Main Impacts

The following main impacts identified include but are not limited to:

Impact on the demand for farm land

Influx of people/labour which could lead to the increase in probability of squatters; increase is probability of theft and the increase in probability of a loss of farm labour to mines; and

Probable effect on land value has indicated that those farms that will be adversely affected should not on average not experience a reduction in production capacity or an increase in cost structure of more than 20%. As such, it is unlikely that the market value of the land of these particular farms (or portions) will decrease by more than 20%.

Main Management Measures

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

The use of local labour should be maximised to limit the negative impact on the existing infrastructure, services and resources;
Housing and other infrastructural needs should pro-actively be discussed with the Emalahleni Local Municipality to ensure that the additional requirements for the population increase can be met over time;
Implement education and skills development programmes to ensure an effective skills match between local people and mine requirements;
Focus on also creating employment opportunities for the youth and women;
Ensure safe and secure public transport access points;
Ensure effective safety and security measures;
Maximise the usage of local service providers and use local workforce;
Implement education and skills development programmes to ensure an effective skills match between local people and mine requirements (seeing as the proposed mine is an open cast mine, whilst the labour force has experience on underground mining);
Mining company should strive to achieve best practice Guidelines of EMP should be strictly followed;
Ongoing and transparent communication with community leaders, landowners and spokespersons; and
Possible establishment of a Management and Monitoring Committee consisting of representatives of the mining company (TCSA DCM), Emalahleni Local Municipality, community leaders and landowners to monitor mining activities over the long term.

Main Gaps Identified

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

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

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

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

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

3. Dirty water infrastructure design

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

to the plant and other areas should the current conceptual design dams be silted up and require maintenance.

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

4. Decanting

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

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

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

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

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

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

5. Surface Right Ownership

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

6. Further studies

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

Purpose and Motivation of the Project

The greatest positive aspect of the Expansion Project lies in meeting socio-economic requirements. The need for DCM and TCSA to continue to supply coal for their RBCT entitlement after their JV with Xstrata expires in 2009 will have a positive effect on the Emalahleni Local Municipality.

If the establishment of the Expansion Project is not approved, the majority of persons currently employed at DCM will be retrenched in the near future with the decline in coal production.

The Expansion Project and the increase in the coal production could also provide employment opportunities for the local communities in the near future.

The following will result should the Expansion Project be classed as a no-go project:

By not allowing the Expansion Project, DCM can't contribute their to their RBCT entitlement;

The above will result in a loss of economically viable and mineable reserves;

An opportunity to ensure sustainable job creation will be lost;

By not ensuring the continuation of the mining operation and subsequent/sustainable employment; opportunity, economic input into the area will be lost;
Loss of regional, socio-economic benefit; and
Loss of the opportunity to update and improve the current environmental commitments.

TCSA is investigating the feasibility of increasing and expanding the current mining operations at the existing DCM, which will increase the life of mine by more than 20 years.
The project will ensure:
A mining operation with a sustainable life of mine;
Provision of sustainable employment (retention);
Ongoing economic input into the area;
Establishment of infrastructure;
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; and
Improved environmental management commitments.

It is the opinion of the Environmental Assessment Practitioner that considering the necessity of the Expansion Project in terms of the current economic conditions, the impacts associated with the Expansion Project could be mitigated and managed during the life of mine by the effective and committed implementation of the relevant management measure.

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APPENDICES

APPENDIX A: ENVIRONMENTAL AWARENESS PLAN

WATER
ENVIRONMENTAL
ENGINEERING
EARTH SCIENCES

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DORSTFONTEIN COAL MINE

Environmental Awareness Plan and Environmental Emergency Response Plan

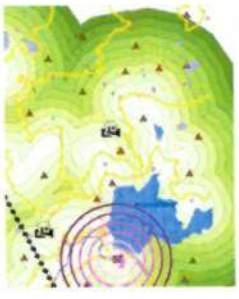
Updated June 2009

Client Name: Total Coal South Africa
Project Number: 08-180

TOTAL

mmakaumining




GCS (Pty) ltd.
Johannesburg Durban Kimberley
Directors: AC Johnstone (Managing) SE Scawthon (Financial) AH Barbour (Non-exec)* V Cresswell (Non-exec)*
Reg No: 2004/000765/07 Est. 1987

Dorstfontein Coal Mine (Pty) Ltd

Environmental Awareness Plan and Environmental Emergency Response Plan

Updated June 2009

TOTAL

mmakaumining

Total Coal South Africa
08-180

DOCUMENT ISSUE STATUS

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ENVIRONMENTAL AWARENESS PLAN

Dorstfontein Coal Mine (Pty) Ltd (DCM) has an Environmental Awareness Plan (EAP) which is implemented at their mining operation.

The EAP has been updated to incorporate the proposed East Expansion Project including the changes in the transportation system. EAP will be implemented as part of the purpose to create environmental awareness and being productive in the management of potential impacts associated with the mining and associated activities.

The material/source of information for the EAP will be the approved Environmental Management Programmes (EMP), as well as other relevant specialist reports. These documents will be utilised to compile a database, which is referred to in this EAP, which will contain all medium to high significant environmental aspects and issues. The environmental issues and aspects will be entered into the database with associated mitigation measures and responses, along with the specific legislation that governs such an impact or aspect. The environmental awareness plan is detailed in the sections below.

1.1 Induction

All full time staff and contractors are required to attend an induction session. Employees are inducted when they start at the mine and when they return from leave. Any contractor, who works on the mine for a period of 24 hours or more, is required to undergo the respective head of department (H.O.D.) induction training. These workshops will be conducted in English, as well as one of the local languages. This induction will form part of the health and safety induction.

Environmental issues and aspects related to the operation phase and other relevant phases will be addressed in the induction sessions. All environmental impacts and aspects and their mitigatory measures will be discussed, explained and communicated to employees. The induction sessions will be modified according to the level of employee attending the induction session, so that all employees gain a suitable understanding of environmental issues and pollution.

1.2 Environmental Symposiums

Environmental symposiums can be held with management, and selected groups of supervisors/foremen and/or employee representatives. This will take the form of an open discussion between the relevant department and these individuals. The symposiums will aid in environmental awareness being generated

at all levels, as well as to assist the relevant department in defining all and identifying new environmental issues, concerns and pollution sources.

1.3 In-house Training

In-house training sessions will be held with relevant employees. The training sessions will be determined by the relevant department, and will allow for employees to participate in determining what the environmental issues and concerns are with regard to their specific occupation. Education with regard to environmental incident reporting will be detailed at these sessions.

1.4 On the Job Training

On the job training is an essential tool in environmental awareness. Employees will be given details of the expected environmental issues and concerns specifically related to their occupation. Employees will be trained on how to respond if an environmental problem or source of environmental pollution arises. The training will be on-going, and all new employees will be provided with the same standard of training as existing employees.

1.5 General Training and Skills Development

Human Resources Development Programmes will include appropriate training and skills development programmes as required by the workforce in support of operation specific business plans (both mining and non-mining related). Training will be offered in portable skills, being competencies that will enable employees to find jobs elsewhere within the mining industry, or to become self-employed. Basic environmental and pollution control skill will be included in this training.

1.6 Environmental Open Days

Environmental open days will be arranged for at least once a year by DCM's environmental/management and liaison departments. Open days will be utilised to discuss environmental issues in a less formal manner, thereby allowing employees the opportunity to participate in environmental management by educating them about environmental pollution and waste management in areas beside the workplace (e.g. at home). The open days will not be confined to employees only, but will be made open to employees families, schools, surrounding landowners and all stakeholders, so as to ensure that the principles of environmental management, pollution prevention, waste management and sustainable development are communicated to the communities surrounding the operation.

1.7 Other

An Environmental Steering committee must be implemented which should work to increase awareness in the community regarding environmental constraints and opportunities. At corporate level, this includes providing support for NGOs involved with specific environmental awareness programmes.

The evaluation of the Environmental Awareness Plan will also be conducted by the management of the mine. This evaluation will entail the auditing of the operation in both the construction and operation phase once activity has commenced.

ENVIRONMENTAL COMMUNICATION STRATEGY

DCM management shall continue to establish and maintain procedures for the internal communication between the various levels and functions of the organisation, and receiving, documenting and responding to relevant communication from external interested & affected parties. The communication of the environmental risks for each phase of the project will take place for the management, administrative and mine worker sectors of the mine, as well as contractors. The organisation shall consider processes for external communication on its significant environmental aspects and record its decision.

Communication is a management responsibility. All supervisors are responsible for effective communication within their own sections. Environmental communication can be divided into two categories: internal communication and external communication.

1.8 Internal Communication

The communication of the environmental risks to the various levels will occur through a half day course. This workshop will seek to explain the following necessary actions:

Firstly, each aspect will be described, as shown in Table 1. Risks associated with each aspect will be discussed to ensure that there is an understanding of how each action of the project may impact on the environment.

The mitigation of the environmental risk will be elaborated on. It is important that each person understands these management strategies as it ensures that the impact on the environment is kept to a minimum. Data collection regarding each aspect will also be explained to ensure that each aspect is monitored according to those protocols specified by the mine and DME. Along with data collection the reporting of findings will be discussed.

This workshop will take place before the construction phase begins, thus ensuring a full understanding of the project and it's associated environmental risks before any mining begins. The course will be repeated at the beginning of the operational phase and the material will be integrated in the induction for new personnel.

The following communication channels and media will/can be used to communicate environmental issues within DCM.

HOD Meetings: The Mine Manager communicates information to senior management on environmental issues and the information is minuted.

HSEC Meetings: 'Environmental issues' should be an agenda item on plant and section monthly safety, health & environmental meeting agendas.

Publications: Leaflets, posters etc are produced by the relevant department or other designated persons, for use on notice boards, and distribution. Quarterly newsletter will also be made available. Email notifications and or relevant articles are also distributed.

EMS Database (if established): Feedback from line management on objectives, targets and actions.

Daily/ Weekly Safety Meeting: All meetings are scheduled to commence with a discussion on safety, health & environmental topics.

Table 1: Environmental Awareness Plan for the Dorstfontein Coal Mine.

Aspect	Environmental Risk	COMMUNICATION STRATEGY				MITIGATION ACTIVITY
		Management	Administration	Mine workers	Contractors	
CONSTRUCTION PHASE						
Soil	Increase in soil erosion Contamination of the soil Compaction of soil	Workshop	Course	Induction	Induction	Rehabilitate the area as soon as possible. Stockpile soil in the correct manner. Clean up procedures depending on extent of spill.
Animals	Disturbance					Workers must be educated on animal species. Report any rare or endangered species. Hunting and trapping prohibited on the mine property.
Vegetation	Damage Contamination					Limit the area of disturbance to the footprint of the affected sites only. Identify weeds and invader plants and remove according to plans.
Surface and Ground Water	Contamination & waste Decanting of water	Workshop	Course	Induction	Induction	Contain hydrocarbons, limit water use and recycle where possible. Lining of pollution control dams, reason must be clear to all.
Air Quality	Generation of dust and smoke					Dust will be suppressed by water carts on the haul roads. Open fires will be prohibited on the property.

Aspect	Environmental Risk	COMMUNICATION STRATEGY				MITIGATION ACTIVITY
		Management	Administration	Mine workers	Contractors	
OPERATIONAL PHASE						
Soil	Loss of structure and fertility. Contamination of soils. Loss of soil through erosion Compaction of soils	Workshop	Course	Induction & Monthly Meetings	Induction & Monthly Meetings	Stockpiled to height of less than 1.5 m and vegetated. Hydrocarbon spill kit kept on site and rehabilitation specialist identified. Areas of erosion reported on a monthly basis and rehabilitated.
Vegetation	Removal of vegetation Invader species	Workshop	Course	Induction & Monthly Meetings	Induction & Monthly Meetings	Red Data species reported to Mpumalanga Parks Board. Invader species will be eradicated on site.
Surface Water	Contaminated runoff from the mining property Clean and dirty water systems					All contaminated water to be stored, zero discharge policy.
Ground Water	Acid mine drainage could cause contamination. Potential to de-water natural springs.					Precautions will be implemented to prevent acid-mine drainage. Water ingress into the underground mining sections will be prevented to limit AMD.
Wetlands	Treatment and water quality of remaining wetlands					Clean and dirty water systems must be in place and maintained to operate effectively.
Air quality	Dust generation by blasting, conveying, load out facility and coal trucks.	Workshop	Course	Induction & Monthly Meetings	Induction & Monthly Meetings	Dust will be suppressed by water carts on the haul roads and sprays at the coal transfer points. Open fires will be prohibited on the property.

Aspect	Environmental Risk	COMMUNICATION STRATEGY				MITIGATION ACTIVITY
		Management	Administration	Mine workers	Contractors	
DECOMMISSIONING PHASE						
Soil	Incorrect rehabilitation Lack of soil fertility	Workshop	Course	Induction	Induction	Correct placement of soil layers. Fertilisation programmes will be introduced.
Vegetation	Alien Species					Remove alien species & plant only indigenous vegetation.
Surface Water	Acid mine drainage - Decrease quality of the water source/s	Workshop	Course	Induction	Induction	Monitoring of water sources
Ground Water	Acid mine drainage - Contamination of aquifers					Monitoring of water sources
Wetlands	Treatment					Monitoring of water sources, re-establishment of wetland environment
Air quality	Dust generation by blasting and coal trucks					Dust will be suppressed by water carts on the haul roads and sprays at the coal transfer points. Open fires will be prohibited on the property.

1.9 External Communication

The following communication channels and media will/can be used to communicate environmental issues to individuals who are not employed by DCM.

Environmental Committee: An Environmental Committee should be established and used as a forum to keep interested and affected parties informed of the significant environmental aspects identified through the Environmental Impact Assessments and Management Plans. This should also be the forum where interested and affected parties get the opportunity to raise environmental concerns. Records must be kept of all decisions and concerns. The Environmental Committee should be chaired by the Mine Manager, or another appropriately appointed competent individual.

Publications: Selected publications should be produced and used to communicate environmental issues to outside parties. Examples include newsletters and Annual Reports.

Communication from External Parties and Employees: A clear communication point should be established within the company that will be responsible for liaison with the media in respect of any crisis that may arise within DCM. A complete procedure for media liaison must be made available to all employees. Communication from external interested and affected parties may be received by e-mail, fax, telephonically or by mail. Where required, a written response will be sent, on receiving such communication, by the appropriately appointed individual under signature of the Mine Manager, to the respective interested and/or affected party. All telephonic or facsimile correspondence received on the mine must be forwarded to the relevant department for action. All events or concerns will be captured and actioned on an existing and/or future database.

E-mail: E-mail communication received must be stored, with replies, in an appropriate folder on a server. E-mail messages, relevant to environmental management, should be kept for a minimum of two years before deletion.

Mail: Correspondence received by mail must be filed, along with the response (where relevant), within the relevant department's filing system for a minimum period of two (2) years. Paper correspondence will be archived in this department.

Telephone: A register of telephonic environmental queries should be kept by the relevant department detailing caller, contact details, date, query, action taken and response. Furthermore, the person answering the call will be responsible for logging their particulars against the call, as well as ensuring that all communication that leads to an aspect or an impact, is entered on the database.

Storage of Correspondence: All original correspondence must be retained by the DCM Mine Manager for a minimum period of two years.

Environmental Reports: Copies of relevant specialist study reports and Environmental Impact Assessments will be available on request from an external party by the Mine Manager.

Queries from Interested and Affected Parties: Response to queries about environmental impacts and aspects will be addressed by the relevant department, and approved by the Mine Manager.

Queries and Requests from the Media: Requests for articles from the media on environmental issues at DCM will be co-ordinated by the HR Manager, with input from the relevant department, as approved by the General Manager, in line with the DCM Communication Strategy. The DCM Communication Strategy is based on a behavioural approach. Due to the environmental awareness generated by induction, on the job training etc, employees are able to identify environmental problems, issues, concerns and pollution timeously.

1.10 Incident Reporting Structure

Environmental incident reporting is a vital part of communication at DCM. Employees are required to report any and all environmentally related problems, incidents and pollution, so that the appropriate mitigatory action can be implemented timeously. In the event of an Environmental Incident the reporting procedure as indicated in the table overleaf should be followed:

Table 2: Environmental Incident Reporting Procedures

ENVIRONMENTAL INCIDENT REPORTING STRUCTURE	ACTION REQUIRED
Person causing or observing the incident	**Shall report the incident to an immediate supervisor in the area/section where the environmental incident is observed.**
Line Management in relevant area of responsibility where the incident occurred	Shall investigate the incident and record the following information: o How the incident happened; o The reasons the incident happened; o How rehabilitation or clean up needs to take place; o The nature of the impact that occurred; o The type of work, process or equipment involved; and o Recommendations to avoid future such incidents and/or occurrences. Shall inform the Environmental Manager and the Mine Manager on a daily basis of all incidents that were reported in the area/section. Shall consult with the relevant department / person for recommendations on actions to be taken or implemented where appropriate (e.g. clean-ups). Shall assist the Environmental Manager and/or Mine Manager with applicable data in order to accurately capture the incident into the reporting database.

ENVIRONMENTAL INCIDENT REPORTING STRUCTURE	ACTION REQUIRED
Person causing or observing the incident	**Shall report the incident to an immediate supervisor in the area/section where the environmental incident is observed.**
Area / Line Managers	Shall forward a copy of the incident form to other line managers. Shall forward a copy of the incident form to the Environmental Manager and the Mine Manager. Shall inform the relevant department / person on a weekly basis of the incident by e-mail or by submitting a copy of the incident report. Once a High Risk Incident (*any incident which results from a significant aspect and has the potential to cause a significant impact on the environment*) occurred it must be reported immediately to the Environmental Manager and the Mine Manager by telephone or email to ensure immediate response / action. Shall forward a copy of the completed Incident Reporting Form (and where applicable a copy of the incident investigation) to the relevant department / person.
Environmental Manager / Mine Manager	Shall complete an incident assessment form to assess what level of incident occurred. Shall make recommendations for clean-up and / or appropriate alternate actions. Shall enter actions necessary to remediate environmental impacts into the database in conjunction with the responsible line manager. Shall enter the incident onto the database in order to monitor the root causes of incidents. Shall include the reported incidents in an appropriate monthly / quarterly report. Shall highlight all incidents for discussion at HSEC meetings.

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.

1.11 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 radio's, pagers or telephones, must be placed around the mine. 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 Kriel.

The checklist includes:

- fire department;
- police;
- emergency health services such as ambulances, paramedic teams, poisons centres;
- hospitals, both local and further a field, 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 organisations.

DCM has, as a result of a few incidences on the mine, established a Crisis Management Plan. Below is a summary of the mine procedures, to be carried out in the event of any accident or incident.

1.12 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 casevac 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 casevac 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 in the underground environment, 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:

a) The mine doctor and paramedics;

b) Occupational hygienist (Ventilation Officer)

c) The mine overseer for the incident area;

d) The mine engineer; and

e) 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, 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.

1.13 Emergencies, Procedures and Remedial Action

Table 3 is a list of numbers of emergency units to contact, which is provided around the mine site.

Table 3: Safety and Health Contact Numbers

	Name	Telephone number
Occupational Nurse	Marian Simms	082 789 5902
Kriel Emergency Services		017)648-3838
Paramedics (Kriel)		10177
Fire Brigade (Kriel)		(017)648-2341
Mine Rescue Services	T N Fourie	(017)632-4671

		082 852 4046 (017)632-2683
	J P Wessels	(017)632-4671 082 852 4052
Ambulance Services		082 124
Police (Kriel)		(017)648-2267

The following define the most likely potential environmental emergencies:

- Accidents;
- Fires, spontaneous combustion on co-disposal facilities, opencast pits and underground workings;
- A major hydrocarbon spill or leak;
- A major spill or leak of process water;
- Flooding;
- Explosions;
- Subsidence; and
- Dump Failure.

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, Kriel or Witbank.

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 spontaneous combustion the area should be covered with unweathered material.
- 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.

Major Hydrocarbon Spill: Hydrocarbons such as diesel, petrol, and oil will be kept on site as fuel for the mine machinery. 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 Hasmat clean up 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

specialised clean up 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 clean up operations.

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, 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 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.

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 freebord 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.

Explosions: Explosions can occur underground with the presence of methane gas, or they 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:

- A Proto Team should be ready and deployed for assisting with the evacuation of employees working underground;
- 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.

Subsidence: Subsidence underground can result in injuries to human life and damage to property.

Procedure:

- Alternative evacuation and access routes should be identified and used, should the way in or out be blocked;
- A Proto Team should be ready and deployed for assisting with the location and extraction of employees trapped underground;
- There should be alternative air supply routes should the air supply become damaged in the rock fall; and
- All relevant emergency response units must be notified and hospitals informed of incoming patients.

Dump Failure: The dump could fail as a result of too much water being stored on it resulting in the slumping and collapse of a side.

Procedure:

- Rescue, evacuation and medical assistance, where necessary, to any persons affected by the incident;
- Efforts will be directed to the containment and neutralisation of the influx and prevention of further injury; and
- It is essential to assess the extent of damage/pollution as soon as possible after the event. This will best be accomplished by:
    - Communication
    - Site Controller;
    - Media Controller;
    - Media Consultant;
    - Green Groups;

- Incident Controller;
- Political Representatives;
- Chief Inspector of Mines;
- Department of Environmental Affairs;
- Department of Water Affairs;
- Transitional Local Council; and
- Any other relevant or statutory authority.

APPENDIX B: CLOSURE COST – REPORT

WATER
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East Mine Expansion
Financial Provision Update

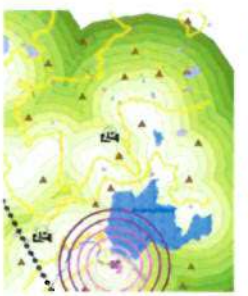
Report

Version - First Amendment - Final

May 09

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

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I. EXECUTIVE SUMMARY

Dorstfontein Coal Mines (DCM) is owned by Total Coal South Africa (TCSA) (74%) and Mmakau Mining (26%), its Black Economic Empowerment Partner. The mine is an outsourced operation with underground mining and coal processing conducted by contractors and TCSA retaining general management and marketing control.

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

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

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

The proposed East Mine Expansion Project has been authorised in terms of the National Environmental Management Act (Act No. 107 of 1998). The record of decision from the Department of Minerals and Energy is pending on the finalisation of the closure cost assessment, to which this report relates.

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

- New plant and associated infrastructure;
- Two (2) new opencast operations;
- Initiation of the three (3) underground mining blocks;
- Co-disposal Facility, which will accommodate the waste rock from the mining operations and the waste material from the proposed plant;
- Transportation (i.e. roads and conveyors);

- Water supply, which will be obtained from the old defunct TNC mine workings;
- Pipeline transporting water from the old TNC mine to the plant;
- Power supply, which will be provided by Eskom; and
- Sewage treatment.

The financial provision for the environmental rehabilitation and closure of any mine and its associated mining operations forms an integral part of the MPRDA. Sections 41(1), 41(2), 41(3) and 45 of the MPRDA deal with the financial provision for mine rehabilitation and closure.

In order to derive the financial provision GCS was supplied with the bill of quantities for the proposed project by TCSA.

In order to determine the closure cost the Guideline Document for the Evaluation of Financial Provisions made by the Mining Industry (Report no. 5863-5900-2-P, Rev 1.6), Department of Minerals and Energy, 7 September 2004 were utilised. Where relevant, the Master Rates were amended according to industry standards.

A summary of the estimated closure costs is provided below. Refer to Appendix 3 for detailed breakdowns of the closure cost assessments.

"Clean Closure Cost" estimate, refer to summary sheet in Appendix 3:

- Sub Total 1 **R 39,165,080.71** (excluding VAT)
- Sub Total 2 **R 47,781,398.47** (excluding VAT)
- Sub Total 3 **R 54,470,794.25** (including VAT)

CONTENTS PAGE

LIST OF TABLES

1. INTRODUCTION

Dorstfontein Coal Mines (DCM) is owned by Total Coal South Africa (TCSA) (74%) and Mmakau Mining (26%), its Black Economic Empowerment Partner. The mine is an outsourced operation with underground mining and coal processing conducted by contractors and TCSA retaining general management and marketing control.

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

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

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

The proposed East Mine Expansion Project has been authorised in terms of the National Environmental Management Act (Act No. 107 of 1998). The record of decision from the Department of Minerals and Energy is pending on the finalisation of the closure cost assessment, to which this report relates.

2. PROJECT DESCRIPTION

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

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

- New plant and associated infrastructure;

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

All new infrastructure will be situated within the existing mining area.

3. METHODOLOGY

3.1 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 MPRDA. Sections 41(1), 41(2), 41(3) and 45 of the MPRDA deal with the financial provision for mine rehabilitation and closure.

In order to derive the financial provision GCS was supplied with the bill of quantities for the proposed project by TCSA.

In order to determine the closure cost the Guideline Document for the Evaluation of Financial Provisions made by the Mining Industry (Report no. 5863-5900-2-P, Rev 1.6), Department of Minerals and Energy, 7 September 2004 were utilised. Where relevant, the Master Rates were amended according to industry standards.

Two costs are provided. Firstly, the cost should the mine undertake rehabilitation themselves. The second option is based on the assumption that a third party will be employed to undertake

the necessary rehabilitation and remedial work, should the mining operation close prematurely.

The mine infrastructure is assumed to have no salvage value when determining the quantum for 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 DME offices to review the quantum determination for the rehabilitation and closure of mining sites.

The following principles have been adopted by the guideline document:

- Legal standing

The guideline document is to be used by the Regional Office personnel as a tool to assess the accuracy and legitimacy of the quantum of financial provision submitted to the DME by the mining industry. The guideline document does not have any legal standing. The guideline document does therefore not obviate in any way the holder of a mining right from the legal requirement to annually assess his or her environmental liability and increase his or her financial provision to the satisfaction of the Minister.

- Generic nature

The guideline document is generic in nature and cannot answer all possible questions or deal with all scenarios relating to financial provision, rehabilitation and mine closure.

- Standardised approach

The guideline document provides a universal standard approach to the determination of the quantum for financial provision by the DME. The guideline document covers the "standard" closure components that are generally required for the closure of a mine site.

- Complete picture

The guideline document ensures that the financial provision assesses the complete picture associated to the proposed project.

Two costs are provided for the purposed of this project:

- Firstly, the cost, should the mine undertake rehabilitation themselves.

- The second option is based on the assumption that a third party will be employed to undertake the necessary rehabilitation and remedial work, should the mining operation close prematurely.

It should be noted that the infrastructure associated with this project is assumed to have no salvage value when determining the quantum for closure. The DME guidelines require a "clean closure" cost assessment, meaning that the mine infrastructure has no salvage value in accordance.

The following steps have been utilised to derive the quantum:

Table 1: Closure Cost Methodology and Outcomes

Step	Description	DME Table Application	Outcomes
1	Determine primary mineral and saleable mineral by-products	Table B.12	Mineral : Coal
2	Determine Risk Class	Table B.12	Primary Risk Class: A (Large mine encompassing mine, mine waste, plant and plant waste).
3	Determine the Area Sensitivity	Table B.4	Medium
4.1	Determine the level of information	N/A	Extensive information is provided herewith (detailed EIA and EMP).
4.2	Determine the closure components	Table B.5	See Table 1 of this report.
4.3	Determine the unit rates for closure components	Table B.6	See Table 2 of this report. The multiplication factor for all components is 1.00, except for the opencast rehabilitation where it is 0.52, processing wastes where it is 0.80 and water management where it is 0.67.

4.4	Determine and apply the weighting factors	Table B.7 Table B.8	Weighting factor 1 (Nature of the terrain): 1 (generally flat terrain) Weighting factor 2 (Proximity to urban area): 1 (Urban, very close to Kriel)
4.5	Identify areas of disturbance	N/A	See Appendix 1 of this report
4.6	Identify closure costs from specialist studies	Table B.9	The outcomes of the specialist studies have indicated that no significant residual impacts will take place as part of the construction activities. This is specific to this stage of the operation where the mine is in its construction phase – during future annual assessments this must be reviewed based on the monitoring data of the mine
4.7	Calculate Closure Costs	Table B.10	See Section 3.2, as well as Appendix 3 of this report.

It should be noted that for the calculation of the closure cost GCS made use of the DME Master Rates were applicable, however in some instances more specific master rates were obtained from contractors and were utilized as for the closure costs supplied with the DCM Seam 4 Bulk Sample EMP Amendment. All rates have been escalated with CPIX.

Table 2 below summarizes the unit rates for closure components as specified in the DME Guideline Document and indicates which rates were used by GCS in the assessment.

Table 2: Master Rates Utilised

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005 (3.9%)	DME Master Rate 2006 (4.6%)	DME Master Rate 2007 (6.5%)	DME Master Rate 2008 (8.6%)	DME Master Rate 2009 (12.1%)	Rates used 2009	GCS Comments
1	Dismantling of processing plant and associated structures	m^3	R 6.82	R 7.09	R 7.41	R 7.89	R 8.57	R 9.61	R 26.00 R 8.57	R26.00 has been obtained as an industry standard for the removal of infrastructure of approximately 15m in height. For conveyors the DME master rate (R8.57) has been utilized.
2(A)	Demolition of steel buildings and structures (including floor slabs)	m^2	R 95.00	R 98.71	R 103.25	R 109.96	R 119.41	R 133.86	R 150.00	The DCM Master rate (R150.00) was used with the assumption that the buildings are 15m in height.
2(B)	Demolition of reinforced concrete buildings and structures including Processing Plant and related structures - including all admin and mine buildings and sewage facilities.	m^2	R 140.00	R 145.46	R 152.15	R 162.04	R 175.98	R 197.27	R 648.00	The DCM Master rate (R648.00) was used with the assumption that the infrastructure has a medium concrete thickness between 750 and 250mm.
3(A)	Rehabilitation of access roads	m^2	R 17.00	R 17.66	R 18.48	R 19.68	R 21.37	R 23.96	R 52.00	The DCM Master rate (R52.00) was used assuming the removal and disposal of low grade tar roads.
4(A)	Demolition of electrified railway lines	m	R 165.00	R 171.44	R 179.32	R 190.98	R 207.40	R232.50	R 324.00	The DCM Master rate (R324.00) was used
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	R 90.00	R 93.51	R 97.81	R 104.17	R 113.13	R 126.82	N/A	N/A
5	Demolition of housing and facilities (including floor slabs)	m	R 190.00	R 197.41	R 206.49	R 219.91	R 238.83	R267.73	R 298.00	The DCM Master rate (R298.00) was used.

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005 (3.9%)	DME Master Rate 2006 (4.6%)	DME Master Rate 2007 (6.5%)	DME Master Rate 2008 (8.6%)	DME Master Rate 2009 (12.1%)	Rates used 2009	GCS Comments
6	Opencast rehabilitation (including final voids and ramps)	ha	R 99,600.00	R 103,484.40	R 108,244.68	R 115,280.59	R 125,194.72	R 140,343.00	R 140,343.00	The DME Master rate (R140,343.00) was used.
7	Sealing of shafts, adits and inclines (including concrete cap)	m^3	R 51.00	R 52.99	R 55.43	R 59.03	R 64.11	R71.88	N/A	This activity has not been included as TCSA will be utilizing the box cuts of the opencast pits as access into the underground workings. By rehabilitating the opencast areas the underground mining accesses will be rehabilitated.
8(A)	Rehabilitation of overburden and spoils	ha	R 66,400.00	R 68,989.60	R 72,163.12	R 76,853.72	R 83,463.14	R93,562.18	N/A	This activity has not been included as TCSA will be utilizing the box cuts of the opencast pits as access into the underground workings. By rehabilitating the opencast areas the underground mining accesses will be rehabilitated.

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005 (3.9%)	DME Master Rate 2006 (4.6%)	DME Master Rate 2007 (6.5%)	DME Master Rate 2008 (8.6%)	DME Master Rate 2009 (12.1%)	Rates used 2009	GCS Comments
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	R 82,700.00	R 85,925.30	R 89,877.86	R 95,719.92	R 103,951.84	R 116,530.01	R 116,530.01	The DME Master rate (R116,530.01) was used. It should be noted that the entire area of 102ha has not been provided for as the mine will undertake ongoing rehabilitation. The mine commits in providing for the area that will be utilised in the first 10 years. It should be noted that the annual assessment of the quantum will be undertaken. Should areas change during these assessments, the necessary adjustments will be incorporated and funded for.
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	R 240,200.00	R 249,567.80	R 261,047.92	R 278,016.03	R 301,925.41	R 338,458.38	R 338,458.38	The DME Master rate (R338,458.38) was used.
9	Rehabilitation of subsided areas	ha	R 55,600.00	R 57,768.40	R 60,425.75	R 64,353.42	R 69,887.81	R 78,344.24	N/A	N/A
10	General surface rehabilitation, including grassing of all denuded areas - this has made provision for the opencast areas, and co-disposal facility.	ha	R 52,600.00	R 54,651.40	R 57,165.36	R 60,881.11	R 66,116.89	R 74,117.03	R 74,117.03	The DME Master rate (R74,117.03) was used.
11	River diversions	ha	R 52,600.00	R 54,651.40	R 57,165.36	R 60,881.11	R 66,116.89	R 74,117.03	N/A	N/A

Item	Closure Component	Unit	DME Master Rate 2004	DME Master Rate 2005 (3.9%)	DME Master Rate 2006 (4.6%)	DME Master Rate 2007 (6.5%)	DME Master Rate 2008 (8.6%)	DME Master Rate 2009 (12.1%)	Rates used 2009	GCS Comments
12	Fencing	m	R 60.00	R 62.34	R 65.21	R 69.45	R 75.42	R 84.55	R 58.00	The DCM Master rate (R58.00) was utilized assuming the re-erection of fencing.
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required) – this makes provision for 25% of the quantity of the general rehabilitation as presented in No. 14.	ha	R 20,000.00	R 20,780.00	R 21,735.88	R 23,148.71	R 25,139.50	R 28,181.38	R 28,181.38	The DME Master rate (R28,181.38) was used.
14	Two to three year maintenance and aftercare	ha	R 7,000.00	R 7,273.00	R 7,607.56	R 8,102.05	R 8,798.83	R 9,663.49	R 9,663.49	The DME Master rate (R9,663.49) was used.

3.2 Cost Estimate Summary

A summary of the estimated closure costs is provided below. Refer to Appendix 3 for detailed breakdowns of the closure cost assessments.

"Clean Closure Cost" estimate, refer to summary sheet in Appendix 3:

- Sub Total 1 **R 39,165,080.71** (excluding VAT)
- Sub Total 2 **R 47,781,398.47** (excluding VAT)
- Sub Total 3 **R 54,470,794.25** (including VAT)

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

- Preliminary and general (P&G) = 12% of Total 1 (6% if larger than R100 million; 12% if smaller than R100 million);
- 10% Contingency has been included.
- 14% VAT.

3.3 Provision of the funds

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). 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.

The following requirements must be considered in developing a pecuniary provision strategy:

The closure cost estimate to cover the current environmental liability in the event of premature closure = **R 54,470,794.25** (including VAT).

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.

TCSA has an approved rehabilitation trust fund in place. The DCM has been included into this fund, therefore the additional activities as per this report will be incorporated into this fund by means of a bank guarantee.

Appendix A: Bill of quantities

Latest updated list below (07/04/08)

1	Dismantling of processing plant and associated structures (including overland conveyors and power lines)	m^3	**501598 m^3**
2(A)	Demolition of steel buildings and structures (including floor slabs) (Plant) Stores & Workshop (Mine) Workshop (Mine) Stores (Mine) Warehouse	m^2	**1129.5m^2** 300 m^2 376.5 m^2 104.5 m^2 348.5 m^2
2(B)	Demolition of reinforced concrete buildings and structures including Processing Plant and related structures	m^2	**18057 m^2**
3	Rehabilitation of access roads	m^2	**71683 m^2**
4(A)	Demolition and rehabilitation of electrified railway lines	m	**9526m**
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	**none**
5	Demolition of housing and/or administration buildings Security (all locations) Change House Lamp Room & Crush Admin Medical Service Ramp Substation 1 Substation 2 (Plant) Office buildings (Plant) Laboratory (Plant) Change House	m^2	**3278.5 m^2** 435 m^2 609 m^2 274.5 m^2 676 m^2 91 m^2 222.5 m^2 397 m^2 338.5 m^2 150 m^2 25 m^2 60 m^2
6	Opencast rehabilitation (including final voids and ramps)	ha	**410 ha**
7	Sealing of shafts, audits and inclines (including concrete cap) Portal Plug Infilling by Dozing Infilling by Load and Haul Area for top soil (AB) Area for top soil (C) Vent Shaft Plug Infilling of Void	m^3	**3211125 m^3** 273 m^3 1605562.5 m^3 1605562.5 m^3 47386 m^3 8218.5 m^3 136.5 m^3 None (all in box cut)
8(A)	Rehabilitation of overburden and spoils	ha	**11 ha**
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	**0.75 ha**
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	**0.75 ha**
9	Rehabilitation of subsided areas	ha	**none**
10	General surface rehabilitation, including grassing of all denuded areas - included in the foregoing sections	ha	**556.5 ha**
11	River diversions	ha	**none**
12	Fencing	m	**10277 m**
13	Water Management	ha	**16.9 ha**
14	2 to 3 years of maintenance and aftercare	ha	**556.5 ha**

Breakdown:

1	Dismantling of processing plant and assoicated structures (including overland conveyors and power lines)	**501598m³**		
	Plant Area	65352m²	x 7.5m High =	490140m³
	Conveyor Area	5729m²	x 2m High =	11458m³
2(A)	Demolition of steel buildings and structures (including floor slabs)	**1129.5m²**		
	(Plant) Stores & Workshop	300 m2	+	
	(Mine) Workshop	376.5 m2	+	
	(Mine) Stores	104.5 m2	+	
	(Mine) Warehouse	348.5 m2	+	
2(B)	Demolition of reinforced concrete buildings and structures including Processing Plant and related structures	**18057m²**		
	Potable Water	12.5m²		
	Raw Water	706m²		
	Setling Pond	2500m²		
	Silt Trap	2500m²		
		5719m²	x 3 =	17157m²
	Water Purification	900m²		
3	Rehabilitation of access roads	**71683m²**		
	Roads (8m Wide) - Opencast Contractors	13161m²	+	
	Roads (8m Wide) - Plant to Box 'A&B' Entrance	22133m²	+	
	Roads (8m Wide) - Gate to Box 'C' Entrance	36389m²	+	
4(A)	Demolition and rehabilitation of electrified railway lines	**9526m**		
	TFR to NCC	4004m	+	
	NCC to Plant Loop	5522m	+	
4(B)	Demolition and rehabilitation of non-electrified railway lines	**None**		
5	Demolition of housing and/or administration buldings	**3278.5m²**		
	Security (all locations)	435 m²	+	
	Change House	609 m²	+	
	Lamp Room & Crush	274.5 m²	+	
	Admin	676 m²	+	
	Medical	91 m²	+	
	Service Ramp	222.5 m²	+	
	Substation 1	397 m²	+	
	Substation 2	338.5 m²	+	
	(Plant) Office buildings	150 m²	+	
	(Plant) Laboratory	25 m²	+	
	(Plant) Change House	60 m²	+	
6	Opencast rehabilitation (including final voids and ramps)	**410 ha**		
	O/Cast Pit 1	214 ha	+	
	O/Cast Pit 2	196 ha	+	
7	Sealing of shafts, adits and inclines (including concrete cap)	**3211125m³**		
	Box Cut Volume (Block A&B)	2998123m³	+	
	Box Cut Volume (Block C)	213002m³	+	
	Portal Plug	273 m³	+ 45.5m3 x 6	
	Infilling by Dozing	1605562.5 m³	+ Halve of Total Volume	
	Infilling by Load and Haul	1605562.5 m³	+ Halve of Total Volume	
	Area for top soil (AB)	47386 m³	+ 94772 m2 x 1/2m thk	
	Area for top soil (C)	8218.5 m³	+ 16437 m2 x 1/2m thk	
	Vent Shaft Plug	136.5 m³	+ 45.5m3 x 3	
	Infilling of Void	None (all in box cut)	+	
8(A)	Rehabilitation of overburden and spoils	**11 ha**		
	Box Cut Area (Block A&B)	9.4 ha	+	
	Box Cut Area (Block C)	1.6 ha	+	
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	**0.75 ha**		
	Setling Ponds x 3	2500		
8(C)	Rehabilitation of processing waste deposits and evaporation ponds	**0.75 ha**		

	(acidic, metal-rich waste)			
	Silt Traps x 3	2500		
9	Rehabilitation of subsided areas	**none ha**		
10	General surface rehabilitation, including grassing of all denuded areas - included in the foregoing sections	**556.5 ha**		
	Roads	7.2 ha	+	
	Plant	6.5 ha	+	
	Conveyor	0.6 ha	+	
	O/Cast	410.1 ha	+	
	Discard Dump	102.6 ha	+	
	Dams	16.9 ha	+	
	Over Burden	11.1 ha	+	
	Main Water	1.5 ha	+	
11	River diversions	**none ha**		
12	Fencing	**10277m**		
	Plant & Block A&B	8742m	+	
	Block C	1535m	+	
13	Water Management	**16.9 ha**		
	Dam O/Cast Pit 1	9.9 ha	+	
	Dam O/Cast Pit 2	6.4 ha	+	
	Dam DMC Plant	0.59 ha	+	
14	2 to 3 years of maintenance and aftercare	**556.5 ha**		Same as 10

Appendix B: DCM Rates

UNIT RATES FOR DEMOLITION AND RELATED WORK
JULY 2007

1. Concrete

• Heavy concrete thickness greater than 750 mm	:	R 1 050/m^3
• Medium concrete thickness between 750 and 250 mm	:	R 500/m^3
• Light concrete thickness less than 250 mm	:	R 350/m^3

Note: Above unit costs allow for disposal of demolished concrete as well.

2. Workshops and related buildings

• Super structures and steel buildings:		
5 to 10 m height:		R 18/m^3 or R90/m^2
10 to 15 m height:		R 8/m^3 or R115/m^2
• Bases and floors after removal of super structures	:	R 125/m^2

3. Brick buildings

• Normal one storey brick buildings	:	R 230/m^2
• Normal double storey brick buildings	:	R 400/m^2
• Car ports (excluding paving)	:	R 80/m^2

Note: The above relates to floor/surface area.

4. Plant and related equipment

• Overland conveyors	:	R 80/m to R 150/m
• Suspended conveyors (including gantries)	:	R 200 to 250/m
• Plant structures and related equipment	:	R 20 to 25/m^3
• Overland powerlines	:	R 40/m
• Sub-stations	:	R 400/m^2

5. Roads, paving and walkways

• Removal and disposal of "low" grade tar roads	:	R 40/m^2
• Gravel road with engineered surface	:	R 15/m^2
• Removal and disposal of hard stand and paving	:	R 35/m^2
• Concrete slabs	:	R 105/m^2

6. Railway lines

• Electrified	:	R 250/m

- Non-electrified : R 150/m

7. Disturbed areas

- Shaping/levelling of areas from which infrastructure has been removed (general) (about 500 mm thickness) : R 60 000/ha
- Establishment of vegetation : R 15 000/ha
- Seeding of vegetation : R 10 000/ha
- Maintenance of vegetation : R 2 000/ha/yr
- Monitoring : R 500/ha/yr

8. Earthworks

- Dozing : R 8-50/m^3
- Excavation : R 12/m^3
- Load and haul : R 18/m^3
- Load, haul and shaping : R 21/m^3
- Load, haul, place, compact and shape : R 25/m^3

9. Fencing

- Erection of security fencing : R 125/m
- Erection of stock fencing : R 45/m
- Demolition of security fencing : R 20/m
- Demolition of stock fencing : R 7-50/m

		Comments
to the underground		
	B*C*D	Comments
	Total	
	41,835.06	Plant - Assumed at 15m height (DCM Master Rate). Conveyor - DME Master Rate
	43,640.00	
	8,195.06	
	9,425.00	Plant - Assumed at 15m height (DCM Master Rate)
	5,000.00	
	5,475.00	
	5,675.00	
	2,275.00	
	99,964.00	Assuming medium concrete thickness between 750 and 250mm (DCM Master Rate)
	4,300.00	
	72,464.00	
	60,000.00	
	60,000.00	
	3,200.00	
	27,516.00	Assuming the removal and disposal of low grade tar roads (DCM Master Rate)
	34,372.00	
	50,916.00	
	92,228.00	
	R 0.00	
	R 0.00	
	R 0.00	
	R 0.00	
	R 0.00	N/A
	76,993.00	DCM Master Rates utilised
	29,630.00	
	81,482.00	
	1,801.00	
	01,448.00	
	27,118.00	
	56,305.00	
	18,306.00	
	00,873.00	
	44,700.00	
	7,450.00	
	17,880.00	
	02,756.24	DME Master Rate utilised
	85,991.70	
	16,764.54	
	R 0.00	
	R 0.00	
	R 0.00	
	R 0.00	
	R 0.00	
	R 0.00	
	R 0.00	

CALCULATION OF THE QUANTUM								
Mine:	Dorstfontein Coal Mine - Expansion Project			Location:	Mpumalanga			
Evaluators:	GCS (Pty) Ltd			Date:	2009/05/14 (Second Amendment)			
	The cost estimate is calculated with the assumpiton that the mine will undertake ongoing rehabilitation and that no opencast pits will remain except for the boxcut accesses to the underground workings.							
No	Description	Unit	A Quantity	B Master rate	C Multiplication factor	D Weighting factor 1	E=A*B*C*D	Comments
			Step 4.5	Step 4.3	Step 4.3	Step 4.4	Sub Total	
1	**Dismantling of processing plant and associated structures (including associated conveyors)**						R 12,841,835.06	Plant - Assumed at 15m height (DCM Master Rate) Conveyor - DME Master Rate
	Plant	m^3	490140.00	R 26.00	1.00	1.00	R 12,743,640.00	
	Conveyors	m^1	11458.00	R 8.57	1.00	1.00	R 98,195.06	
2(A)	**Demolition of steel buildings and structures (including floor slabs)**						R 169,425.00	
	Stores and Workshop at Plant	m^2	300.00	R 150.00	1.00	1.00	R 45,000.00	
	Workshop at Mine	m^2	376.50	R 150.00	1.00	1.00	R 56,475.00	Plant - Assumed at 15m height (DCM Master Rate)
	Stores at Mine	m^2	104.50	R 150.00	1.00	1.00	R 15,675.00	
	Warehouse at Mine	m^2	348.50	R 150.00	1.00	1.00	R 52,275.00	
2(B)	**Demolition of reinforced concrete buildings and structures including Processing Plant and related structures**	m^2					R 11,699,964.00	
	Potable Water Tanks (3)	m^2	37.50	R 648.00	1.00	1.00	R 24,300.00	
	Raw Water Tanks (3)	m^2	2118.00	R 648.00	1.00	1.00	R 1,372,464.00	Assuming medium concrete thickness between 750 and 250mm (DCM Master Rate)
	Settling Ponds (3)	m^2	7500.00	R 648.00	1.00	1.00	R 4,860,000.00	
	Silt Traps (3)	m^2	7500.00	R 648.00	1.00	1.00	R 4,860,000.00	
	Water Purification Strucutures	m^2	900.00	R 648.00	1.00	1.00	R 583,200.00	
3	**Rehabilitation of access roads (surfaced roads)**						R 3,727,516.00	
	Roads (8m wide) - Opencast contractors	m^2	13161.00	R 52.00	1.00	1.00	R 684,372.00	Assuming the removal and disposal of low grade tar roads (DCM Master Rate)
	Roads (8m wide) - Plant to Box A & B entrance	m^2	22133.00	R 52.00	1.00	1.00	R 1,150,916.00	
	Roads (8m wide) - Gate to Box C entrance	m^2	36389.00	R 52.00	1.00	1.00	R 1,892,228.00	
4(A)	**Demolition of electrified railway lines (initial planning indicated the need for these, but further studies have excluded this requirement)**						R 0.00	
	Plant to TNC Pump Station	m	0.00	R 324.00	1.00	1.00	R 0.00	
	Plant to Pit 2	m	0.00	R 324.00	1.00	1.00	R 0.00	
	Plant to Pit 1	m	0.00	R 324.00	1.00	1.00	R 0.00	
4(B)	**Demolition and rehabilitation of non-electrified railway lines**	m	0.00	R 113.13	1.00	1.00	R 0.00	N/A
5	**Demolition of housing and facilities (including floor slabs)**						R 976,993.00	
	Security (all locations)	m^2	435.00	R 298.00	1.00	1.00	R 129,630.00	
	Change House	m^2	609.00	R 298.00	1.00	1.00	R 181,482.00	
	Lamp Room and Crush	m^2	274.50	R 298.00	1.00	1.00	R 81,801.00	
	Administrative Buildings	m^2	676.00	R 298.00	1.00	1.00	R 201,448.00	
	Medical Facility	m^2	91.00	R 298.00	1.00	1.00	R 27,118.00	DCM Master Rates utilised
	Service Ramp	m^2	222.50	R 298.00	1.00	1.00	R 66,305.00	
	Substation 1	m^2	397.00	R 298.00	1.00	1.00	R 118,306.00	
	Substation 2	m^2	338.50	R 298.00	1.00	1.00	R 100,873.00	
	Office Buildings at Plant	m^2	150.00	R 298.00	1.00	1.00	R 44,700.00	
	Laboratory at Plant	m^2	25.00	R 298.00	1.00	1.00	R 7,450.00	
	Change House at Plant	m^2	60.00	R 298.00	1.00	1.00	R 17,880.00	
6	**Opencast rehabilitation (including final voids and ramps)**						R 802,756.24	
	Opencast Pit 1	ha	9.40	R 140,342.00	0.52	1.00	R 685,991.70	DME Master Rate utilised
	Opencast Pit 2	ha	1.60	R 140,342.00	0.52	1.00	R 116,764.54	
7	**Sealing of shafts, adits and inclines (including concrete cap) - Not included as TCSA will be utilising the box cuts of the opencast pit as access into the underground workings. By rehabilitating the opencast areas the underground mining accesses will be rehabilitated.**						R 0.00	
	Portal Plug	m^3	0.00	R 1,681.50	1.00	1.00	R 0.00	
	Infilling by Dozing	m^3	0.00	R 9.53	1.00	1.00	R 0.00	
	Infilling by Load and Haul	m^3	0.00	R 23.54	1.00	1.00	R 0.00	
	Area for Top Soil (Block A and B)	m^2	0.00	R 28.03	1.00	1.00	R 0.00	
	Area for Top Soil (Block C)	m^3	0.00	R 28.03	1.00	1.00	R 0.00	
	Vent Shaft Plug	m^3	0.00	R 1,681.50	1.00	1.00	R 0.00	

8(A)	**Rehabilitation of overburden and spoils (concurrent rehabilitation with the opencast rehabilitation)**						R 0.00	
	Box Cut area (Block A and B)	ha	0.00	R 93,562.18	1.00	1.00	R 0.00	DME Master Rate utilised
	Box Cut area (Block C)	ha	0.00	R 93,562.18	1.00	1.00	R 0.00	
8(B)	**Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)**						R 4,049,417.94	
	Co-disposal facility (DCM commits in providing for the area that will be utilised in the first 10 years - it should be noted that annual assessment of the quanum will be undertaken - should areas change during these assessments, the necessary adjustments will be incorporated)	ha	34.00	R 116,530.01	1.00	1.00	R 3,962,020.43	DME Master Rate utilised
	Settling Ponds (3)	ha	0.75	R 116,530.01	1.00	1.00	R 87,397.51	
8(C)	**Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)**						R 203,075.03	
	Silt Traps (3)	ha	0.75	R 338,458.38	0.80	1.00	R 203,075.03	DME Master Rate utilised
9	**Rehabilitation of subsided areas**						R 0.00	
10	**General surface rehabilitation, including grassing of all denuded areas - this has made provision for the opencast areas, box cut areas, as well as the co-disposal facility**						R 3,335,266.52	DME Master Rate utilised
	Opencast areas	ha	11.00	R 74,117.03	1.00	1.00	R 815,287.37	
	Overburden/Box cut areas (concurrent rehabilitation with opencast areas)	ha	0.00	R 74,117.03	1.00	1.00	R 0.00	
	Co-disposal facility (DCM commits in providing for the area that will be utilised in the first 10 years - it should be noted that annual assessment of the quanum will be undertaken - should areas change during these assessments, the necessary adjustments will be incorporated)	ha	34.00	R 74,117.03	1.00	1.00	R 2,519,979.15	DME Master Rate utilised
12	**Fencing**						R 590,066.00	
	Plant, Block A and B	m	8742.00	R 58.00	1.00	1.00	R 507,036.00	RE-erecting of fencing (DCM Master Rate)
	Block C	m	1535.00	R 58.00	1.00	1.00	R 89,030.00	
13	**Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required)**						R 318,908.94	
	Dam at Opencast Pit 1	ha	9.90	R 28,181.38	0.67	1.00	R 186,927.09	DME Master Rate utilised
	Dam at Opencast Pit 2	ha	6.40	R 28,181.38	0.67	1.00	R 120,841.76	
	Dam at the Plant	ha	0.59	R 28,181.38	0.67	1.00	R 11,140.10	
14	**Two to three year maintenance and aftercare co-disposal and general surface rehabilitation**						R 443,856.98	
	Opencast areas	ha	11.00	R 9,863.49	1.00	1.00	R 108,498.37	
	Overburden/Box cut areas (concurrent rehabilitation with opencast areas)	ha	0.00	R 9,863.49	1.00	1.00	R 0.00	DME Master Rate utilised
	Co-disposal facility (DCM commits in providing for the area that will be utilised in the first 10 years - it should be noted that annual assessment of the quanum will be undertaken - should areas change during these assessments, the necessary adjustments will be incorporated)	ha	34.00	R 9,863.49	1.00	1.00	R 335,358.61	

	Weighting factor 2 (Step 4.4)	1	**Sum of Items 1 to 14**	R 39,165,080.71
			Sub Total 1	*R 39,165,080.71*
1	Preliminary and General	12% of Subtotal 1		4,699,809.69
2	Contingency	10% Of Subtotal 1		R 3,916,508.07
			Sub Total 2 (Sub total 1 plus sum of management and administrative items 1 to 6)	**R 47,781,398.47**
			VAT (14%)	**R 6,689,395.79**
			Sub Total 3	**R 54,470,794.25**

Appendix D: Closure Cost Estimation – break-up for every two years

Draft Dorstfontein East Mine Rehabilitation Provision

Calculation of the Quantum

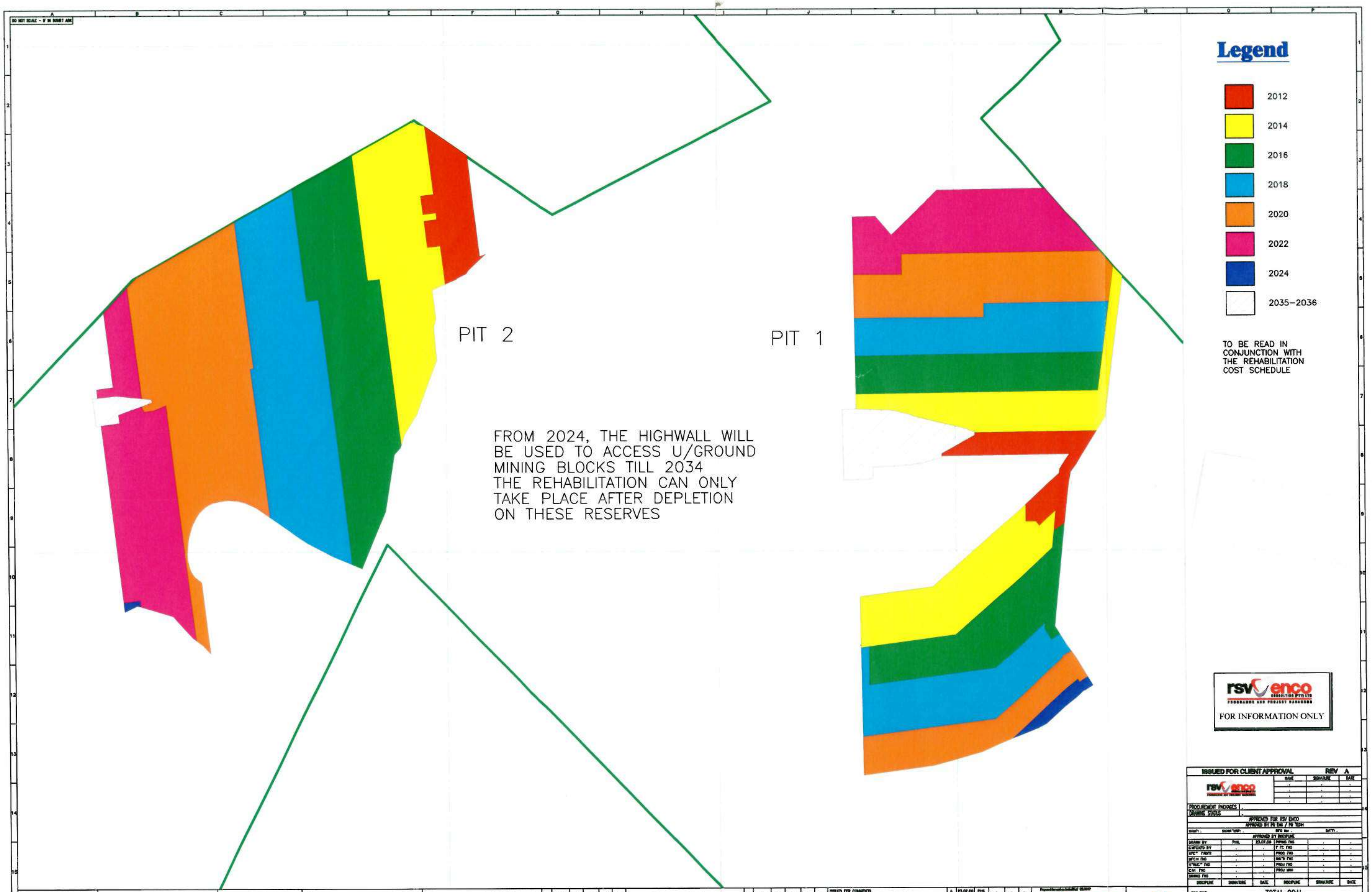
Mine:					Dorstfontein Coal Mine - Expansion Project							Location:				Mpumalanga				
Evaluators:					GCS (Pty) Ltd							Date:				03-Jun-09				
					The cost calculated with the assumption that the mine will undertake ongoing rehabilitation and that no opencast pits will remain except for the boxcut access to the underground workings																
Nº	Activity	Unit	Master Rate	Multiplication Factor	Weighting Factor	Mine - Total	Year Nº 2009 - 2010	Year Nº 2011 - 2012	Year Nº 2013 - 2014	Year Nº 2015 - 2016	Year Nº 2017 - 2018	Year Nº 2019 - 2020	Year Nº 2021 - 2022	Year Nº 2023 - 2024	Year Nº 2025 - 2026	Year Nº 2027 - 2028	Year Nº 2029 - 2030	Year Nº 2031 - 2032	Year Nº 2033 - 2034	Comments
10	**General Surface Rehabilitation, including Grassing of all Denuded areas - this has made Provision the Opencast Area, Box-Cut Areas, as well as the Co-Disposal Facility)**	R				3,335,266.52	-	7,198,148.38	7,402,820.96	7,411,681.29	7,533,960.85	9,984,506.07	6,571,245.61	5,832,506.56	5,209,923.48	6,026,018.73	5,403,435.64	4,780,852.56	3,335,266.52	
	Opencast Areas	ha	74,117.03	1	1		-	54.4	114.4	184.6	256.1	337.8	340.9	340.9	340.9	340.9	340.9	340.9	340.8935	
	Overburden / Box-Cut Areas (Concurrent Rehabilitation with Opencast Areas)	ha	74,117.03	1	1	11.0					9.40	9.40	11.00	11.00	11.00	11.00	11.00	11.00	11.0000	
	Co-Disposal Facility (DCM commits in providing for the area that will be utilised in the first 10 years - it should be noted that annual assessment for the quantum will be undertaken - should areas change during these assessments, the necessary adjustments will be incorporated)	ha	74,117.03	1	1	34.0		58.9	58.9	58.9	58.9	95.3	95.3	95.3	95.3	114.7	114.7	114.7	114.7000	DME Master Rates Utilised
	ha Disturbed	**ha**				45.00	-	113.34	173.31	243.51	324.42	442.45	447.19	447.19	447.19	466.60	466.60	466.60	455.59	
	ha Rehabilitated	**ha**				-	-	16.22	73.43	143.51	222.77	307.74	358.53	368.49	376.89	385.29	393.69	402.09	410.59	
12	**Fencing**	R				596,066.00	-	-	-	-	507,036.00	507,036.00	596,066.00	596,066.00	596,066.00	596,066.00	596,066.00	596,066.00	596,066.00	
	Plant, Block A and B	m	58.00	1	1	8,742.0					8,742	8,742	8,742	8,742	8,742	8,742	8,742	8,742	8,742	RE-Erecting of Fencing (DCM Master Rate)
	Block C	m	58.00	1	1	1,535.0							1,535	1,535	1,535	1,535	1,535	1,535	1,535	
13	**Water Management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment when required)**	R				318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	318,908.94	
	Dam at Opencast Pit Nº 1	ha	28,181.38	0.67	1	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	DME Master Rates Utilised
	Dam at Opencast Pit Nº 2	ha	28,181.38	0.67	1	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	
	Dam at Plant	ha	28,181.38	0.67	1	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	
	ha Disturbed	**ha**				16.89	16.89	16.89	16.89	16.89	16.89	16.89	16.89	16.89	16.89	16.89	16.89	16.89	16.89	
	ha Rehabilitated	**ha**												-	-	-	-	-	-	
14	**Two to Three Year Maintenance and Aftercare Co-Disposal Facility and General Surface Rehabilitation**	R				443,856.98	238,358.60	615,357.68	642,595.49	742,409.51	924,389.07	1,057,220.52	719,373.28	739,807.50	631,309.13	631,309.13	631,309.13	631,309.13	718,107.82	
	Surface Infrastructure	ha	9,863.49	1	1	27.8	24.2	24.2	24.2	24.2	24.2	24.2	24.2	27.8	27.8	27.8	27.8	27.8	27.8	
	Opencast Area	ha	9,863.49	1	1	11.0	-	38.2	41.0	46.1	46.8	51.8	12.6	11.0	-	-	-	-	-	
	Overburden / Box-Cut Areas (Concurrent rehabilitation with Opencast Areas)	ha	9,863.49	1	1	-					9.4	9.4	11.0	11.0	11.0	11.0	11.0	11.0	11.00	DME Master Rates Utilised
	Co-Disposal Facility (DCM commits in providing for the area that will be utilised in the first 10 years - it should be noted that annual assessment for the quantum will be undertaken - should areas change during these assessments, the necessary adjustments will be incorporated)	ha	9,863.49	1	1	34.0		-	-	5.00	13.40	21.80	25.20	25.20	25.20	25.20	25.20	25.20	34.00	
14	**Long Term Water Management System**	R				-	-	-	-	-	-	-	-	-	-	-	-	-	7,224,296.00	
	Evaporation Dam	ha	800,000.00	1	1														6.3	DCM Master Rates Utilised
	25m³/ hr Pump & Motor	Each	62,124.00	1	1														4.0	
	Piping	m	534.00	1	1	-													3,700.0	
	Sub Total 1	**R**				**39,165,081**	**28,371,245**	**45,563,187**	**45,996,624**	**45,896,261**	**45,776,127**	**52,027,488**	**44,522,010**	**44,602,710**	**42,892,777**	**44,991,972**	**43,390,537**	**41,789,102**	**46,663,628**	
	Preliminary and General	12%				4,699,810	3,404,549	5,467,582	5,519,595	5,507,551	5,493,135	6,243,299	5,342,641	5,352,325	5,147,133	5,399,037	5,206,864	5,014,692	5,599,635	
	Contingency	10%				3,916,508	2,837,125	4,556,319	4,599,662	4,589,626	4,577,613	5,202,749	4,452,201	4,460,271	4,289,278	4,499,197	4,339,054	4,178,910	4,666,363	
	Sub Total 2	**R**				**47,781,398**	**34,612,919**	**55,587,088**	**56,115,881**	**55,993,439**	**55,846,874**	**63,473,536**	**54,316,852**	**54,415,306**	**52,329,187**	**54,890,206**	**52,936,455**	**50,982,704**	**56,929,626**	
	VAT	14%				6,689,396	4,845,809	7,782,192	7,856,223	7,839,081	7,818,562	8,886,295	7,604,359	7,618,143	7,326,086	7,684,629	7,411,104	7,137,579	7,970,148	
	Sub Total 3	**R**				**54,470,794**	**39,458,728**	**63,369,280**	**63,972,104**	**63,832,520**	**63,665,437**	**72,359,831**	**61,921,211**	**62,033,449**	**59,655,274**	**62,574,835**	**60,347,559**	**58,120,283**	**64,899,773**	
	Nett Cash Flow (Rehab)	**R**				**(54,470,794)**	**(39,458,728)**	**(23,910,552)**	**(602,824)**	**139,584**	**167,083**	**(8,694,394)**	**10,438,619**	**(112,238)**	**2,378,176**	**(2,919,561)**	**2,227,276**	**2,227,276**	**(6,779,490)**	
	Total ha Disturbed	**ha**				**54.11**	**5.47**	**118.50**	**178.47**	**248.67**	**320.18**	**438.52**	**441.66**	**445.30**	**445.30**	**464.71**	**464.71**	**464.71**	**464.70**	
	Total ha Rehabilitated	**ha**					-	**16.22**	**73.43**	**143.51**	**222.77**	**307.74**	**358.53**	**368.49**	**376.89**	**385.29**	**393.69**	**402.09**	**410.59**	
	Tonnes Mined	t				68,854,881	-	6,142,500	7,020,000	7,020,000	7,169,004	7,179,622	6,934,065	7,126,106	6,725,186	6,732,397	5,040,000	1,680,000	86,000	
	Yields	%				60.58%	-	58.99%	58.99%	58.99%	59.26%	59.27%	62.19%	62.41%	61.87%	61.91%	61.90%	61.90%	61.90%	
	Sales tonnes	t				41,711,023	-	3,623,445	4,141,080	4,141,080	4,248,614	4,255,186	4,312,025	4,447,612	4,160,957	4,168,110	3,119,760	1,039,920	53,234	
	Discard Tonnes	t				27,143,858	-	2,519,055	2,878,920	2,878,920	2,920,391	2,924,436	2,622,040	2,678,494	2,564,229	2,564,287	1,920,240	640,080	32,766	
	Working Costs	R					-	1,563,218,052	1,752,546,199	1,755,886,233	1,781,232,044	1,783,551,604	1,727,568,751	1,749,838,557	1,643,546,029	1,642,620,443	1,237,061,656	585,288,961	110,634,679	
	Revenue	R					-	2,301,098,795	2,629,827,194	2,629,827,194	2,663,136,186	2,666,755,098	2,434,183,546	2,448,943,880	2,291,106,321	2,295,044,914	1,717,802,251	572,600,750	29,311,705	
	Cash Flow	R					(185,661,170)	(866,418,793)	100,020,838	408,448,735	257,388,864	297,821,158	297,821,158	295,416,334	298,108,961	277,034,845	299,052,043	298,776,741	248,438,321	

Draft Dorstfontein East Mine Rehabilitation Provision

Calculation of the Quantum

Mine:					Dorstfontein Coal Mine - Expansion Project							Location:				Mpumalanga				
Evaluators:					GCS (Pty) Ltd							Date:				03-Jun-09				
The cost calculated with the assumption that the mine will undertake ongoing rehabilitation and that no opencast pits will remain except for the boxcut access to the underground workings																				
Nº	Activity	Unit	Master Rate	Multiplication Factor	Weighting Factor	Mine - Total	Year Nº 2009 - 2010	Year Nº 2011 - 2012	Year Nº 2013 - 2014	Year Nº 2015 - 2016	Year Nº 2017 - 2018	Year Nº 2019 - 2020	Year Nº 2021 - 2022	Year Nº 2023 - 2024	Year Nº 2025 - 2026	Year Nº 2027 - 2028	Year Nº 2029 - 2030	Year Nº 2031 - 2032	Year Nº 2033 - 2034	Comments
1	**Dismantling of Process Plant and associated Structures**	R				**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	**12,841,835.06**	Plant - Assumed 15m Height (DCM Master Rate); Conveyor - DME Master Rate
	Plant	m^2	26.00	1	1	**490,140.00**	490,140.00	490,140.00	490,140.00	490,140.00	490,140.00	490,140.00	490,140.00	490,140.00	490,140.00	490,140.00	490,140.00	490,140.00	490,140.00	
	Conveyors	m^2	8.57	1	1	**11,458.00**	11,458.00	11,458.00	11,458.00	11,458.00	11,458.00	11,458.00	11,458.00	11,458.00	11,458.00	11,458.00	11,458.00	11,458.00	11,458.00	
2(A)	**Demolition of steel buildings and structures (including Floor Slabs)**	R				**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	**169,425.00**	
	Stores and Workshop at Plant	m^2	150.00	1	1	**300.00**	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	
	Workshop at Mine	m^2	150.00	1	1	**376.50**	376.50	376.50	376.50	376.50	376.50	376.50	376.50	376.50	376.50	376.50	376.50	376.50	376.50	Plant - Assumed 15m Height (DCM Master Rate)
	Stores at Mine	m^2	150.00	1	1	**104.50**	104.50	104.50	104.50	104.50	104.50	104.50	104.50	104.50	104.50	104.50	104.50	104.50	104.50	
	Warehouse at Mine	m^2	150.00	1	1	**348.50**	348.50	348.50	348.50	348.50	348.50	348.50	348.50	348.50	348.50	348.50	348.50	348.50	348.50	
	ha Disturbed	ha				**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	
	ha Rehabilitated	ha																		
2(B)	**Demolition of Reinforced Concrete Buildings and Structures including Processing Plant and Related Structures**	R				**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	**11,699,964.00**	
	Potable Water Tanks (3)	m^3	648.00	1	1	**37.50**	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	Assuming medium concrete thickness between 750 and 250mm (DCM Master Rate)
	Raw Water Tanks (3)	m^3	648.00	1	1	**2,118.00**	2,118.00	2,118.00	2,118.00	2,118.00	2,118.00	2,118.00	2,118.00	2,118.00	2,118.00	2,118.00	2,118.00	2,118.00	2,118.00	
	Settling Ponds (3)	m^3	648.00	1	1	**7,500.00**	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	
	Silt Traps (3)	m^3	648.00	1	1	**7,500.00**	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	
	Water Purification Structures	m^3	648.00	1	1	**900.00**	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	
	ha Disturbed	ha				**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	**1.81**	
	ha Rehabilitated	ha																		
3	**Rehabilitation of Access Roads (Surfaces Roads)**	R				**3,727,516.00**	**1,835,288.00**	**1,835,288.00**	**1,835,288.00**	**1,835,288.00**	**1,835,288.00**	**1,835,288.00**	**1,835,288.00**	**3,727,516.00**	**3,727,516.00**	**3,727,516.00**	**3,727,516.00**	**3,727,516.00**	**3,727,516.00**	
	Roads (8m wide) - Opencast Contractors	m^2	52.00	1	1	**13,161.00**	13,161.00	13,161.00	13,161.00	13,161.00	13,161.00	13,161.00	13,161.00	13,161.00	13,161.00	13,161.00	13,161.00	13,161.00	13,161.00	
	Roads (8m wide) - Plant to Box A & B Entrance	m^2	52.00	1	1	**22,133.00**	22,133.00	22,133.00	22,133.00	22,133.00	22,133.00	22,133.00	22,133.00	22,133.00	22,133.00	22,133.00	22,133.00	22,133.00	22,133.00	Assuming the removal and disposal of low grade tar roads (DCM Master Rate)
	Roads (8m wide) - Gate to Box C Entrance	m^2	52.00	1	1	**36,389.00**								36,389.00	36,389.00	36,389.00	36,389.00	36,389.00	36,389.00	
	ha Disturbed	ha				**7.17**	**3.53**	**3.53**	**3.53**	**3.53**	**3.53**	**3.53**	**3.53**	**7.17**	**7.17**	**7.17**	**7.17**	**7.17**	**7.17**	
	ha Rehabilitated	ha																		
5	**Demolition of Housing and Facilities (Including Floor Slabs**	R				**976,993.00**	**976,993.00**	**976,993.00**	**976,993.00**	**976,993.00**	**976,993.00**	**976,993.00**	**976,993.00**	**976,993.00**	**976,993.00**	**976,993.00**	**976,993.00**	976,993.00	**976,993.00**	
	Security (All Locations)	m^2	298.00	1	1	**435.00**	435.00	435.00	435.00	435.00	435.00	435.00	435.00	435.00	435.00	435.00	435.00	435.00	435.00	
	Change House	m^2	298.00	1	1	**609.00**	609.00	609.00	609.00	609.00	609.00	609.00	609.00	609.00	609.00	609.00	609.00	609.00	609.00	
	Lamp Room and Crush	m^2	298.00	1	1	**274.50**	274.50	274.50	274.50	274.50	274.50	274.50	274.50	274.50	274.50	274.50	274.50	274.50	274.50	
	Administrative Buildings	m^2	298.00	1	1	**676.00**	676.00	676.00	676.00	676.00	676.00	676.00	676.00	676.00	676.00	676.00	676.00	676.00	676.00	
	Medical Facility	m^2	298.00	1	1	**91.00**	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	
	Service Ramp	m^2	298.00	1	1	**222.50**	222.50	222.50	222.50	222.50	222.50	222.50	222.50	222.50	222.50	222.50	222.50	222.50	222.50	DCM Master Rates Utilised
	Substation 1	m^2	298.00	1	1	**397.00**	397.00	397.00	397.00	397.00	397.00	397.00	397.00	397.00	397.00	397.00	397.00	397.00	397.00	
	Substation 2	m^2	298.00	1	1	**338.50**	338.50	338.50	338.50	338.50	338.50	338.50	338.50	338.50	338.50	338.50	338.50	338.50	338.50	
	Office Buildings at Plant	m^2	298.00	1	1	**150.00**	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	
	Laboratory at Plant	m^2	298.00	1	1	**25.00**	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	
	Change House at Plant	m^2	298.00	1	1	**60.00**	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	
	ha Disturbed	ha				**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	**0.33**	
	ha Rehabilitated	ha																		
6	**Opencast Rehabilitation (Including Final Voids and Ramps)**	R				**802,756.24**	-	**2,789,335.54**	**2,990,862.26**	**3,364,475.61**	**3,411,897.87**	**3,781,675.51**	**917,126.87**	**802,756.24**	**802,756.24**	**802,756.24**	**802,756.24**	**802,756.24**	**802,756.24**	
	Disturbed																			
	Opencast Pit Nº 1	ha	140,342.00	0.52	1	**9.40**	-	33.58	62.92	94.32	129.11	160.54	163.51	163.51	163.51	163.51	163.51	163.51	163.51	
	Opencast Pit Nº 2	ha	140,342.00	0.52	1	**1.60**	-	20.86	51.49	90.30	127.01	177.22	177.38	177.38	177.38	177.38	177.38	177.38	177.38	DME Master Rates Utilised
	Rehabilitated																			
	Opencast Pit Nº 1	ha	140,342.00	0.52	1		-	7.39	38.85	69.22	102.31	135.42	152.62	154.11	154.11	154.11	154.11	154.11	154.11	
	Opencast Pit Nº 2	ha	140,342.00	0.52	1		-	8.83	34.58	69.30	107.05	150.52	175.70	175.78	175.78	175.78	175.78	175.78	175.78	
	ha Disturbed	ha				**11.00**	-	54.44	**114.41**	**184.62**	**256.12**	**337.76**	340.89	**340.89**	**340.89**	**340.89**	**340.89**	**340.89**	**340.89**	
	ha Rehabilitated	ha						16.22	**73.43**	**138.51**	**209.37**	**285.94**	328.33	**329.89**	**329.89**	**329.89**	**329.89**	**329.89**	**329.89**	
8(B)	**Rehabilitation of Processing Waste Deposits and Evaporation Ponds (Basic, Salt Producing Waste)**	R				**4,049,417.94**	**87,397.51**	**6,914,855.99**	**6,914,855.99**	**6,332,205.93**	**5,353,353.82**	**8,651,561.04**	**7,672,708.93**	**6,693,856.82**	**5,715,004.72**	**6,998,105.03**	**6,019,252.93**	**5,040,400.82**	**4,049,417.94**	
	Co-Disposal Facility (DCM commits in providing for the area that will be utilised in the first 10 years - it should be noted that annual assessment for the quantum will be undertaken - should areas change during these assessments, the necessary adjustments will be incorporated)	ha	116,530.01	1	1	**34.0**	-	58.6	58.6	58.6	58.6	95.3	95.3	95.3	95.3	114.7	114.7	114.7	114.7	
	Settling Ponds (3)	ha	116,530.01	1	1	**0.75**	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	DME Master Rates Utilised
	ha Disturbed	he				**34.75**	**0.75**	**59.34**	**59.34**	**59.34**	**96.04**	**96.04**	**96.04**	**96.04**	**96.04**	**115.45**	**115.45**	**115.45**	**115.45**	
	ha Rehabilitated	ha					-	-	-	**5.0**	**13.4**	21.8	**30.2**	**38.6**	**47.0**	**55.4**	63.8	**72.2**	**80.7**	
	Dump Construction																			
	Discard Placement	ha						58.6	58.6	58.6	58.6	95.3	95.3	95.3	95.3	114.7	114.7	114.7	114.7000000	
	Discard Compaction	ha					-	58.6	58.6	58.6	58.6	95.3	95.3	95.3	95.3	114.7	114.7	114.7	114.7000000	
	Discard Cladding (Top-Soil & Seeding)	ha								5.0	13.4	21.8	30.2	38.6	47.0	55.4	63.8	72.2	80.7000000	
8(C)	**Rehabilitation of Processing Waste Deposits and Evaporation Ponds (Acidic, Metal-Rich Waste)**	R				**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	**203,075.03**	
	Silt Traps (3)	ha	338,548.38	0.80	1	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	DME Master Rates Utilised
	ha Disturbed	ha				**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	**0.75**	
	ha Rehabilitated	ha																		

Appendix E: Rehabilitation Plan



rsv enco
FOR INFORMATION ONLY

ISSUED FOR CLIENT APPROVAL — REV A

PROJECT: TOTAL COAL
AREA: DORSTFONTEIN EAST MINE
TITLE: MINING PLAN
OPENCAST AREA DISTURBANCE
REHABILITATION SCHEDULE

RSV DRG No. 401-004-000-S-001-89-A
SCALE N.T.S.

TOTAL

Y:\Projects\Cadd\0401-0004\Total-Dorstfontein EPCM\2D Drawings\Sketches\401-004-000-S-001-89-A.dwg, 2009/07/30 15:41:07, ISO expand A3 (420.00 x 297.00 MM), 1:3.05369