Environmental Impact Significance Determination

CONSTRUCTION PHASE

Activity, Phase and Impact					Impact Rating (before mitigation)									Impact Rating (after mitigation)						
Impacted Environment	Phase impact occurs (C, O, D, PC)	Activity No.	Activity	Summary of Impact	Reference in EIA	Nature of Impact (positive / Negative	Extent (5)	Duration (5)	Severity (5)	Probability (5)	Consequence (15)	Significance (75)	Mitigation Measures	Nature of Impact (positive / Negative	Extent	Duration	Severity	Probability	Consequence	Significance (75)
Biophysical Impacts																				
Geology	C,O	6	Establishment of initial boxcut and access ramps	Rock and overburden will be removed, permanantly altering the geology	7.3	N	1	5	3	5	9	45	No mitigation will be possible	N	1	5	3	5	9	45
Topography	C,O,D, PC	4 & 6	Site clearing and topsoil removal and Establishment of initial boxcut and access ramps	The natural lie of the land will be altered. This alteration of the land will have further impacts on surface water flow dynamics as the natural drainage pattern is disrupted.	7.2/ 11.3.1	N	1	3	4	5	8	40	Divert surface water flow around the obstruction. Draw up post mining rehabilitation plan prior to construction in order to comply with the established goals and objectives. Confine construction to designated areas.	N	1	3	3	5	7	35
Soil	C	2	Transport of construction material	Compaction of soil	7.4/ 11.3.2	N	3	1	4	5	8	40	All vehicles must be restricted to roads	N	3	1	3	5	7	35
	C,O	4&5	Site clearing and topsoil removal and construction of infrastructure.	Compaction of soil, erosion of exposed areas and decrease in available land for agricultural practices.		N	2	4	5	5	11	55	Compile accurate soil map showing classification, thickness, fertility status. Remove and stockpile 0.3 m-0.35 m topsoil in berms or heaps less than 2 - 3 m high. Do not use as storm water control feature. Vegetate with diverse grass mix to control erosion. Wetland soils should only be stockpiled at heights of 1 - 2 m. Subsoil stockpiles can be bigger but must be protected against erosion similar to topsoil stockpiles. Ensure that a storm water management plan is implimented.Focus developments and avoid un-necessary subdivision of land and activities that could be sited on already disturbed land. Vehicles to keep to within designated areas	N	1	4	4	5	9	45
	C	7	Temporary waste and sewage handling and treatment	Potential for hydrocarbons and waste to comtaminate soil, which can then impact on surface water and vegetation growth		N	2	1	3	3	6	18	Store waste in bunded areas, regular removal of waste off site and reporting of any spillages. Adhere to emergency response plan in the case of a spill and rehabilitated contaminated soil	N	2	1	2	2	7	14
	C	6	Establishment of initial boxcut and access ramps	Compaction of areas surrounding box cut. Loss of arable soil.		N	1	4	4	5	9	45	All vehicles must be restricted to roads. Area of disturbance must be restricted to that of the mine plan. Storm water diversion and erosion control contour berms separate clean and contaminated water systems around the pit and infrastructure areas. Design erosion control and diversion berms, terraces or drains with the runoff for a particular soil type and slope gradient	N	1	4	4	5	9	45
	C,O	3 & 9	Storage of fuel, lubricant and explosives	Possible contamination of surface water due to incorrect handling and spillages		N	2	4	4	3	10	30	Berms and trenches should be constructed to divert clean water away from the workings and collect and contain potentially contaminated water. Pollution control facilities should be constructed to contain all polluted rainfall for the 1:50 year flood conditions. Materials capable of resulting in poor quality leachates should be not be used for the construction of roads or other infrastructure.	N	2	4	3	3	12	36

Surface water	C,O	4	Site clearing and topsoil removal	Site clearing will change the surface flow dynamics of the site. Surface flow off exposed soils will contribute to siltation of streams.	7.5/ 11.3.3	N	2	3	3	4	8	32	Soil stockpiles must be vegetated as soon as possible. Construction of stockpiles close to streams should take place in the dry season. Monitoring of surface water must be undertaken.	N	2	3	2	3	7	21
	C	5 & 6	Construction of surface infrastructure and establishment of initial box cut and access ramps	Reduction in base flow and in catchment area size and a change in flow dynamics		N	3	4	4	4	11	44	Clean and dirty water separation must be undertaken and clean water areas must be maximised. Reuse of inpit/dirty water needs to be maximised	N	3	4	3	4	10	40
	C,O	7	Temporary waste and sewage handling and treatment	Possible contamination of surface water due to incorrect handling and spillages		N	2	2	4	4	8	32	Maintenance of facilities must occur.Appropriate sewage & waste management facilities should be planned and constructed. Monitoring to take place to check for problem areas. Spillages to be reported and action plans implemented. Waste to be stored in bunded areas.	N	2	1	3	3	6	18
Groundwater	C,O &D	3	Storage of fuel, lubricant and explosives	Contamination of surface water due to infrastructure failure (emergency), leakage or spillages during normal operation and a	7.6/11. 3.4	N	2	2	3	3	7	21	All hydrocarbons, lubricants and explosives should be adequately stored and bunded off to prevent any contamination to the groundwater during an accidental spill.	N	1	2	2	3	5	15
	C	6	Establishment of initial boxcut and access ramps	Negative effect on the surrounding aquifers cause lowering of water levels in boreholes		N	1	1	5	5	7	35	No mitigation will be possible	N	1	1	3	3	8	24
Air Quality	C,O	4,5 & 6	Site clearing and topsoil removal ,construction of infrastructure, establishment of box cut	Increased vehicle movement on site and the clearing of topsoil to expose subsoil's will increase the dust fallout on site and the PM10 levels	7.7/ 11.3.5	N	2	3	3	5	8	40	Removal of vegetation must be restricted to the area of disturbance. Topsoil stockpiles need to be vegetated. Dust fallout monitoring need to be implemented. Roads and construction site to be dampened using recycled water or adust binding agent.	N	1	3	2	4	6	24
Noise	C,O	2	Transport of construction material	The construction machinery will be a source of continuous noise through out the construction phase. Trucks bringing in equipment from elsewhere will affect receptors along the route.	7.8/ 11.3.6	N	3	2	2	4	7	28	Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers. Noisy machinery to be used during daylight hours preferably. Grievance mechanism to record complaints should be kept on site and investigated.	N	3	2	1	4	6	24
	C,O	4,5 & 6	Site clearing and topsoil removal, construction of infrastructure and establishment of initial boxcut and access ramps	The construction machinery will be a source of continuous noise through out the construction phase. The blasting activities (related to Activity 6) during the construction phase are also expected to impact on the ambient noise levels of the area. Receptors in the area are limited.		N	2	2	3	4	7	28	A noise barrier in the form of a berm should be constructed on the western as well as south eastern side of the proposed area of disturbance (as per current mine plan) so that it is situated between the main noise source and sensitive noise receptor . Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers	N	2	2	1	4	5	20
Air Blasting and Ground vibration	C, O	6	Establishment of initial boxcut and access ramps	Minimal blasting may be required for the development of the boxcut. Blasting activities could impact on local land users, fauna and sensitive receptors such as chicken farms and structurers	7.9/ 11.3.7	N	2	3	4	4	9	36	Strict controls will need to be imposed on surface initiation of any explosive as this will immediately induce undesirable effects into the surroundings. Reduced charges and control on stemming will be assisting in reducing the possibilities of complaints from home owners. The greater the distance between receptors and the blast the less is the influence.	N	2	3	3	3	8	24
	C	2	Transport of construction material	All heavy duty vehicles that transport materials and the general operating of vehicles, will increase dust and erosion occurrences, possible scare away fauna and compact the soil, thus impacting on subterranean fauna, eg moles &		N	3	1	3	5	7	35	All vehicles must be restricted to designated roads and covered is transporting goods or equipment that could become airborne.	N	3	1	2	4	6	24

Flora & fauna	C,O	3 & 7	Storage of fuel, lubricant and explosives and temporary waste and sewage handling	Incorrect, storage of these materials may result in the potential pollution of surface water and top soil resources due to spillages and leaks which may impact negatively on plants and subsequently animals.	7.10/ 11.3.8	N	1	1	2	3	4	12	Store waste in bunded areas, regular removal of waste off site and reporting of any spillages. Adhere to emergency response plan in the case of a spill and rehabilitated contaminated soil and re-vegetate. Monitor for any problem areas.	N	1	1	2	2	4	8
	C,O	4, 5 & 6	Site clearing and topsoil removal, construction of infrastructure and establishment of initial boxcut and access ramps	Existing vegetation will be removed to facilitate the construction of mining related infrastructure. The construction of discard dumps, pollution control dams, offices, sewage treatment facility and other infrastructure will increase the favourable habitat for alien invasive plant species, increase water runoff and decrease water infiltration.		N	1	3	3	5	7	35	Removal of vegetation during stripping and construction will be minimised to reduce the erosion potential. Topsoil will only be removed off areas proposed for immediate mining or construction as in accordance to the conceptual mine plan	N	1	3	2	5	6	30
Wetlands	C	2	Transport of construction material	Increasing the potential for erosion and sedimentation during rainfall periods from use of informal dirt roads. Increase the potential of spillages and leaks from operating vehicles into the wetland systems which would impact on water quality.	7.12/ 11.3.10	N	3	1	2	4	6	24	Use of existing roads. Maintenance of vehicles. Maintenance of roads and proper drainage off roads.	N	3	1	1	4	5	20
	C,O,D	3 & 7	Storage of fuel, lubricant and explosives and temporary waste and sewage handling	Incorrect, inadequate or negligent storage of these materials may result in the potential pollution of surface water resources due to pollutant and toxicant spillages and leaks which may impact negatively the water quality and ecological functioning of the systems		N	1	3	3	4	7	28	The storage of materials and substances will be housed in suitable facilities. Management of these facilities.	N	1	3	2	3	6	18
	C,O	4 & 6	Site clearing and topsoil removal and establishment of initial boxcut and access ramps	Increase the potential load of sedimentation of the water resources . Erosion of exposed surfaces. The removal of the topsoil and vegetation reduces the potential for recharge of shallow aquifers that feed hillslope wetlands, which in turn reduces the flow in water resources. Possible dewatering of aquifers and loss of perched aquifer and interflow between certain wetland areas.		N	2	4	5	5	11	55	Keep footprint area as minimal as possible. Vegetate all stockpiles and berms. Minimise vegetation removal. Limited mitigation available for affecting aquifers.	N	2	4	5	4	11	44
	C	5	Construction of surface infrastructure	The reduction in the seepage potential of the catchment will result in a decrease in surface water quantity reporting to the downstream system. The reduction in water quantity will in turn result in a loss of wetland areas due to these areas being "starved" of water, as well as wetland areas being reduced and ecological functioning inhibited.		N	2	1	1	4	4	16	Introduction of a Storm water Management Plan	N	2	1	1	2	4	8
Social Impacts																								
Socio-economic	C,O	1	Recruitment, procurement and employment	Employment opportunities to the local area will be minimal., however there will be indirect employment and economic opportunities and it will provide further opportunities for small business in the area to contract services to the mine	7.15/ 11.3.13	P	3	3	2	4	8	32	The mine must attempt to contract small business from the local area.	P	3	3	3	4	9	36

Local economic development (LED)	C,O	1	Recruitment, procurement and employment	The LED initiative to establish a small maize milling and distribution B.E.E business, purchasing from local small scale or subsistence farmers and selling processed maize products directly to communities or through a network of local agents. This initiative will employ approximately eight people with further opportunities for the employment of agents in outlying areas.		P	2	4	3	4	9	36	Positive impact will be implemented through LED initiative as part of Social and Labour Plan and local development and need to be managed.	P	2	4	4	4	10	40
Visual	C,O,D	2	Transport of construction material	Increased transportation will directly affect the visual environment to people on site and receptors along the transport routes	7.13/ 11.3.11	N	3	2	2	4	7	28	Dirt roads need to be wet by a water dowser so as to reduce dust plumes. Avoid transporting goods at night.	N	3	2	1	4	6	24
	C,O,D	4 & 6	Site clearing and topsoil removal and establishment of initial boxcut and access ramps	The project site will become noticeable as it will be in stark contrast to surrounding areas		N	2	3	3	5	8	40	Minitation is limited. Erect berms in order to shield visual affects. Rehabilitate area as soon as possible. Use muted colours for buildings. Over time, people will adjust to the visual intrusion, thus reducing the severity.	N	2	3	2	5	7	35
	C,O,D	5	Construction of surface infrastructure	Agricultural land-use is transformed to that of mining. Once the infrastructure is established and lighting installed there will be light pollution in the evenings		N	3	3	3	5	9	45	To reduce the visual impact of permanent structures, colours for roofing, walls etc should be of a matt finish to reduce reflection. The colour chosen should be one that softens the visual impact, colours that are suited to the natural tones in the area, such as pastel browns and greens. Avoid up lighting of structures but rather direct the light downwards and focussed on the object to be illuminated.	N	2	3	2	5	7	35
Traffic	C,O	2	Transport of construction material	Increase of vehicular activity on site and the traffic to the site	7.13/ 11.3.11	N	3	2	3	5	8	40	Speed limits bust be adhered to and must be placed on site. It must be assessed if safety intersections are required. Grievance mechanism initiated to record complaints.	N	3	2	2	4	7	28
Cultural and Heritage Impacts																			
Site 3 & 4: Cemetery	C,O,D	2,4,5 & 6	All activities associated with construction phase	No foreseen impact as cemeteries are located just outside the mining area	7.11/ 11.3.9	N	1	3	1	1	5	5	Currnelty no mitigation is required. In the event o fpossibl eimpacts from mining encroaching onto the neighbouring farm, the sites should be fenced.	P	1	3	1	1	5	5
Site 2: Historical Structure	C,O,D	2,4,5 & 6	All activities associated with construction phase	Due to the location of infrastructure required may result in the need to demolish the structure for the purpose of development		N	1	3	1	1	5	5	Prior to site construction, a historical archaetecht must evaluate the structure to determine if a permit is required for demolition.	N	1	3	1	1	5	5
Site 1: Cemetery	C,O,D	2	Transport of construction material	No foreseen impact as cemeteries are located just outside the area of disturbance.		N	1	3	1	1	5	5	20meter buffer must be placed around the cemetery and the area must be fenced off. Access must be granted to relatives	P	1	3	1	1	5	5
Findings of un-documented archaeological sites, artefacts	C,O	4, 6	Site clearing and establishment of initial box cut	Archaeological artefacts or sites may be located subsurface and can be destroyed during mining activities		N	1	3	2	2	6	12	In the event of the finding of archaeological artefacts subsurface or that have not been documented an archaeologist will need to be contacted immediately to identify, assess and document the discovery.	P	1	3	2	2	6	12

Significance	
High	**57 - 75**
Medium-High	**38 - 56**
Medium-Low	**19 - 37**
Low	**0 - 18**

C - Construction Phase
O - Operational Phase
D - Decommissioning Phase
PC - Post Closure Phase

Environmental Impact Significance Determination

OPERATIONAL PHASE

Activity, Phase and Impact					Impact Rating (before mitigation)									Impact Rating (after mitigation)						
Impacted Environment	Phase impact occurs (C, O, D, PC)	Activity No.	Activity	Summary of Impact	Reference in EIA	Nature of Impact (positive / Negative	Extent (5)	Duration (5)	Severity (5)	Probability (5)	Consequence (15)	Significance (75)	Mitigation Measures	Nature of Impact (positive / Negative	Extent	Duration	Severity	Probability	Consequence	Significance (75)
Biophysical Impacts																				
Geology	O	12	Coal removal	The coal will be removed, permanently altering the geology	7.3	N	1	5	3	5	9	45	No mitigation will be possible	N	1	5	3	5	9	45
Topography	O,D	10	Topsoil and overburden removal and stockpiling	The natural lie of the land will be altered. This alteration of the land will have further impacts on surface water flow dynamics as the natural drainage pattern is disrupted. Alteration of slope direction and slope percentages, thus creating the potential for erosion.	7.2/ 11.3.1	N	2	3	4	5	9	45	Mitigation is limited and is covered under soil and surface water	N	2	3	4	5	9	45
	O,D	16	Discard dump	Altering slope direction and percentages, thus creating the potential for erosion. Possibility of the siltation of drainage networks.		N	1	3	4	5	8	40	Engineering design to be adhered to to ensure slopes are stable and dump is rehabilitated effectively	N	1	3	3	5	7	35
	O,D	19	Concurrent replacement of overburden and topsoil an re-vegetation	Improvement of natural surface flow dynamics.		P	1	2	3	4	6	24	Replacement of overburden and topsoil but occur as soon as possible. Rehabilitated areas must be contoured .	P	1	2	3	5	6	30
Soil	O	10	Topsoil and overburden removal and stockpiling	Compaction of soil, erosion of exposed areas and decrease in available land for agricultural practices. Natural soil horizons are destroyed.	7.4/ 11.3.2	N	1	3	5	5	9	45	Compile accurate soil map showing classification, thickness, fertility status. Remove and stockpile 0.3 m- 0.35 m topsoil in berms or heaps less than 2 - 3 m high. Do not use as storm water control feature. Vegetate with diverse grass mix to control erosion. Wetland soils should only be stockpiled at heights of 1 - 2 m. Subsoil stockpiles can be bigger but must be protected against erosion similar to topsoil stockpiles. Ensure that a storm water management plan is implemented.	P	1	3	4	5	8	40
	O,D	13	Vehicular activity on haul roads	Compaction of soil, erosion of exposed areas and soil contamination.		N	1	3	4	5	8	40	All vehicles must be restricted to roads and designated areas. All coal haul trucks must be covered. Maintenance and refuelling must occur on hard park surfaces and if not drip trays must be placed under vehicles parked on exposed soil.	P	1	3	3	5	7	35
	O,D	19	Concurrent replacement of overburden and topsoil and re-vegetation	Improved integration between soil an vegetation. Possible erosion of rehabilitated areas in the event that revegetation does not occur. Soil properties have been altered.		P	1	3	4	4	8	32	Rehabilitation must ensure long-term stability and not compromise post-mining land use objectives. Ensure monitoring and remediate if necessary soil fertility, soil acidity and depths	P	1	3	4	5	8	40
	O	9	Storage of fuel , lubricant and explosives	Risk of contamination of surface water resources from improper storage, incorrect handling and spillages		N	1	3	3	3	7	21	A hydrocarbon and chemical management standard operating procedure	P	1	2	2	3	5	15

Surface Water	O	10	Topsoil and overburden removal and stockpiling	Long term stockpiling of overburden resulting in prolonged exposure may result in the the potential of Acid Mine Drainage concurring . As rehabilitation is undertaken it will alter the flow dynamics of the area and exposed soil will be come susceptible to soil erosion which could result in siltation of surface water bodies	7.5/ 11.3.3	N	3	4	5	4	12	48	All water from overburden stockpiles must be collected and treated as dirty water . Soil stockpiles must be vegetated as son as possible. During rehabilitation exposed areas must be vegetated.	P	2	3	4	3	9	27
	O	14	Water use around site	water use from a stressed water source will impact on the availability of water for existing users		N	2	3	4	4	9	36	Water recycling must be maximised.	P	2	3	3	3	8	24
	O	15	Screening and washing	Runoff from the plant area could result in in the contamination of surface water.		N	2	3	4	4	9	36	The plant must be constructed on an impermeable surface and all waste water resulting from the process must be collected and reused. All runoff from the plant area must be collected and treated as dirty water	P	2	3	2	3	7	21
	O,D,PC	16	Discard dump	Potential contamination of surface water from seepage and runoff from the discard dump		N	3	5	5	4	13	52	The discard dump must be designed correctly in order to prevent seepage and containment of run off	P	2	3	4	4	9	36
	O, D, PC	17	Pollution control dams	Possible contamination of surface water due to leakages or spillages from pollution control dams		N	3	4	4	4	11	44	Pollution control should be lined and maintained. They must be constructed in terms of DWAF BPG to ensure sufficient freeboard.	P	2	4	3	3	9	27
	O,D	18	Waste and sewage generation and disposal	Possible contamination of surface water incorrect disposal and handling of waste and sewage disposal		N	2	3	3	3	8	24	Waste disposal facilities must be correctly managed and maintained. Sewage disposal facilities must be monitored to ensure correct operation.	P	2	2	2	2	6	12
Groundwater	C,O& D	9	Storage of fuel, lubricant and explosives	Possible contamination of groundwater through incorrect storage of, fuel and lubricants as well as through potential spillages	7.6/11. 3.4	N	2	3	3	5	8	40	All hydrocarbons, lubricants and explosives should be adequately stored and bunded off to prevent any contamination to the groundwater during an accidental spill.	N	1	3	2	4	6	24
	O & D	10	Topsoil and overburden removal and stockpiling	Infiltration runoff from stockpiles, resulting in groundwater contamination		N	1	2	3	5	6	30	The stockpile footprint should be compacted to prevent infiltration of contaminated water into the sub-surface. Runoff from stockpiles must be contained and managed.	N	1	2	2	5	5	25
	O	12	Coal removal	Impact on groundwater quality		N	2	5	5	5	12	60	No mitigation will be possible	N	2	5	5	5	12	60
	C, O & D	14	Water use around site	Rreduction of the recharge of aquifers and the lowering of the water table affecting water quantity		N	1	3	1	5	5	25	Grey water should be collected into a dirty water system and recycled.	N	1	3	1	5	5	25
	O	15	Screening and washing	Groundwater contamination		N	1	3	2	5	6	30	Dirty water should be collected and pump to pollution control dams.	N	1	3	1	5	5	25
	O &D	16	Discard dumps	Contaminated water from infiltrating to aquifers		N	2	4	5	5	11	55	The discard dump footprint should be compacted and lined to prevent infiltration of contaminated water into the sub-surface. Water collected from penstock should be pump back to pollution control dams. Runoff from discard dump must be contained and managed. Monitoring boreholes must be drilled and sampled to detect any contamination	N	1	5	3	4	9	36

	O &D	17	Pollution control dams	Contaminated water from infiltrating to aquifers		N	2	3	3	3	8	24	Pollution control dams should be lined to prevent infiltration to aquifers. Water level in pollution control dam should always have a 0.8m freeboard available during a 1:50 year flood event.	N	2	1	2	3	5	15
	C, O & D	18	Waste and sewage generation and disposal	Grounwater contamination through spillages and inadequate waste handling		N	2	3	3	5	8	40	All waste storage areas should be adequately stored and bunded off to prevent any contamination to the groundwater during an accidental spill or leaks. Sewage should be collected by an authorized contractor and disposed of at a licensed waste disposal site	N	1	3	2	4	6	24
	O & D	19	Concurrent replacement of overburden and topsoil and revegetation	AMD formation		P	1	3	2	5	6	30	Material with acid generating potential should be backfilled in areas were flooding is possible to reduce the risk of AMD polluting the underlying dolomites. It is strongly recommended that high acid generating potential material should not be backfilled and rather kept on the discard dump were management options are easier.	P	1	3	2	5	6	30
Air Quality	O,D,PC	10, 11 & 19	Topsoil and overburden removal and stockpiling, drilling and blasting and discard dump	The movement and placing of soil will contribute to dust levels. Exposed soil will also contribute to dust levels. Blasting activities will contribute to dust levels. The coal discard dump will result in windblown coal dust	7.7/ 11.3.5	N	2	4	3	5	9	45	Stockpiles must be vegetated if they are to remain for a long period of time. Once soils have been replaced they should be watered to reduce the loss of soil from wind and increase in dust. Vegetation must be encouraged on all exposed soil surfaces. Dust monitoring to continue throughout operations. The discard dump should be rehabilitate as soon as possible	N	2	4	2	3	8	24
	O,D	13	Vehicular activity on haul roads	Continual vehicular movement on haul roads will contribute to dust levels. Wind blow coal dust can occur during transportation of coal.		N	2	3	4	4	9	36	Haul roads need to be sprayed with water twice daily to reduce dust, or must be treated during the dry season. Coal haul trucks must be covered while transporting coal.	P	2	3	3	3	8	24
Noise	O,D	10, 12, 13& 19	Topsoil and overburden removal and stockpiling, coal removal, vehicular activity on haul roads, concurrent replacement of overburden and topsoil and revegetation	The excavators and haul trucks and other construction machinery which will be a source of continuous noise throughout the operational phase	7.8/ 11.3.6	N	2	3	2	4	7	28	Rehabilitation must ensure long-term stability and not compromise post-mining land use objectives. Ensure monitoring and remediate if necessary soil fertility, soil acidity and depths	P	2	3	1	4	6	24
	O	11	Drilling and blasting of hard overburden	The blasting activities are expected to impact on the ambient noise levels of the area. The blasting and drilling activities will be the highest noise producing source during the operational phase.		N	3	3	4	5	10	50	limited to daylight hours when ambient noise levels are highest. Reduction of the powder factor, that is, use of less explosive per cubic yard of overburden; Restriction of blasting to daylight hours are mitigation measures that should be followed .The use of millisecond delays between rows of blast holes in a given blasting pattern in order to reduce the amount of explosive charge detonated at any given instant is recommended.	P	3	3	2	5	8	40
	O	15	Screening and washing	Localized impact and is expected not to extend beyond the site boundary		N	1	3	2	2	6	12	Optimum location of plant, away from nearest sensitive receptors. Noise barriers in the form of screens installed at various positions around the wash plant.		1	3	1	2	5	10

Air blasting and ground vibration	O	11	Drilling and blasting of hard overburden	Air blasting could result in fly rock. Blasting activities could be come problematic to near by chicken farms. Ground vibration can result in damage to infrastructure. Blasting activities also contribute to both noise and dust fallout levels.	7.9/ 11.3.7	N	3	3	5	4	11	44	Strict controls will need to be imposed as well on surface initiation of any explosive as this will immediately induce undesirable effects into the surroundings. Reduced charges and control on stemming will be assisting in reducing the possibilities of complaints from home owners. The greater the distance between receptors and the blast the less is the influence.	N	3	3	4	4	10	40
Flora & fauna	C,O	10	Topsoil and overburden removal and stockpiling	The removal of topsoil and overburden will result in stockpiling of the material which will increase the potential of the stockpiles becoming eroded as a result of winds and rain moving across the areas	7.10/ 11.3.8	N	1	2	3	4	6	24	Removal of vegetation during stripping will be minimised to reduce the erosion potential. Topsoil will only be removed off areas proposed for immediate mining as in accordance to the conceptual mine plan. Stockpiles will conform to best practice guidelines to reduce erosion risk	N	1	2	2	3	5	15
	O,D	13	Vehicular activity on haul roads	The vehicular activity will result in the creation of dust and coal dust which will increase the deposits these materials on plant leaves, blocking stomata and inhibiting evapotranspiration.		N	1	2	2	4	5	20	Coal haulage trucks must be covered. Dust suppression must be undertaken.		1	2	2	3	5	15
	O,D, PC	19	Concurrent replacement of overburden and topsoil and re-vegetation	The replacement of overburden and topsoil may result in the reduction of available space for alien invasive species, soil erosion and soil compaction. May also will create favourable habitat for indigenous plant species, and promote rehabilitation efforts.		P	1	2	3	4	6	24	Once overburden and topsoil has been place on the area seeding must be undertaken as soon as possible with grasses such as a standard seed-mix . Any alien invasive species that establish them selves in rehabilitated areas must be removed. If compaction of the areas occur they must be ripped to encourage plant growth. Rehabilitated areas must be monitored and maintaining to prevent soil erosion as stipulated in the rehabilitation plan that is compiled as part of the closure plan for the mine.	P	1	2	4	5	7	35
	O,D	9 & 18	Storage of fuel, lubricant and explosives and waste ad sewage generation and disposal	Incorrect, storage of these materials may result in the potential pollution of surface water and top soil resources due to spillages and leaks which may impact negatively on plants and subsequently animals.		N	1	3	3	3	7	21	Store waste in bunded areas, regular removal of waste off site and reporting of any spillages. Adhere to emergency response plan in the case of a spill and rehabilitated contaminated soil and re-vegetate. Monitor for any problem areas.	N	1	3	2	2	6	12
	O,D	9 & 18	Storage of fuel, lubricant and explosives and waste ad sewage generation and disposal	Incorrect, inadequate or negligent storage of these materials may result in the potential pollution of surface water resources due to pollutant and toxicant spillages and leaks which may impact negatively the water quality and ecological functioning of the systems.		N	2	3	3	3	8	24	The storage of materials and substances will be housed in suitable facilities and managed. Emergency reponse plan to be put in place if spillages occur.	N	2	3	2	2	7	14
	O	10	Topsoil and overburden removal and stockpiling	Increase the potential load of sedimentation of the water resources . Erosion of exposed surfaces. The removal of the topsoil and vegetation reduces the potential for recharge of shallow aquifers that feed hillslope wetlands, which in turn reduces the flow in water resources.		N	2	3	5	5	10	50	Keep footprint area as minimal as possible. Vegetate all stockpiles and berms. Minimise vegetation removal.	N	2	3	4	4	9	36
	O	12	Coal removal	Both soil and coal dust being created will increase the potential of excessive siltation. This will impact on the quality of water available in the wetland units as well as inhibit the ability of the wetland units to provide key ecological services. There will be a reduction on surface water quantity due to reduction in catchments size.		N	2	3	5	5	10	50	Dust suppression measures must be implemented. Monitoring undertaken to pick up any problme areas.	N	2	2	3	3	10	30
	O,D	13	Vehicular activity on haul roads	The creation of soil as well as coal dust which will increase the potential of excessive siltation of the wetland areas. . This will impact on the quality of water available in the wetland units as well as inhibit the ability		N	2	3	1	4	6	24	Dust suppression measures must be implemented. Coal haul trucks must be covered.	N	2	3	1	2	6	12

	O	14	Water use around site	May result in underground aquifers and/or opencast areas being pumped to make water available for use. This may decrease the lateral seepage potential of the area resulting in a reduction of wetland size and potentially wetland loss. Additionally, the use of dirty water from opencast areas may impact on the quality of water within the wetland systems .	7.12/ 11.3.10	N	2	3	4	4	9	36	A water and waste water management plan must be implemented.	N	2	3	2	3	7	21
	O,D,PC	16	Discard dump	Seepage from the discard dump into the underground aquifers may impact on the quality of water of these aquifers which in turn provide seepage to wetland areas. In spite of this seepage process providing some water quality enhancement ability, the seepage of impacted water quality from the discard dump may impact on wetland functioning as the quality of the impacted water may not be completely restored by the seepage process.		N	2	4	4	4	10	40	Placement of perforated pipes and cut-off trenches to capture and drain dirty water.	P	2	4	3	4	9	36
	O,D	19	Concurrent replacement of overburden and topsoil and revegetation	This will also allow for the seepage areas to be restored to maintain sub-surface flow dynamics and restore ecological functioning. Sedimentation of the water resources due to erosion of the rehabilitated areas will be limited through the revegetation of the area.		P	2	3	3	3	8	24	The soil profile will be replaced to represent the original make-up and structure. Exposed areas will be revegetated which will help with the recharge of the aquifer.	P	2	3	5	4	10	40
Social Impacts																				
Visual	O, D, PC	10	Topsoil and overburden removal and stockpiling	Overburden stockpiles and discard dumps are expected to be approximately 30m in height, and will contribute the most severe visual disturbance to surrounding receptors	7.13/ 11.3.11	N	3	3	3	5	9	45	Where possible stockpiles and overburden dumps should be kept as low as possible, rather make the dumps longer than higher. Establish vegetation where possible	N	2	3	3	5	8	40
Traffic	O,D	13	Vehicular activity on haul roads	Increase of vehicular activity on site and the traffic to the site	7.13/ 11.3.11	N	2	3	4	5	9	45	All speed and safety controls must be adhered to. All vehicular must be maintained. Safety intersections must be constructed if needed.	N	2	3	4	3	9	27
Socio-economic	O	7	Employment	Mine continues to support the local ecomonic sector through direct and indirect employment	7.15/ 11.3.13	P	2	3	3	4	12	48	Ensure skills training continues, increase employment where possible, employ local companies and contractors, liaise with the local community development officers	P	2	3	4	4	13	52
Cultural and Heritage Impacts																				
Findings of un-documented archaeological sites, artefacts	C,O	4, 6	Site clearing and establishment of initial box cut	Archaeological artefacts or sites may be located subsurface and can be destroyed during mining activities	7.11/ 11.3.9	N	1	3	2	2	6	12	In the event of the finding of archaeological artefacts subsurface or that have not been documented an archaeologist will need to be contacted immediately to identify, assess and document the discovery.	P	1	3	2	2	6	12

Significance	
High	**57 - 75**
Medium-High	**38 - 56**
Medium-Low	**19 - 37**
Low	**0 - 18**

C - Construction Phase
O - Operational Phase
D - Decommissioning Phase
PC - Post Closure Phase

Activity, Phase and Impact					Impact Rating (before mitigation)									Impact Rating (after mitigation)						
Impacted Environment	Phase impact occurs (C, O, D, PC)	Activity No.	Activity	Summary of Impact	Reference in EIA	Nature of Impact (positive / Negative	Extent (5)	Duration (5)	Severity (5)	Probability (5)	Consequence (15)	Significance (75)	Mitigation Measures	Nature of Impact (positive / Negative	Extent	Duration	Severity	Probability	Consequence	Significance (75)
Biophysical Impacts																				
Topography	D, PC	22	Final replacement of overburden, topsoil and revegetation	Restoration of natural surface flow dynamics. Possible surface subsidence and slumping. The discard dump remain a permanent feature and form part of the future topography	7.2/ 11.3.1	P	1	2	3	4	6	24	Rehabilitated areas need to be contoured. Monitor for sinkholes and drainage problems and act appropriately	P	1	2	4	5	7	35
Soil	D,PC	22	Final replacement of overburden, topsoil and revegetation	Compaction of soil, change in soil structure and fertility.	7.4/ 11.3.2	N	1	3	3	5	7	35	Revegetation must be undertaken with a adequate seed mix. Take into account developments in surrounding areas and design post-mining land use options to support and enhance long-term development options. Integrate available land with activities in adjacent areas.	P	1	3	4	5	8	40
	D, PC	23	Monitoring and rehabilitation	Monitoring of the rehabilitated areas to ensure erosion and soil loss is not occurring		P	1	2	3	4	6	24	Take into account developments in surrounding areas and design post-mining land use options to support and enhance long-term development options. Rehabilitation must ensure long-term stability and not compromise post-mining land use objectives.	P	1	2	4	4	7	28
Surface Water	D, PC	22	Final replacement of overburden, topsoil and revegetation	Siltation of surface water due to run off over exposed soils. Decant from the pit is possible and could result in AMD contaminated water entering surface water bodies	7.5/ 11.3.3	N	2	2	5	4	9	36	Exposed areas must be vegetated. The final decant point must be at level higher than the level of spoil replacement. Decant water to be contained.	N	2	2	3	3	7	21
	D	23	Waste and sewage disposal	Potential for surface water contamination if not removed off site		N	1	2	3	2	6	12	All waste must be removed off site for final disposal. All sewage handling facilities must be emptied and decommissioned.	N	1	1	2	2	4	8
Groundwater	PC	24	Post-closure monitoring and rehabilitation	Reduce ongoing negative impact on the groundwater environment		N	1	3	3	3	10	30	Groundwater monitoring should be ongoing for several years to determine what the long term impacts will be or to confirm predictions regarding post mine flooding and geochemical behavior.	P	1	3	2	3	9	27
Air Quality	D	21 & 22	Demolition of infrastructure and final replacement of overburden and topsoil and revegetation	These activities will result in the generation of increased dust fallout levels	7.7/ 11.3.5	N	1	1	2	4	4	16	Exposed areas must be vegetated. Demolition of infrastructure will be short lived.	N	1	1	1	2	3	6

Noise	D	21 &22	Demolition of infrastructure no longer required, final replacement of overburden and topsoil and revegetation	Machinery which will be responsible for demolition activities will be a source of noise during the decommissioning phase	7.8/ 11.3.6	N	2	1	2	4	5	20	Limiting demolition activities . Limiting demolition activities to daylight hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.	N	1	1	2	3	4	12
Flora & fauna	D	21	Demolition of infrastructure no longer required	Of concern here is the destruction of vegetation, creation of favourable habitat for fast growing invasive and ground compaction. Also of concern are the possible spillages from infrastructure holding hazardous material	7.10/ 11.3.8	N	1	1	4	4	6	24	Heavy vehicles will be restricted to areas where infrastructure is to be removed. Monitoring plan to chec for invasive species.	N	1	1	2	3	4	12
	D, PC	22	Final replacement of overburden and topsoil and revegetation	This may be considered to be a positive impact if implemented properly. The replacement of overburden and topsoil throughout the life of mine as well as the final replacement during the decommissioning phase may result in the restoration of the natural vegetation		P	1	2	4	4	7	28	Once overburden and topsoil has been place on the area seeding must be undertaken as soon as possible with grasses such as A standard seed-mix is 5 kg/ha of Smuts finger grass (Digitaria eriantha), 5 kg/ha of Rhodes grass (Chloris gayana) and 5 kg/ha of teff (Eragrostis tef). A second option is 10 kg/ha of love grass (Eragrostis curvula) and 5 kg/ha of teff. Any alien invasive species that establish them selves in rehabilitated areas must be removed. If compaction of the areas occur they must be ripped to encourage plant growth. Rehabilitated areas must be monitored and maintaining to prevent soil erosion as stipulated in the rehabilitation plan that is compiled as part of the closure plan for the mine.	P	1	2	5	5	8	40
Wetlands	D	21 & 23	Demolition of infrastructure no longer required & waste and sewage handling	May result in impacts to water quality through spillages and leaks. These spillages and leaks may be considered for infrastructure such as sewerage and waste facilities, toxicant, pollutant and fuel storage infrastructure and general vehicle use.	7.12/ 11.3.10	N	2	2	3	4	7	28	Correct and careful handling of the infrastructure housing pollutants and toxicants to prevent spillages and leaks. Vehicles must use existing roads.	N	2	1	1	2	4	8
	D,PC	22	Final replacement of overburden, topsoil and revegetation	May result in the restoration of the catchment size prior to being impacted on. This will restore the lost seepage areas and maintain sub-surface flow dynamics and restore ecological functioning.		P	2	3	5	4	10	40	The footprint of the area disturbed by the mining operation will have topsoil and overburden replaced to restore the total catchment area. The soil profile will be replaced to represent the original make-up and structure. Exposed areas will be vegetated.	P	2	3	5	5	10	50
Social Impacts																				
Socio-economic	D,PC	20	Retrenchment	Loss of employment and required services	7.15/ 11.3.13	N	2	5	4	5	11	55	The LED plan should be implemented to assist local business development. The workforce should be empowered to develop skills that will equip them to obtain employment in other sectors of the economy	P	2	5	3	3	10	30
Visual	D	21	Demolition of infrastructure no longer required	Increased transportation of removed infrastructure and machinery. The act of demolition will cause dust clouds . Removed infrastructure will no longer cause an impact	7.13/ 11.3.11	N	2	1	3	4	6	24	Dirt roads need to be wet by a water dowser so as to reduce dust plumes.	N	2	1	2	3	5	15
	D, PC	22	Final replacement of overburden, topsoil and revegetation	Revegitation will assist in making the noticeable area of disturbance to be reduced		P	2	1	3	4	6	24	Revegetation growth must be encouraged and monitored to ensure areas of soil loss and erosion do not occur.	P	2	1	3	5	6	30

Traffic	D	21	Demolition of infrastructure no longer required	Materials and equipment will either be transported off site for disposal or will be sold and transported to its new destination. Traffic on the surrounding roads will decrease . The vehicular movement occurring on site will also have reduced from the operational phase but it will still be mildly contributing to noise and dusts levels	7.13/ 11.3.11	P/N	2	1	2	2	5	10	vehicle movement on site must be restricted to daylight hours. All speed and safety controls must be adhered to. Vehicles must be maintained.	P	2	1	1	2	4	8
Cultural and Heritage Impacts																				
No further impacts expected											0	0							0	0

Significance		
High	**57 - 75**	
Medium-High	**38 - 56**	
Medium-Low	**19 - 37**	
Low	**0 - 18**	

C - Construction Phase
O - Operational Phase
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Parameter Weighting

Significance = Consequence X Probability

Consequence = Severity + Spatial Scale + Duration

Probability - with reference to history, industry knowledge and a good dose of common sense

PARAMETER VALUES

Severity

	Severity - Environmental	Severity - Social/Culural/Heritage
5	Very significant impact/total destruction of a highly valued species, habitat or ecosystem	Irreparable damage to/destruction of highly valued items of great cultural significance or complete breakdown of social order
4	Serious impairment of ecosystem function	Serious social issues/Permanent damage to items of cultural significance
3	Moderate alteration of ecosystem functioning	Moderately important social issues and/or significant damage to items of cultural significance
2	Moderate effects not affecting ecosystem functioning	Impacts on the local population, repairable over time. Temporary impairment of the availability of items of cultural significance.
1	Minor/insignificant effects on the biophysical environment	Insignificant social issues / low-level repairable damage to commonplace structures.

Spatial Scale / Extent

5	National/International
4	Provincial/Regional
3	Regional (substantially beyond site boundary)
2	Local (beyond site boundary and affects neighbours
1	Site (does not extend beyond site boundary)

Duration

5	Permanent/Irreversible
4	Long Term (10 to 25 years or beyond closure)
3	Medium Term (6-10 years)
2	Medium-Short Term (1-5 years)
1	Short term (Less than a year)

PROBABILITY

5	Certain/ Normally happens in cases of this nature (81-100% chance of happening
4	Will more than likely happen (61-80% chance)
3	Could happen and has happened here or elsewhere (41-60% chance)
2	Has not happened yet, but could (21-40% chance)
1	Conceivable, but only in a set of very specific and extreme circumstances (0-20% chance)

Significance		
High	57 - 75	
Medium-High	38 - 56	
Medium-Low	19 - 37	
Low	0 - 18	