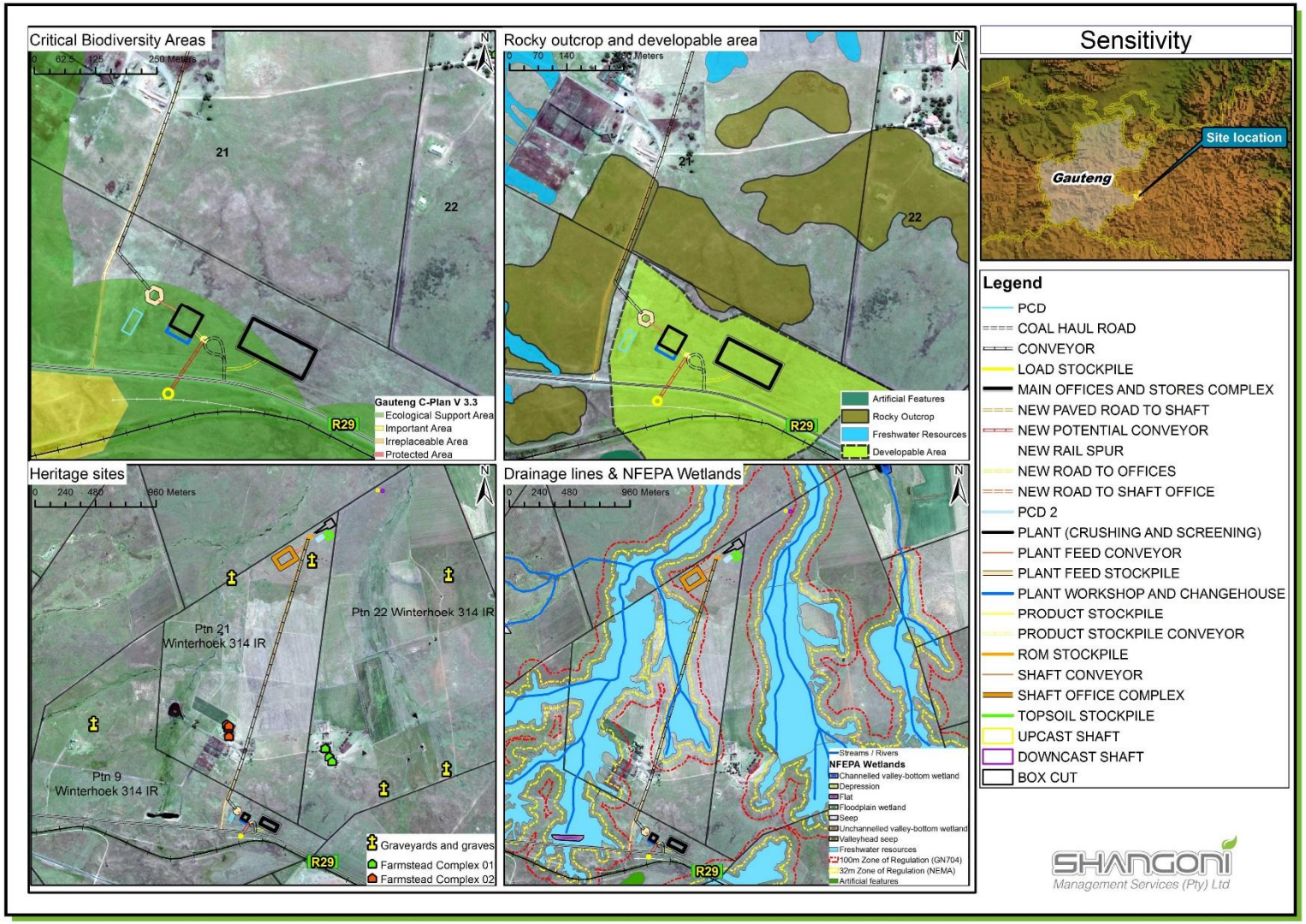

Figure 87: Environmental features (Sensitivity map) in relation to proposed site layout plan

7.5 Impacts and risks identified

A detailed risk assessment has been undertaken, as contained in Annexure J. The following table contains all the potential impacts identified for the activities described in the initial site layout.

Table 65: Impacts and Risks identified: Planning and design-, Pre-construction- and Construction Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
1	Land capability	• Site clearance • Adit; decline shaft • Ventilation shaft • Pre-fabricated structures (offices, stores, workshops, change houses) • Screening and crushing plant • Conveyor system • Roads • PCD's and water reticulation • Diesel generators • Potable water reservoirs • Construction of train loading spur • Storm- and process water pipelines • Hazardous storage facilities Applicable Alternatives: • TA1; TA2, TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2 • CA1 and CA2 • MM2, MA2	The main impact from a land capability perspective is anticipated to be limited to the construction and operation of the surface infrastructure, which will render parts of the mining rights application area inaccessible for prevailing land uses, particularly agricultural activities including cultivation and livestock grazing. In addition, the aboveground conveyor will create a barrier restricting livestock access to grazing pastures and/or water resources. The extent of the impact is limited to the vicinity of the proposed surface infrastructure areas. The duration of the impact is likely to persist for a long term to permanent duration of not mitigated adequately.	M	M	Construction, Operational, Rehabilitation and Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	3	M	Stop and control through appropriate design, layout and planning	• The conveyor can be designed to allow for the passing of livestock for grazing and access to drinking water; • Access provisions should also be made for agricultural implements where needed for the duration of the mining activity; • Strip soils according to soil type as illustrated in the soil and land capability maps attached to the EIAR / EMPr. • The upper 0-20 cm topsoil should be stockpiled separately; • Stockpiles should be re-vegetated as soon as possible; • Interburden material should be stockpiled separately to the classifiable soil material. • Sequentially replace soils in a reversed order such that the diagnostic horizon sequence corresponds to pre-mining conditions during the rehabilitation phase.	3	2	L	• Preserve sufficient soil volumes to enable pre-mining land capability post-rehabilitation • Maintain natural soil morphology (horizon sequence) and structural characteristics	• Principles in the MPRDA, 2002, NEMA, 1998, NEM: WA, 2008, Regulations there under and amendments thereto. • National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GNR.331 of 2014), thereunder. • Rehabilitation, Decommissioning- and Closure plan and Closure Objectives. • The mine's internal procedures. • Government Gazette 39425. Government Notice R.1147 dated 2015 (Financial Provision Regulations) and any amendments thereto	During the Construction and Operational Phases.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
2	Soil	• Site clearance • Construction of all surface infrastructure • Hauling activities Applicable Alternatives: • PL01 and PL02 • MM2 • VL01 AND VL02 • CA1 and CA2	Susceptibility to erosion will be largely increased once the vegetation is cleared and the soils become exposed to wind and storm water during construction activities. Soil erosion will also persist on unvegetated (bare) areas such as haul roads during the operational phase. The extent of the impact is limited to the cleared areas in the vicinity of the proposed infrastructure development areas and haul road(s).	M	M	Construction, Operational, Rehabilitation and Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	3	H	Control through appropriate planning and scheduling Stop through installation of relevant measures and structures	• Schedule vegetation clearance and soils stripping to coincide with the dry (low rainfall) season as far as possible; • Strictly limit vegetation clearance and earthworks to the pre-determined development areas as proposed; • Implement progressive soil stripping according to the mining schedule to minimise exposure duration; • Stockpiles should be re-vegetated as soon as possible; • Install erosion control measures to divert storm water away from stockpiles e.g. berms, soil traps, hessian curtains. • Strict waste management and activity-specific • EMP guidelines should be adhered to throughout the project; • Contamination prevention measures should be addressed in the EMP for the proposed activity; • A spill prevention and emergency spill response plan with clean-up measures, to mitigate ingress of contaminants into the soils and potential leaching into groundwater should be incorporated to the safety protocols; • Burying of waste should be strictly prohibited, and all waste should be managed in accordance with the relevant legislative requirements; and • The accumulated coal dust layer over the soil surface should be excavated and disposed. • Vegetation clearance and surface infrastructure construction works should, as far as possible, be scheduled during the dry (low rainfall) season when chances of runoff and water erosion are minimal, and soil moisture content is also minimal, in order to avoid irreversible soil compaction; • Schedule construction works such that there are no unprecedented delays such that the soil exposure duration is reduced to absolute minimum; • The development footprint including the plant and shaft complexes, offices etc. should be clearly barricaded to restrict construction activities within the proposed infrastructure footprint; • Avoid unnecessary stripping and/or excavation of in-situ soils as far as possible to ensure that the soils remain in their natural horizon sequence; • Where necessary, topsoil stripping should be scheduled to coincide with low rainfall conditions when soil moisture is minimal and diagnostic soil layers are easily discernible; • Individual stripping and management of the various soil layers must be performed according to soil type as	5	2	M	• Preserve sufficient soil volumes to enable pre-mining land capability post-rehabilitation • Maintain natural soil morphology (horizon sequence) and structural characteristics	• Rehabilitation, Decommissioning- and Closure plan and Closure Objectives. • The mine's internal procedures.	During the Construction and Operational Phases.
3	Soil	• Construction of infrastructure • Hazardous storage facilities • ROM and product stockpiling • Use of roads / hauling activities Applicable Alternatives: • PL01 and PL02 • MM2 • VL01 AND VL02	The soil contamination impact is largely dependent on the nature, volume and/or concentration of the contaminant of concern, and all of the identified soils are considered to be equally predisposed to contamination, as contamination sources are unpredictable and typically occur as incidental spills or leaks, and/or or decant of contaminated mine waste water. In addition, accumulative coal dust settling on the soil surface may cause significant soil contamination through leaching. The extent of the impact will likely spread to the surrounding areas depending on the nature (e.g. solid vs liquid) of the incident as well as volume and/or concentration of the contaminant source. The duration of the impact may persist for the duration of the mining activities.	M	L	Construction, Operational, Rehabilitation and Closure		3	4	H	Stop through contamination prevention and emergency preparedness Stop through training Control through waste management		3	3	M	Preserve healthy (non-toxic) growth medium for future land use	• Principles in the MPRDA, 2002, NEMA, 1998, NEM: WA, 2008, Regulations there under and amendments thereto. • National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GNR.331 of 2014), thereunder. • Rehabilitation, Decommissioning- and Closure plan and Closure Objectives. • The mine's internal procedures.	During Construction, Operational and Rehabilitation / Closure Phases.
4	Soil	• Construction of infrastructure	The identified soils are inherently less prone to dust emission due to	M	M	Construction, Operational,	Refer to footprint sizes	4	1	L			3	1	L	Maintain a protective	• Principles in the MPRDA, 2002,	Construction and Operational Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		• Hazardous storage facilities • ROM and product stockpiling • Use of roads / hauling activities Applicable Alternatives: • PL01 and PL02 • MM2 • VL01 AND VL02	their characteristically duplex and clayey nature; however, they will be more susceptible to dust emission under dry and windy conditions once the vegetation is cleared during the construction phase. Extent of impact: The extent of the impact will be limited to the disturbed areas, however, the dust may spread to the surrounding areas since fine dust particles are typically airborne.			Rehabilitation and Closure	on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*					illustrated in the compiled soil map (Figure 11), and in accordance with the respective diagnostic horizon sequence, as illustrated in Tables 6 to 10 above, in order to ease of re-instating the soils during rehabilitation; • In addition, the unconsolidated interburden material should also be stockpiled separately to the classifiable soil material if excavated during the construction and installation of the proposed shaft complexes; • The location of the all soil, interburden, and/or ROM stockpiles should be selected strategically such that minimal re-handling is required during rehabilitation; and should preferably be located on a relatively flat landscape, with adequate erosion control measures to minimise surface runoff and erosion; • Furthermore, all stockpiles should located at least 100 m away from wetlands, surface water features and/or drainage lines; • Strictly limit vegetation clearance and earthworks to the pre-determined development areas as proposed; • Regularly dampened with water to suppress dust, especially when strong wind conditions are anticipated; and • Regulate speed limit to ≤ 40 km per hour to minimise dust generation from the hauling roads. • Vehicular movement should be strictly prohibited over the stockpiles to avoid potentially irreversible compaction and all vehicles must remain on designated roadways only; • Soil erosion from stockpiles can be minimised by providing suitable storm water and cut off drains, and/or establishing a temporary vegetation cover on the stockpiles; • The stockpiled soils should be replaced in reverse order in order to replicate the original sequence during rehabilitation, in order to reinstate the soil structural integrity and functioning; • Once the soils have been replaced, re-vegetation should be initiated immediately subsequent to fertilizer application according to the specific soil requirements, where necessary; • The timing for soil amelioration should preferably coincide with dry (low rainfall) season to minimise washing away and/or leaching of lime and/or fertilizer from the soils; • Re-vegetate stockpiles with indigenous grass species as soon as practically possible areas as an erosion control mechanism such that the interval between soil stripping				vegetation cover on soil stockpiles	NEMA, 1998, NEM: WA, 2008, Regulations there under and amendments thereto. • National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GNR.331 of 2014), thereunder. • Rehabilitation, Decommissioning- and Closure plan and Closure Objectives. • The mine's internal procedures.	

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												and re-vegetation is kept to an absolute minimum in order to limit run-off and mitigate dust emission; • Re-vegetation may be carried out by manual hand seeding or hydro-seeding according to the Environmental Management Plan (EMP) protocols for the proposed development; • It is recommended that the soils be re-vegetated with indigenous non-arable vegetation species for a least three consecutive years (fallow period) during rehabilitation, in order to improve the natural buffering capacity of the soils prior to reinstatement of pre-mining land uses, particularly crop cultivation; • Regulated speed limit of ≤ 40 km per hour can be maintained to minimise dust generation from the haul roads; • Cleared areas can be regularly dampened with water to supress dust, especially when strong wind conditions are predicted according to the local weather forecast; • Susceptible areas to subsidence should be identified during the geotechnical risk assessment prior to any underground mining activity; • No infrastructure (particularly hazardous waste facilities and offices) should be developed over the identified geotechnically susceptible areas; • A geotechnical risk assessment can be conducted after demolition and decommissioning of surface infrastructure and prior to abandonment of the underground mine to assess the potential risk of subsidence and associated implications for future land use opportunities; • Subsided areas (if any) can be backfilled and re-shaped to correspond with the original pre-mining topography to avoid ponding and waterlogging conditions; • Contamination prevention measures should be addressed in the EMP for the proposed activity, and this should be implemented and made available and accessible at all times to the contractors and construction crew; • A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled and incorporated to the safety protocols to guide the construction works. This should adequately address clean-up measures, to mitigate ingress of contaminants into the soils and potential leaching of contaminants into groundwater in the event of a spill and/or a leak;						

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												• Soil compaction (where encountered) can be alleviated by ripping the soils to approximately 45 cm below ground surface to physically loosen the soil, using appropriate tillage implements; • Soil ripping and re-vegetation should be performed repeatedly on a regular basis until a satisfactory vegetation coverage of at least 70% is achieved; • Installation of an irrigation system or manual irrigation can be carried out for topsoil stockpiles where feasible, particularly for the vertic soils that may irreversibly harden under long dry spells subsequent to compaction; • Burying of waste, including rubble, domestic waste, or empty containers on the site should be strictly prohibited, and all potentially hazardous waste must be removed to an authorised disposal site; • Uncontaminated rubble waste may be re-used within the MRA where needed e.g. on road surfaces; • Efforts should be made to reclaim all the mine facilities immediately as soon as they are no longer in use, to prevent complex accumulated impacts; and • The accumulated coal dust layer over the soil surface should be excavated and disposed of at a suitable landfill during rehabilitation. • It is recommended that stockpile soil samples be collected for analysis of chemical composition in order to determine liming and fertilizer requirements, and thereafter, soils should be ameliorated accordingly prior to re-vegetation; • Soils should be tilled to at least 1350 kg/m3 to improve infiltration and crop water and nutrients uptake following rehabilitation where significant compaction of more than 1600 kg/m3 bulk density is encountered in the topsoil; and • In addition, an annual soil contamination assessment can be carried out to monitor soil quality down-gradient of the potentially contaminating facilities e.g. the proposed PCD and sewer treatment plant, relative to baseline soil quality prior to the construction of such facilities. This will enable detection of latent soil contamination and facilitate emergency response for remedial action where necessary.						
5	Flora	• Site clearance • Construction of road between Shaft and Plant	The impact of vegetation clearing for the Plant and Office Complex Alternative PL02 is considered to	L	H	Construction, Operational, Rehabilitation and Closure; Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans	3	4	H	Stop through avoidance Control through assessment and demarcation	• Avoid disturbance of moderately-high sensitivity habitat units as far as possible. • As the assessment was done prior to the occurrence of summer rains and limited floral SCC were encountered although suitable habitat for Near Threatened and	3	2	M	Limit vegetation clearance within ecological sensitive areas to what is absolutely required, and prevent	• NEM:BA (2004) and the regulations thereunder, • Mining and Biodiversity Guideline:	Planning Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		• Construction of overland conveyor • Construction of Plant Complex and Shaft Complex Applicable Alternatives: • PL01 and PL02	be lower (medium impact)[62] as this area is already considered modified, with a low possibility of floral SCC occurring within the modified grassland habitat unit. Should this alternative be used, and proper mitigation takes place, the impact rating after mitigation can be further reduced, possibly to low level impacts for this Alternative; however, the impact for the infrastructure development as a whole is considered to be high prior to mitigation, and medium post mitigation as a result of the Shaft Complex, Overland Conveyor and Access Road located within floral communities considered to be of moderately high and intermediate ecological sensitivities. Extent of impact: The impact is confined to certain infrastructure footprint areas.				(Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*				Stop through training and restrictions	Vulnerable floral species was present, a thorough walkthrough of the infrastructure footprint areas should be conducted of areas considered to be of increased ecological sensitivity once final layout plans have been developed. These assessments should take place during the correct flowering and growing season of the respective species and the floral SCC communities must be mapped. This should be done regardless of which alternative is used, as the overland conveyor will still traverse sensitive habitat units. Should Near Threatened and Vulnerable species be encountered within the development footprint areas, a 400m buffer around the populations will have to be implemented, and GDARD should then be approached in order to determine the way forward. • Should *Pelargonium sidoides* be encountered within the development footprint areas, the Department of Environmental Affairs (DEA) should be contacted to obtain a permit for the relocation of this species; • Demarcate the construction footprint, and ensure that all construction activities remain within this footprint. • Ensure that the proposed development footprint area remain as small as possible, particularly within areas of increased sensitivity. • Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development • Prohibit the collection of plant material for medicinal purposes. • As the conveyor will be constructed overland, vegetation within the conveyor footprint area should be cut, as oppose to complete removal, this will allow stabilisation of the soil, preventing erosion and alien proliferation in bare areas.				removal and destruction of floral SCC	Mainstreaming biodiversity into the mining sector • Environmental Conservation Act, 1989 (Act No 73 of 1989) • National Forests Act, 1998 (Act No 84 of 1998) • National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) • National Environmental Management: Protected Areas Act (NEM:PAA) (Act No 57 of 2003) • Gauteng Conservation Plan.	
6	Flora	• Construction of: ➢ Shaft complex ➢ Plant Complex ➢ Road between Shaft and Plant	The loss of floral SCC as a result of the establishment of infrastructure for the Plant and Office Complex Alternative PL02 is considered to	L	H	Construction, Operational, Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans	3	4	H	Stop through training and restrictions Stop through demarcation	• Demarcate the construction footprint, and ensure that all construction activities remain within this footprint. • After construction footprint areas have been cleared, avoid further disturbance of moderately-high sensitivity habitat units as far as possible.	3	3	M	Prevent the disturbance of natural floral ecology beyond the infrastructure footprint area	• NEM:BA (2004) and the regulations thereunder, • Mining and Biodiversity Guideline:	Construction & Operational phase

[62] The impact rating is representative should Alternative PL02 of the Plant and Office Complex be utilised for mining operations. Should Alternative 1 be implemented, it must be noted that the impact rating will be considerably higher, particularly the after-mitigation impact rating. Clearing within the Wetland, Rocky Outcrop and Open Grassland Habitat Units for the Shaft Complex, Access Road and Overland Conveyor, will result in the permanent removal of habitat considered to be of increased ecological importance and sensitivity. These habitat units also provide suitable habitat for floral SCC such as *Hypoxis hemerocallidea*, as encountered during the site assessment, as well as other potential species such as *Gladiolus robertsniae, Crinum bulbispermum, Nerine gracilis* and *Kniphophia typhpoides*.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		➢ Overland conveyor Applicable Alternatives: • PL01 and PL02 • CA1 and CA2 • BA1 and BA2	be lower (medium impact)[63] as this area is already considered modified, with a low possibility of floral SCC occurring within the modified grassland habitat unit. Should this alternative be used, proper mitigation implemented, and care taken to prevent edge effects from impacting on the surrounding areas of higher ecological importance, the impact rating after mitigation can be further reduced, possibly to low level impacts for this Alternative. The loss of floral SCC as a result of infrastructure development as a whole is considered to be high prior to mitigation, and medium post mitigation as a result of the Shaft Complex, Overland Conveyor and Access Road located within floral habitat units which provide suitable habitat for floral SCC. Extent of impact: The impact is not limited to infrastructure laydown areas, but can extend to the surrounding natural areas, but should not extent beyond the mining rights area.				(Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*					• Restrict construction, maintenance and operational vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development. • No informal fires are allowed by construction personnel outside of the development footprint. • Harvesting of medicinal plant species by construction and operational personal are strictly prohibited. • *Hypoxis hemerocallidea* as well as a Crinum spp. were encountered within the study area. Suitable habitat was also encountered for all floral SCC listed in Appendix B, as such it is recommended that a thorough walkdown of final infrastructure laydown areas be done and all *Hypoxis hemerocallidea, Crinum bulbispermum* and *C. macowanii* encountered be mapped, rescued and relocated by a suitable qualified specialist prior to vegetation clearance; • Some floral SCC listed in Appendix B are considered A3 Priority Grouping species and are designated to be Near Threatened or Vulnerable by the Gauteng Red List Plant Species Guidelines (2006) and as such should these species be encountered during the infrastructure walkdown, a 400m buffer around the community should be applied and care should be taken to avoid placement of infrastructure within these areas. If placement of infrastructure within these areas is unavoidable and the presence of these species have been confirmed, GDARD should be approached to discuss the possibility of rescuing and relocating these species; • The TOPS species Pelargonium sidoides was also encountered within the rocky outcrop habitat unit, and should this species be encountered within the infrastructure footprint areas, the DEA should be contacted to obtain a permit for the relocation of the species to suitable similar habitat within the vicinity of is original location, and • Demarcate all sensitive floral habitat areas and ensure that these areas are off-limits to construction, operational vehicles and all personnel.					Mainstreaming biodiversity into the mining sector • Environmental Conservation Act, 1989 (Act No 73 of 1989) • National Forests Act, 1998 (Act No 84 of 1998) • National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) • National Environmental Management: Protected Areas Act (NEM:PAA) (Act No 57 of 2003) • Gauteng Conservation Plan	

[63] The impact rating is representative should Alternative PL02 of the Plant and Office Complex be utilised for mining operations. Should Alternative PL01 be implemented, it must be noted that the impact rating will be considerably higher, particularly the after-mitigation impact rating. Construction and operational activities of the Shaft Complex, Access Road and Overland Conveyor within the Wetland, Rocky Outcrop and Open Grassland Habitat Units will result in the permanent removal of habitat considered to be of increased ecological importance and sensitivity. There is also a significant risk that construction and operation of infrastructure areas will affect natural vegetation adjacent to cleared mine infrastructure footprint areas, which may affect floral SCC which have not previously been rescued and relocated during site clearing (if the rescue and relocation of NT and VU species are approved by GDARD).

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												• Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities, and no indiscriminate driving through ecological sensitive habitat as set out in this document should be allowed; and • In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil. • Limit the footprint area of the construction activity to what is absolutely essential in order to minimise environmental damage; • Edge effects of activities including erosion and alien/ weed control need to be strictly managed in these areas; and • It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil.						

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
7	Flora	• Site clearance • Adit; decline shaft • Ventilation shaft • Pre-fabricated structures (offices, stores, workshops, change houses) • Screening and crushing plant • Conveyor system • Roads • PCD's and water reticulation • Diesel generators • Potable water reservoirs • Construction of train loading spur • Storm- and process water pipelines • Hazardous storage facilities Applicable Alternatives: • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2 • CA1 and CA2 • MM2 • MA2	Alien species proliferation for the Plant and Office Complex Alternative PL02 is considered to be lower (medium impact)[64] as this area is already considered modified, with few species representative of the Soweto Highveld Grassland Vegetation type occurring within the modified grassland habitat unit., however care should be taken to prevent the spread of alien species to the surrounding areas considered to be of increased ecological importance and sensitivity. Should this alternative be used and proper mitigation implemented the impact rating after mitigation can be further reduced, possibly to low level impacts for this Alternative. As the Shaft Complex, Overland Conveyor and Access Road are located within floral habitat units of increased sensitivity the loss of indigenous floral species as a result of alien proliferation for the development as a whole is considered to be high prior to mitigation, however if effective mitigation measures are implemented, the impact can be reduced to a medium level impact.. Extent of impact: The impact is confined to infrastructure laydown areas.	M	M	Construction, Operational, Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	4	H	Stop through training and restrictions Stop through demarcation Control through alien invasive vegetation management	• Demarcate the construction footprint, and ensure that all construction activities remain within this footprint. • Restrict construction, maintenance and operational vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development. • Implement an alien invasive species programme for regular monitoring and eradication of alien species within the mine infrastructure laydown areas as well as all areas where such species might have become established within the MRA, particularly areas with higher ecological importance. • All areas of disturbed and compacted soils need to be ripped, reprofiled and reseeded with indigenous vegetation to prevent the establishment of alien and invasive species.	3	3	M	Limit vegetation clearance within ecological sensitive areas to what is absolutely required, indiscriminate driving within natural areas outside of the development footprint		Construction and Operational Phase
8	Flora	• Site clearance • Adit; decline shaft • Ventilation shaft	Placement of infrastructure is likely to have a detrimental impact on floral habitat as habitat fragmentation within sensitive	L	H	Construction, Operational, Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant	4	4	H	Stop through constructing culverts	• Maintaining migratory corridors and connectivity particularly within the wetland habitat unit is deemed essential; and	3	3	M	Maintain migratory corridors hand habitat connectivity,	• NEM:BA (2004) and the regulations thereunder,	Construction phase

[64] The impact rating is representative should Alternative 2 of the Plant and Office Complex be utilised for mining operations. Should Alternative 1 be implemented, it must be noted that the impact rating will be higher. Alien and invasive species might establish in areas where ground disturbance has occurred, as these species can establish themselves more readily than indigenous vegetation. This will result in the displacement of indigenous vegetation, change in species composition, and an overall loss in floral biodiversity.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT: Impact description	POTENTIAL IMPACT: Reversible	POTENTIAL IMPACT: Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated: Probability	SIGNIFICANCE if not mitigated: Magnitude	SIGNIFICANCE if not mitigated: Significance	MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated: Probability	SIGNIFICANCE If mitigated: Magnitude	SIGNIFICANCE If mitigated: Significance	STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		• Pre-fabricated structures (offices, stores, workshops, change houses) • Screening and crushing plant • Conveyor system • Roads • PCD's and water reticulation • Diesel generators • Potable water reservoirs • Construction of train loading spur • Storm- and process water pipelines • Hazardous storage facilities Applicable Alternatives: • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2 • CA1 and CA2 • MM2 • MA2	areas will occur, especially within the wetland and rocky outcrop habitat units associated with the Overland Conveyor and Acces Road. Floral habitat fragmentation within the MRA has been increasing as a result of historic and on-going disturbances such as crop cultivation, grazing and infrastructure development. Extent of impact: The impact				Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*				Control through managing corridors	• Culverts must be used when the proposed conveyor linear alignment crosses a wetland as to ensure connectivity of the wetland • As far as possible vegetation should be cut and not completely removed during the construction of the overland conveyor, this will assist with maintaining habitat connectivity of natural areas. • A Sensitivity map has been developed for the mining rights application area (MRA), indicating wetland features and associated regulatory zones, as well rocky outcrop areas which are considered to be of increased ecological importance. It is recommended that this sensitivity map be considered during all development phases, including closure and decommissioning, to aid in the conservation of floral habitat within the MRA; • Whenever wetlands or rocky outcrop areas need to be crossed during the construction phase it must be at 90 degree or acute angle as to minimise negative impacts and limit soil erosion particularly within the wetlands; • The footprint of the proposed mining activities should be confined to transformed, cultivated or modified areas of low ecological importance as far as possible. As such Alternative 2 for the office and plant complex is the preferred layout alternative from a floral perspective; • During the detailed planning stage of the proposed mining development, a Biodiversity Action Plan (BAP) should be developed in line with the requirements of the National Environmental Management Biodiversity Act (NEMBA, 2004). The BAP should guide all activities throughout the life of mine including the construction and post closure and after care and maintenance phases of the project. The BAP should indicate all requirements and objectives for closure and control of impacts such as erosion and alien vegetation; and • Appropriate sanitary facilities must be provided for the life of the mine and all waste removed to an appropriate waste facility. • The existing integrity of flora surrounding the project footprint should be upheld and no activities be carried out outside the footprint of the construction areas; • In terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations, GN R586 of 2016, landowners are legally responsible for the control of invasive alien plants on				particularly the wetland habitat unit	• Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector • Environmental Conservation Act, 1989 (Act No 73 of 1989) • National Forests Act, 1998 (Act No 84 of 1998) • National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) • National Environmental Management: Protected Areas Act (NEM:PAA) (Act No 57 of 2003) • Gauteng Conservation Plan	

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												their properties and it is therefore recommended that the declared weed and invader species be removed; • Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the development/ decommissioning footprint. Alien plant seed dispersal within the top • layers of the soil within footprint areas, that will have an impact on future rehabilitation, has to be controlled; • Species specific and area specific eradication recommendations: • Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species or floral SCC occurs due to the herbicide used, and where possible hand pulling should be used the preferred method; and • Footprint areas should be kept as small as possible when removing alien plant species.						
9	Fauna	• Site clearance • Construction of road between Shaft and Plant • Construction of overland conveyor • Construction Of Plant Complex and Shaft Complex Applicable Alternatives: • PL01 and PL02	The impact of vegetation clearing for the Plant and Office Complex Alternative PL02 is considered to be lower (medium impact)[65] as this area is already considered modified, with a moderate possibility of faunal SCC occurring within the modified grassland habitat unit. Should this alternative be used, and effective mitigation takes place, the impact rating after mitigation can be further reduced, possibly to low severity impacts for this Alternative; however the impact for the infrastructure development as a whole is considered to be high prior to mitigation, and medium post mitigation as a result of the Shaft Complex, Overland Conveyor and Access Road located within faunal habitat considered to be of high and	L	H	Construction, Operational, Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	5	H		• Avoid disturbance of high sensitivity habitat units as far as possible; • Demarcate the construction footprint, and ensure that all construction activities remain within this footprint area; • Ensure that the proposed development footprint area remain as small as possible, particularly within areas of increased sensitivity; • Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development; • No trapping of faunal species may take place; • No informal fires are allowed by construction personnel outside of the development footprint; and • As the conveyor will be constructed overland, vegetation within the conveyor footprint area should be cut, as opposed to complete removal, this will allow stabilisation of the soil, preventing erosion and alien proliferation in bare areas.	4	4	H	• Limit vegetation clearance within ecological sensitive areas to what is absolutely required, and prevent removal and destruction of faunal SCC habitat for breeding and foraging purposes.		Planning phase Construction phase

[65] The impact rating is applicable should Alternative PL02 of the Plant and Office Complex be utilised for mining operations. Should Alternative PL01 be implemented, it must be noted that the impact rating will be the same as Alternative PL02, particularly the post-mitigation impact rating. Clearing within the Wetland, Modified Grassland and Open Grassland Habitat Units for the Shaft Complex, Access Road and Overland Conveyor, will result in the permanent removal of habitat considered to be of increased ecological importance and sensitivity. These habitat units also provide suitable habitat for faunal SCC such as *Eupodotis caerulescens* and *Phoenicopterus roseus*, as encountered during the site assessment as well as other potential species such as *Sagrittarius serpentarius, Anthropoides paradiseus* and *Polemaetus bellicosus.*

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
			intermediate ecological sensitivities. Extent of impact: The impact is confined to infrastructure laydown areas.															
10	Fauna	• Site clearance • Adit; decline shaft • Ventilation shaft • Pre-fabricated structures (offices, stores, workshops, change houses) • Screening and crushing plant • Conveyor system • Roads • PCD's and water reticulation • Diesel generators • Potable water reservoirs • Construction of train loading spur • Storm- and process water pipelines • Hazardous storage facilities Applicable Alternatives: • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2 • CA1 and CA2 • MM2	The loss of faunal SCC as a result of the establishment of infrastructure for the Plant and Office Complex Alternative PL02 is considered to be the same as Alternative PL01 as the area is already considered modified, but faunal SCC have adapted to utilise these modified areas.[66] Should this alternative be used, effective mitigation implemented, and care taken to prevent edge effects from impacting on the surrounding areas of higher ecological importance, the impact rating after mitigation can be further reduced, possibly to low severity impacts for this Alternative. The loss of faunal SCC as a result of infrastructure development as a whole is considered to be high prior to mitigation, and high post mitigation as a result of the Shaft Complex, Overland Conveyor and Access Road located within faunal habitat units which provide suitable habitat for faunal SCC. Extent of impact: The impact is not limited to infrastructure laydown areas, but can extend to the	L	H	Construction, Operational, Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	4	H	Stop through training and restrictions Stop through demarcation	• • Demarcate the construction footprint, and ensure that all construction activities remain within this footprint are; • After construction footprint areas have been cleared, avoid further disturbance to areas outside of the footprint areas as far as possible; • Restrict construction, maintenance and operational vehicles to travelling only on designated roadways to limit the footprint of the proposed development; • No informal fires are allowed by construction personnel outside of the development footprint; • Mine vehicles must be limited to only travel 40km/h on designated roads used by contractors within the MRA, as to limit to probability of roadkill. • No trapping, collecting or hunting of faunal species must be allowed during any phases of the proposed mining development; • A faunal SCC awareness (with focus on avifaunal species.), monitoring and management plan must be designed and implemented by a suitably qualified specialist. More detail on monitoring is provided in section 5.2.3 of the faunal assessment report. • The proposed conveyor belt alignment must make provision for faunal species by using culverts (30cm by 30cm) when crossing wetland areas and openings for small mammal species to use as corridors between grassland areas; • Suitable terrestrial underpasses should be provided to facilitate safe movement of faunal species. All underpasses should be dressed with minimum 10cm, should be a minimum of 1.0m wide and 1.5m high and should be	4	4	H	• Prevent the disturbance of faunal ecology especially avifaunal species beyond the infrastructure footprint area and limit the negative impact on the game breeding project within the MRA.		Construction and Operational Phase

[66] The impact rating is applicable should Alternative PL02 of the Plant and Office Complex be utilised for mining operations. Should Alternative PL01 be implemented, it must be noted that the impact rating will be the same as Alternative PL02, particularly the after mitigation impact rating. Construction and operational activities of the Shaft Complex, Access Road and Overland Conveyor within the Wetland, Rocky Outcrop Modified Grassland and Open Grassland Habitat Units, will result in the permanent removal of habitat considered to be of increased ecological importance and sensitivity for faunal SCC that will utilise the area for feeding and breeding purposes. There is also a significant risk that construction and operation of infrastructure areas will affect the game breeding project as it will most likely increase the stress levels of the animals and lower breeding rate will occur. Avifaunal SCC have utilise the short grassland micro habitat that is created by cattle farming, and also utilise crop field during the winter breeding months.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		• MA2	surrounding natural areas, but should not extent beyond the MRA									provided with small grates in the road surface to allow light penetrations into the underpass. Maintenance staff should be able to have access to underpasses and any accumulated material must be cleared at least at the start of the rainy season (GDARD, 2014a); • Power lines must have bird flappers installed as to prevent avifaunal collisions. Where fence lines are erected, bird flappers must be placed 10m apart on the top strand of the fence line; • Road margins close to telephone lines and power lines must be burned and/or mowed regularly to prevent micro habitat for small mammals that could be hunted by raptors. By keeping the grass height low, it lowers the possibility for raptors to collide with vehicles (GDARD, 2014a); • Sign posts must be erected (in accordance with applicable legislation) where Tyto capensis (African Grass Owl) habitat is present within road verges close to wetland areas and cultivated fields as to warn motorists of the possible presence of T. capensis. Road margins must be mowed to a distance of 5m from the hard edge of the road and/ or regularly burned to prevent the accumulation of grass cover that provide habitat for small mammal species (GDARD, 2014a); • Storm water structures should be designed in such a way as to block reptiles and amphibians access to the road surface (GDARD, 2014a); • Awareness campaigns must be implemented to inform all construction and mine workers, especially vehicle operators/drivers, of the importance of faunal species within the MRA, including the presence of faunal SCC species; and • Lighting pollution and its effect on fauna (with special mention of invertebrates, bats and avifauna) must be effectively mitigated with the following guidelines in mind with due cognizance take of health and safety requirements: ➢ Downward facing lights must be installed and limited to absolutely essential areas; and ➢ Covers/light diffusers must be installed to lessen the intensity of illumination if at all possible. • A faunal monitoring plan must be designed and implemented throughout all phases of the mining development, should it be approved. The following points aim to guide the design of the monitoring plan, and it must						

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												be noted that the monitoring plan must be continually updated and refined for site-specific requirements: • Permanent monitoring points must be established in areas surrounding the surface infrastructure. These points must be designed to accurately monitor the following parameters: ➢ Species diversity (mammal, invertebrate, amphibian, reptile and avifaunal); ➢ Species abundance; and ➢ Faunal community structure including species composition and diversity which should be compared to pre-development conditions. • The following methods aim to guide the monitoring plan, although more detailed, site specific methods must be employed during the development and implementation of the monitoring plan: ➢ Monitoring activities must take place on an annual basis as a minimum, but on a biannual basis for avifauna (summer and winter assessment); ➢ Annual walk down of all wetlands within a radius of 1km of the infrastructure area must be done, as these wetlands will be used as migratory corridors by faunal species. All spoor, scat and signs of faunal species occurrence must be identified and recorded with a relevant GPS point taken; and ➢ Sherman traps must be installed during the monitoring periods to monitor small mammal diversity. • The following method must be used with regards to the monitoring of stress levels of Syncerus caffer (Cape Buffalo): ➢ Six months prior to any construction commences, fresh dung must be collected and the cortisol levels must be tested. This will form the baseline to test if stress levels have increased since the mining operations started or not; and ➢ Biannual testing of Syncerus caffer (Cape Buffalo) dung for cortisol levels must be done and compared to previous tests done. This must be done during the construction and operational phase of the proposed mine. • The following criteria must be used with regards to the avifaunal monitoring:						

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												➢ Coordinated Waterbird Counts (CWAC) counts must be employed to monitor waterfowl abundance, especially around the dams within the MRA; ➢ Fixed and random points for bird counts to determine species composition and diversity trends. At the point the observer must record all avifaunal species and total of species observed at the point. Existing avifaunal monitoring routes Coordinated Avifaunal Roadcounts (CAR) must also be used as reference points. Instead of only recording large and conspicuous avifaunal species, all avifaunal species must be recorded and GPS point of observation included. The Bird Lasser application that can be downloaded onto a smartphone can assist with recordkeeping all necessary information can be captured; and ➢ Proposed avifaunal route monitoring must be monitored bi-annually (July and February) in order to record summer as well as winter avifaunal species utilising the area. • Results of the monitoring activities must be taken into account during all phases of the proposed mining development and action must be taken to mitigate impacts as soon as negative effects from mining related activities become apparent; and • The method of monitoring must be designed to be subjective and repeatable in order to ensure consistent results.						

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
11	Fauna	• Site clearance • Adit; decline shaft • Ventilation shaft • Pre-fabricated structures (offices, stores, workshops, change houses) • Screening and crushing plant • Conveyor system • Roads • PCD's and water reticulation • Diesel generators • Potable water reservoirs • Construction of train loading spur • Storm- and process water pipelines • Hazardous storage facilities Applicable Alternatives: • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2 • CA1 and CA2 • MM2 • MA2	Alien species proliferation for the Plant and Office Complex Alternative 2 is considered to be lower (medium impact) as this area is already considered modified, as the habitat is over grazed by cattle and floral species diversity have been impacted upon negatively, however care should be taken to prevent the spread of alien species to the surrounding areas considered to be of increased ecological importance and sensitivity. Should this alternative be used and effective mitigation implemented the impact rating after mitigation can be further reduced, possibly to low severity impacts for this Alternative. Extent of impact: The impact is confined to infrastructure laydown areas.	L	H	Construction, Operational, Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	4	H	Stop through training and restrictions Stop through demarcation	• Demarcate the construction footprint areas and ensure that all construction activities remain within the footprint areas; • Restrict construction, maintenance and operational vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development; Implement an alien invasive species programme for regular monitoring and control of alien species within the mine infrastructure laydown areas as well as all areas where such species might have become established within the MRA, particularly areas with higher ecological importance; and • All areas of disturbed and compacted soils need to be ripped, reprofiled and reseeded with indigenous vegetation to prevent the establishment of alien and invasive species.	3	4	H	Limit vegetation clearance within ecological sensitive areas to what is absolutely required, indiscriminate driving within natural areas outside of the development footprint	• NEM:BA (2004) and the regulations thereunder, • Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector • Environmental Conservation Act, 1989 (Act No 73 of 1989) • National Forests Act, 1998 (Act No 84 of 1998) • National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) • National Environmental Management: Protected Areas Act (NEM:PAA) (Act No 57 of 2003) • Gauteng Conservation Plan	Construction and Operational Phase
12	Fauna		Placement of infrastructure is likely to have a detrimental impact on faunal habitat as habitat fragmentation within sensitive areas will occur, especially within the wetland and open grassland habitat units. Faunal habitat fragmentation within the MRA has been increasing as a result of historic and on-going disturbances such as crop cultivation, grazing and infrastructure development.	L	H	Construction, Operational, Rehabilitation / Closure		5	4	H	Stop through constructing culverts Control through managing corridors	• Maintaining migratory corridors and connectivity particularly within the wetland habitat unit is deemed essential; • Culverts must be used when the proposed conveyor linear alignment crosses a wetland as to ensure connectivity of the migratory corridors associated with wetland habitat; and • As far as possible vegetation should be cut and not completely removed during the construction of the overland conveyor, this will assist with maintaining faunal habitat connectivity of natural areas traversed by the conveyor.	4	3	H	Maintain migratory corridors and habitat connectivity, particularly the wetland habitat unit.		Construction phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
13	Surface water	• Site clearance Applicable Alternatives: • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2 • CA1 and CA2	Grading, vegetation clearing and soil stripping may lead to siltation of water resources causing deterioration of water quality affecting the use of surface water as a natural resource. Surface water quality: There may be a decrease in surface water quality when any surface water comes into contact with dust, eroded soil, carbonaceous materials or other pollutants generated during the construction phase of the Leslie 2 project. The sediment load within surface water runoff may increase if not prevented or mitigated, or the chemistry of surface water may be altered. Extent: Impacts on extended area beyond the site boundary (hundreds of meters) Duration: Construction phase	H	M	Construction phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	2	M	Stop through seeding and mulching Control through erosion measures	• Temporary seeding (planting of fast growing grasses to hold down the soils in disturbed areas so that they are less likely to be carried off-site by storm water runoff or wind). • Permanent seeding or planting (Permanent seeding is the use of permanent vegetation (grass, trees or shrubs) to stabilise the soil by holding soil particles in place. • Mulching (the placement of material such as hay, grass, wood chips, straw or gravel on the soil surface to cover and stabilise disturbed soils). Mulching often accompanies seeding and can prove useful on slopes. • The following measures can also be implemented to prevent erosion and siltation of clean water resources: ➢ Vegetative buffer strips; ➢ Preservation of natural vegetation; ➢ Dust control; ➢ Soil retaining measures; and ➢ Limiting areas of disturbance during construction	2	2	L	To prevent surface water quality deterioration and a reduction in surface water quantity towards the receiving clean water environment.	• DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	During the Construction phase
14	Surface water	• Hazardous storage facilities (use of hazardous materials) Applicable Alternatives: • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2 • CA1 and CA2	Spillages of hazardous materials used during the construction of the plant, conveyor, pollution control dams, shaft and workshops may impact on the surrounding clean water environment. Surface water quality: Deterioration of water quality due to chemical contamination affecting the use of surface water as a natural resource. Extent: Impacts on extended area beyond the site boundary (hundreds of meters) Duration: Construction phase	H	M	Construction phase		4	2	M	Control and stop through regular maintenance Stop through correct storage of hazardous materials Control through dust control measures Stop through stream bank stabilisation	• Regular maintenance of all equipment and close monitoring of their movement to minimize any discharges of hydrocarbons from machinery during construction, any spills detected will be cleaned up immediately. • Ensure that all hazardous chemicals are stored in designated, bunded areas of which access is controlled. • All vehicle and equipment usage is to limited to designated areas only. • Limit the disturbance of sensitive areas such as steep slopes, soils susceptible to erosion and drainage lines. • Implement dust control measures. • Implement stream bank stabilisation measures.	2	2	L	To prevent surface water quality deterioration and a reduction in surface water quantity towards the receiving clean water environment.		During the Construction phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
15	Surface water	• Site clearance • Construction sites • Roads • Diesel generators • Hazardous storage facilities Applicable Alternatives: • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • CA1 and CA2	Upstream clean surface runoff may be exposed to contaminants and bare surfaces within the construction sites. Surface water quality: Deterioration of water quality due to exposure to possible contaminants and bare surfaces that may result in a decrease in surface water quality towards the natural clean water resources near the operation. Extent: Impacts on extended area beyond the site boundary (hundreds of meters) Duration: Construction phase	H	M	Construction phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	2	M	Control through diversion of clean water	• Divert all upstream surface runoff away from the construction activities. • Earthen dykes can be used for diversion measures. • Silt fences should be used if necessary.	2	2	L	Prevent affected storm water discharge into the receiving clean water environment.	• DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	During the Construction phase
16	Surface water	• Waste management Applicable Alternatives: • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • CA1 and CA2	Dumping of waste or any foreign material into drainage lines and wetlands may impact on surface water resources and aquatic biodiversity and ecosystems. Surface water quality: The above-mentioned impact may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems. Extent: Impacts on extended area beyond the site boundary (hundreds of meters) Duration: Construction phase	M	M	Construction phase		4	4	H	Control and stop through proper waste management Stop through correct storage	• Implement good housekeeping practises. • Separate different types of waste. • Store all hazardous waste in designated areas and dispose of accordingly. • Avoid the location and placement of any waste in close proximity of any water resource outside of demarcated areas.	2	4	M	To prevent surface water quality deterioration and degradation of aquatic biodiversity and ecosystems.		During the Construction phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
17	Surface water	Maintenance activities • Workshops Applicable Alternatives • PL01 and PL02	Maintenance activities resulting in spillage of oil, fuel, grease at construction sites. Surface water quality: Spillages of substances that contains hydrocarbons may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems. Extent: Impacts on extended area beyond the site boundary (hundreds of meters) Duration: Construction phase	H	L	Construction phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	3	M	Control and remedy through procedures Stop through bunding and storage	• Treat all hydrocarbon spills as hazardous waste and dispose of accordingly. • Store fuel and oil is designated bunded areas. • Refuelling of vehicles and equipment to take place no an impermeable surface with a sump. • Emergency spills to be cleaned up quickly and effectively with approved absorbent material.	2	2	L	To prevent surface water quality deterioration and degradation of aquatic biodiversity and ecosystems.	• DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	During the Construction phase
18	Surface water	• Pollution Control Dams and associated infrastructure • Wash bay and oil traps / separators • Workshops Applicable Alternatives • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • CA1 and CA2	Excess surface water runoff may cause affected water containment facilities such as sumps, oil traps, oil separators and drip trays to overflow. Surface water quality: Overflow of affected water containment facilities during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems. Extent: Impacts on extended area beyond the site boundary (hundreds of meters) Duration: Construction phase	H	L	Construction phase		3	3	M	Control through inspections Stop and control through maintenance schedules Stop and control through diversion of clean water	• Conduct regular inspections on sumps and oil traps to ensure integrity • Implement maintenance schedules for regular silt removal. • Empty drip trays into used oil containers on a regular basis. • Ensure that upstream surface runoff is diverted away from sumps / oil traps.	2	2	L	To prevent surface water quality deterioration and degradation of aquatic biodiversity and ecosystems.		During the Construction phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
19	Surface water	• Construction activities: • Cement and concrete mixing Applicable Alternatives • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • CA1 and CA2 • BA1 and BA2	Washing of concrete delivering trucks and cement equipment on site as well as cement/ concrete mixing outside of demarcated areas and the incorrect disposal of excess cement and concrete may impact on the surrounding clean water environment. Surface water quality: Incorrect cement/ concrete handling practises during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems. Extent: Impacts on extended area beyond the site boundary (hundreds of meters) Duration: Construction phase	M	M	Construction phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	3	H	Stop through training Control and stop through procedures Stop through correct facilities (impermeable surfaces)	• Ensure that mixing practices are conducted on impermeable surfaces. • Ensure that all contractors are properly trained in terms of disposal of excess cement. • Site supervisors to ensure that correct disposal procedures are followed. • Ensure that concrete delivery trucks are washed in designated areas. • The wash areas should be on an impermeable surface fitted with a sump.	2	3	M	To prevent surface water quality deterioration and degradation of aquatic biodiversity and ecosystems.	• DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	During the Construction phase
20	Surface water	• Off-loading and refuelling activities Applicable Alternatives • PL01 and PL02	Accidental spillages of fuel on site and incorrect storage practises may impact on the surrounding clean surface water environment. Surface water quality: Incorrect fuel storage, handling and accidental spillages as a result during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems. Extent: Impacts on extended area beyond the site boundary (hundreds of meters) Duration: Construction phase	M	M	Construction phase		3	4	H	Stop through training Control and stop through procedures Stop through correct facilities (impermeable surfaces)	• Fuel storage tanks should be within a bunded area. • The bunded area should at least contain the contents of one storage tank. • Emergency spills kits should be available. • Refuelling of vehicles to take place on an impermeable surface fitted with a sump to contain any spillages. • Do not locate any fuel depot within the 1:100 year flood line or a horizontal distance of 100 m.	2	4	M	To prevent surface water quality deterioration and degradation of aquatic biodiversity and ecosystems.		During the Construction phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
21	Groundwater	• Site clearance, • Construction and use of haul road • Construction of pollution control dams <u>Applicable Alternatives</u> • PL01 and PL02 • VL01 and VL02	Site clearing and removal of topsoil, may lead to ponding of surface water in the cleared areas during the wet season and could potentially lead to increased infiltration to aquifers. Groundwater quality impacts during the construction phase are expected to be insignificant if the proposed management measures are implemented. The stripping and stockpiling of topsoil and subsoil from the pit and infrastructure surface areas is considered negligible since no chemical interaction is envisaged that could have an adverse impact on groundwater quality. The stripping of topsoil may result in a very slight increase in groundwater recharge, which is a slight positive effect on the groundwater environment. The duration of the activity is however so limited that the effect will not be measureable. The construction of the above-mentioned infrastructure will cause a very small reduction in recharge to the aquifer due to the compaction of the surface area. This impact is countered by the fact that vegetation clearing may result in ponding and slight increases in recharge. Runoff water will contribute to the catchment yield. <u>Duration of impact:</u> Construction phase.	H	L	Construction Phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	3	M	Stop and control through storm water management Stop through lining of PCDs Control and stop through training and restrictions Stop and control through maintenance	• Run-off from haul-roads will be diverted and contained in the dirty water system. • All dams should be lined where practically possible, in an effort to minimize the seepage of poor quality leachate. • Clean surface water should not come into contact with dirty water or coal bearing material. • Implement traffic rules and train. • Impelment vehicle maintenance. • Install oil collections pan in or under vehicles.	2	2	L	To minimise the extent of disturbance of the aquifer. To limit degeneration of groundwater quality.	• DWS Best Practice Guidelines • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments • The storm water management plan and / or amendments thereto • Specialist recommendations; • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	Construction Phase

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22	Groundwater	• Blasting activities	Blasting activities may impact negatively on the groundwater quality if significant amounts of explosives are spilled or incompletely detonated. The chemical residues in the form of NH4 and NO3 may potentially leach to the groundwater table. With the construction of the initial box-cut, dewatering of the aquifer will begin to occur, but only within the immediate vicinity of the box-cut. The aquifer structure will be destroyed wherever the box-cut intersects the aquifer. Carbonaceous overburden material found within the mine lease area has the potential to generate acidic leachate, which means that any construction undertaken with carbonaceous material may be a potential source of poor quality leachate. No significant groundwater impacts are however expected during the construction phase. Run-off from haul-roads will be diverted and contained in the dirty water system. <u>Duration of impact</u>: Construction phase extending to rehabilitation phase.	H	L	Construction Phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	3	M	Stop and control through training and procedures Stop and control through storm water management Control through inspections	• Handle and store blasting material according to manufacturing requirements. • No construction of any water management measures, such as the new PCD or the haul roads should be undertaken with carbonaceous material. • Clean surface water should not come into contact with dirty water or coal bearing material. • Train staff and implement correct procedures for the handling of blasting material. • Only qualified staff should handle these materials.	2	2	L	To minimise the extent of disturbance of the aquifer. To limit degeneration of groundwater quality.	• DWS Best Practice Guidelines • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments • The storm water management plan and / or amendments thereto • Specialist recommendations; • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation. • Explosives Act (Act No. 26 of 1956) and Explosives regulations GN R1604 of 1972 and amendments thereto	Construction Phase
23	Aquatic environment	Placement of infrastructure: • Adit; decline shaft • Ventilation shaft • Pre-fabricated structures (offices, stores, workshops, change houses) • Screening and crushing plant • Conveyor system	Placement of conveyors within non-perennial drainage lines, may alter freshwater habitats, lead to a loss of aquatic biodiversity and result in loss of stream connectivity. Placement of conveyors within freshwater habitat may lead to increased risk of erosion and sedimentation of freshwater habitats as well as increasing the mobility of pollutants, which have	M	M	Construction to Post-closure phase		5	5	H	Stop through planning / placement of infrastructure Stop through correct design Control through alien invasive	• Ensure that as far as possible all infrastructure components are placed outside of drainage and river areas as per the proposed layout alternatives for the proposed project. In particular mention is made of the need to not encroach on the riparian systems near the upper reaches of the Steenkoolspruit and the Blesbokspruit and their associated drainage lines with a minimum buffer of 100m around all riparian systems maintained in line with the requirements of regulation GN704 of the National Water Act;	2	2	L	Prevent impacts to aquatic environment	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use	Commence during Planning phases

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		• Roads • PCD's and water reticulation • Diesel generators • Potable water reservoirs • Construction of train loading spur • Storm- and process water pipelines • Hazardous storage facilities <u>Applicable Alternatives:</u> • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2 • CA1 and CA2 • MM2 • MA2	the potential to impact of water quality of the aquatic resources present and a loss of aquatic biodiversity, with special mention of loss of natural migration routes for fish and loss of refugia for the aquatic communities present. Potentially inadequate design of infrastructure may result in changes to instream habitat. Potentially inadequate design of infrastructure may lead to changes to system hydrology and may alter aquatic habitats and lead to a loss in biodiversity as a result of moisture stress and instream flow. Potentially inadequate separation of clean and dirty water areas and the prevention of the release of sediment rich water may alter the aquatic habitat within the receiving environment. Potential inadequate design of a storm water management plan surrounding the structures and parking areas, leading to a loss of streamflow regulation capabilities in the area, altered water quality and hydrology, erosion and sedimentation of the surrounding freshwater environment. <u>Extent of impact</u>: The extent of the impact has the potential to impact both the local and regional areas. <u>Duration of impact:</u> Beyond life of Project								vegetation programme Stop through liner (prevent seepage) Control through monitoring	• Pollution control dams must be adequately designed to contain a minimum of a 1 in 50 year 24 hour storm water event; • Pollution control dams and discard dumps should be off stream and tributary structures as per the proposed layout alternatives and not within the natural drainage system of the area, thereby minimising impacts loss of instream flow and downstream recharge; • Implement an ongoing alien vegetation control program to be initiated in the pre-construction phase of the project; • Design of infrastructure should be environmentally and structurally sound and all possible precautions taken to prevent spillage or seepage to the groundwater resources present; • Any pollution control facilities should be lined with an HDPE liner system to prevent seepage; • Ensure that measures to contain seepage as far as possible to prevent contamination of the groundwater regime are implemented into the design of mining infrastructure; • Upstream dewatering boreholes should be considered to minimise the creation of dirty water and this clean water should be used to recharge the natural systems downstream of the surface infrastructure footprint and zone of hydrogeological influence so as to aid in the prevention of the contamination of the groundwater resources without compromising on surface water recharge further downstream.					Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	

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24	Aquatic environment	Water supply for construction and operational activities Applicable Alternatives: • WS2	Use of surface runoff and groundwater sources for the supply of production water for the mining project may alter surface water recharge and the flow in the receiving systems; Use groundwater sources for the supply of production water for the mining project may result in alterations to groundwater tables and result in the development of an increasing cone of depression over time. Use of the freshwater resources for water supply may lead to changes to system hydrology and may alter aquatic habitats and lead to a loss in biodiversity as a result of moisture stress; and a loss of baseflow in the rivers downstream of the zone of influence. Extent of impact: The extent of the impact is limited to local and regional areas	M	M	Construction to Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	3	H	Stop through planning / placement of infrastructure Control through monitoring	• All infrastructure for the plant, office and shaft complexes should be off stream and tributary structures as per the proposed layouts and not within the natural drainage system of the area, thereby minimising impacts loss of instream flow and downstream recharge; • Upstream dewatering boreholes should be considered to minimise the creation of dirty water and this clean water should be used to recharge the natural systems downstream of the mining rights areas so as to aid in the prevention of the contamination of the groundwater resources without compromising on surface water recharge further downstream.	5	2	M	Prevent impacts to aquatic environment	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Commence during Planning, and Construction, Operation Rehabilitation / Closure phases
25	Aquatic environment	Construction of operational footprint: • Adit; decline shaft • Ventilation shaft • Pre-fabricated structures (offices, stores, workshops, change houses) • Screening and crushing plant • PCD's and water reticulation • Diesel generators • Potable water reservoirs • Construction of train loading spur	Site clearing, the removal of vegetation and disturbance of soils, leading to loss of stormwater attenuation and increased erosion. Long term, may result in alien vegetation encroachment; thereby reducing surface water recharge and resulting in a loss of biodiversity. Earthworks and other mining construction activities in the vicinity of wetland and riparian areas may lead to a loss in aquatic biodiversity.	M	M	Construction to Post-closure		5	3	H	Stop through planning / placement of infrastructure Stop through correct design Control through alien invasive vegetation programme Stop through liner (prevent seepage)	• Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas and the concomitant recharge of streams in the area; • If it is absolutely unavoidable that either the Steenkoolspruit and the Blesbokspruit or their associated tributaries will be affected, disturbance must be minimised and suitably rehabilitated; • Ensure that no incision and canalisation of the aquatic resources present takes place as a result of site clearing and construction activities; • All erosion noted within the study area should be remedied immediately and included as part of the ongoing rehabilitation plan; • During the construction phase of the proposed project, erosion berms should be installed on roadways to prevent gully formation and siltation of the aquatic resources. The	4	2	M	Prevent impacts to aquatic environment		Commence during Planning, and Construction, Operation Rehabilitation / Closure phases

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		• Storm- and process water pipelines • Hazardous storage facilities <u>Applicable Alternatives:</u> • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2	Major earthworks and construction activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites and carbonaceous material. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting; Disturbance of soils during the construction phase could lead to erosion and sedimentation of the aquatic resources present, thus resulting in loss of instream flow. Placement of infrastructure within non-perennial drainage lines with special mention of the mine residue stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity. Altered drainage patterns due to increased impermeable surfaces and installation of culverts/pipes for stream crossings. This would alter the flow and wetting patterns leading to changed vegetation communities. Potential risk of spillage/leakages from waste management infrastructure associated with the proposed structures (e.g. sewage infrastructure) leading to contamination of the receiving freshwater environment. Inadequately constructed clean and dirty water systems may impact on water quality.								Control through monitoring Control through erosion measures Remedy through rehabilitation Control through storm water management Stop and control through training and procedures Control through restrictions and access control Control and stop through waste management Stop through correct design	following points should serve to guide the placement of erosion berms: ➢ Where the track has slope of less than 2%, berms every 50m should be installed; ➢ Where the track slopes between 2% and 10%, berms every 25m should be installed; ➢ Where the track slopes between 10%-15%, berms every 20m should be installed; ➢ Where the track has slope greater than 15%, berms every 10m should be installed; • All soils compacted as a result of construction activities falling outside of development footprint areas should be ripped and profiled; • As much vegetation growth as possible should be promoted within the proposed project area in order to protect soils and vegetation clearance should be kept to a minimum; • No use of clean surface water or any uncontaminated groundwater which potentially recharges the watercourses in the area should take place. In this regard specific mention is made of any water use which will affect the instream flow in the Steenkoolspruit and the Blesbokspruit and the associated tributaries; • Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised; • Permit only essential construction personnel within 100m of all watercourses; • All areas of increased ecological sensitivity should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel during the construction phase of the proposed mining project; • No crossing of the aquatic resources should take place and the substrate conditions of the aquatic resources • Restrict construction to the drier winter months to avoid sedimentation of the aquatic resources in the vicinity of the proposed mining project if at all possible; • No material may be dumped or stockpiled within any rivers, tributaries or drainage lines in the vicinity of the proposed mining project; • Any pollution control facilities should be lined with an HDPE liner system to prevent seepage and contamination of groundwater;						

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			Construction of clean and dirty water separation structures for pollution control purposes may lead to altered flow levels. Potential poor housekeeping and management may lead to impacts on water quality. Potential inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity. <u>Extent of impact</u>: The extent of the impact could extend to both local and regional areas									• Clear separation of clean and dirty water must take place and diversion of clean water around future operational areas (if applicable) must ensure minimisation of the loss of catchment yield; • Clean and dirty water separation systems should be the first systems developed on site; • Very clear and well managed clean and dirty water separation must take place in line with the requirements of regulation GN704 of the national Water Act; • Pollution control dams must be adequately designed to contain a 1 in 50 year 24 hour storm event; • It must be ensured that the construction of all infrastructure prevents failure; • Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts to water quality and loss or transformation of aquatic habitat; • Upstream dewatering boreholes should be considered to minimise the creation of dirty water and this clean water should be used to recharge the natural systems downstream of the surface and underground zone of influence; • All vehicles must be regularly inspected for leaks; • Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil; • It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage; • All hazardous chemicals must be stored on specified surfaces; • All spills should be immediately cleaned up and treated accordingly; • Appropriate sanitary facilities must be provided for the duration of the construction activities and all waste must be removed to an appropriate waste facility • Monitor all systems for erosion and incision; • Implement alien vegetation control program within the riparian zones with special mention of water loving tree species and invasive species such as *Arundo donax* and *Typha capensis;* • Monitor all affected riparian systems for moisture stress;						

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												• Monitor all potentially affected riparian zones for changes in riparian vegetation structure; • Close monitoring of water quality (surface water, groundwater and process water) must take place. • Monitoring of water quality should take place at a minimum frequency of once a month (when surface water is present) during which time major salts and basic metals, are monitored along with basic parameters such as pH, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS), dissolved oxygen and Electrical Conductivity (EC); • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor; • Ongoing aquatic biomonitoring should take place in order to identify any emerging issues in the receiving environment; • Any potential groundwater pollution plume should be modelled and appropriately monitored. Any impacts to the groundwater resources in the vicinity of the proposed mining project will need to be suitably and timeously mitigated to prevent impacts further downstream and potentially on a regional scale.						
26	Aquatic environment	Construction of operational footprint: • Roads • Conveyor system <u>Applicable Alternatives</u>: • PL01 and PL02	Loss of connectivity of freshwater resources as a result of possible road or bridge upgrades and the construction of conveyors in the upper reaches of the tributaries of the Steenkoolspruit, resulting in altered hydrological patterns and fragmented habitats. Water flowing within the freshwater resources could possibly be diverted due to construction of roads within the freshwater resource <u>Extent of impact:</u> The extent of the impact is limited to site and adjacent areas.	M	M	Construction to Rehabilitation / Closure		4	3	H	Stop and control through restriction, training and procedures Control through planning Control through erosion measures Control through storm water management	• During construction phase, no vehicles should be allowed to indiscriminately drive through the freshwater environment and vehicles must remain on designated roadways; • Planning of temporary roads and access routes should take the site sensitivity plan into consideration, and wherever possible, existing roads should be utilised; • If additional roads are required, then wherever feasible such roads should be constructed a distance from the more sensitive freshwater resources and not directly adjacent thereto; • During the construction phase, erosion control measures should be installed on roads to prevent gully formation and siltation of the freshwater resources; • Newly constructed roads should have erosion berms installed in order to reduce the speed of any surface runoff and limit the sedimentation of the freshwater environment; • Adequate storm water management must be incorporated into the design of the roads to prevent erosion and the	3	1	L	Prevent impacts to aquatic environment	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources	Commence during Planning, and Construction, Operation Rehabilitation / Closure phases

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												associated sedimentation of the freshwater resources. Therefore: ➢ Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed; and ➢ Runoff from paved surfaces should be slowed down by the strategic placement of energy dispersing structures. • Access roads for support vehicles, and vehicles used in the construction of the infrastructure and for daily use, should not encroach into the freshwater features unnecessarily; • Any possible road crossings required in addition to the proposed layout alternatives should cross the system at right angles, as far as possible to minimise impacts in the receiving environment, and any areas where bank failure is observed due to the effects of such crossings should be immediately repaired by reducing the gradient of the banks to a 1:3 slope and where needed necessary, installing support structures. This should only be necessary if existing access roads are not utilised; • Areas where bank failure is observed as a result of such stream crossings should be immediately repaired (re-profiled at an 18 degree angle and revegetated with suitable grass species).					Development Act (MPRDA) (Act 28 of 2002)	

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
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27	Aquatic environment	• Construction of ROM, Product and topsoil stockpiles Applicable Alternatives: PL01 and PL02	During the construction phase, stripping/vegetation clearing and potential stockpiling adjacent to freshwater resources and the runoff thereof, could lead to sedimentation of the system, leading to altered water quality and smothering of vegetation. Construction of stockpiles causes altered topography/geomorphology, which leads to altered runoff patterns and formation of preferential flow paths. Runoff from stockpiles and the RoM, could during the operational phase result in additional water inputs into freshwater resources and could cause potential contamination of the surface and groundwater. Extent of impact: The extent of the impact is limited to site and adjacent areas	M	M	Construction to Rehabilitation / Closure		5	3	H	Stop and control through restriction, training and procedures Control through planning Control through erosion measures Control through storm water management Control through monitoring Control through soils management plan	• Ensure that all stockpiles are well managed and have adequate storm water management incorporated into the design of the stockpiles in order to prevent erosion and the associated sedimentation of the freshwater habitat; • All stockpiles must have berms and/or catchment paddocks at their toe to contain runoff from the facilities; • Stockpiles are to be protected by means of protective coverings such as hessian sheeting; • Stockpiles are to be no more than 2m high; • Regular monitoring of stockpiles for seepage and erosion should be implemented, and implement corrective action plans that have been predetermined to be effective in reducing impacts from seepage; • It is highly recommended that a Soils Management Plan be developed by a suitably qualified soil scientist, and implemented to aid in the conservation of soils; • Any pollution control facilities should be lined with an HDPE liner system to prevent seepage; • Clear separation of clean and dirty water must take place and diversion of clean water around future operational areas (if applicable) must ensure minimisation of the loss of catchment yield.	4	2	M	Prevent impacts to aquatic environment	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Commence during Planning, and Construction, Operation Rehabilitation / Closure phases
28	Wetlands	• Site clearance • Pre-fabricated structures (offices, stores, workshops, change houses etc.), • Stockpiles • Roads • Conveyor system • PCD • Adit and shafts • Potential rail spur Applicable Alternatives: • PL01 and PL02 • VL01 and VL02	Site clearing, the removal of vegetation and disturbance of soils for the construction of infrastructure, may enable the recruitment of alien and invasive vegetation, which decreases the available freshwater habitat, increases sedimentation and impacts on the ecological structure of the freshwater environment. Altered drainage patterns due to increased impermeable surfaces and installation of culverts/pipes for stream crossings. This would alter the flow and wetting patterns	H	L	Construction to Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	3	H	Stop and control through seasonal restrictions Stop and control through planning Stop and control through training and procedures Stop and Control through storm water management plan	• As far as possible, all construction activities should occur in the low flow season, during the drier winter months; • Freshwater resource sensitivity maps have been developed for the MRA, indicating the freshwater resources, their relevant buffer zones and regulatory zones in accordance with the National Environmental Management Act (Act 107 of 1998). It is recommended that these sensitivity maps be considered during all phases of the development and with special mention of the planning of infrastructure layout, to aid in the conservation of the freshwater resources habitat and environmental resources within the MRA; • Permit only essential construction personnel within 32m of the freshwater resource habitat, if absolutely necessary that they enter the regulatory zone; • All development footprint areas should remain as small as possible and should not encroach onto surrounding more	3	2	M	Prevent the loss of freshwater habitat and ecological structure, changes to ecological and social-cultural services provision and alteration of the hydrological functioning and sediment balance of the freshwater system, beyond the infrastructure footprint area		Planning, Construction, Operational and Rehabilitation / Closure Phases

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		• TA1, TA2, TA3 • BA1 and BA2 • CA1 and CA2	leading to changed wetland vegetation communities. Potential inadequate design of a storm water management plan surrounding the structures and parking areas, leading to altered water quality and hydrology, erosion and sedimentation of the surrounding freshwater environment.								Control through alien invasive vegetation control plan	sensitive areas. It must be ensured that the freshwater resources, and their associated buffer zones are off-limits to construction vehicles and personnel; • The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas; • All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and maintenance vehicles and personnel; • The duration of possible impacts on the freshwater system should be minimised as far as possible by ensuring that the duration of time in which possible flow alteration and sedimentation will take place is minimised; • Appropriate sanitary facilities must be provided for the life of the construction and all waste removed to an appropriate waste facility; • All hazardous chemicals should be stored on bunded surfaces and no storage of such chemicals should be permitted within the freshwater resources buffer zones; • Adequate storm water management must be incorporated into the design of the proposed activities development in order to prevent erosion and the associated sedimentation of the freshwater resources. In this regard, special mention is made of: • Sheet runoff from cleared areas and impermeable surfaces needs to be curtailed; and • Runoff from paved surfaces should be slowed down by the strategic placement of berms. • No informal fires should be permitted in or near the construction areas; • Ensuring that an adequate number of rubbish and “spill” bins are provided will also prevent litter and ensure the proper disposal of waste and spills; • Edge effects of activities, particularly erosion and alien/weed control need to be strictly managed; and • Implement an alien vegetation control program within freshwater resources areas, throughout the life of mine.						
29	Wetlands	• Site clearance • Construction and use of roads • Construction of conveyor system	Loss of connectivity of freshwater resources as a result of road and conveyor crossings through the freshwater habitat, resulting in altered hydrological patterns and fragmented habitats;	M	M	Construction to Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans	5	3	H	Stop and control through restrictions Stop and control through seasonal restrictions	• During construction phase, no vehicles should be allowed to indiscriminately drive through the freshwater environment and vehicles must remain on designated roadways;	5	2	M	Prevent the loss of freshwater system connectivity, hydrological functioning and loss of habitat.	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA);	Planning, Construction, Operational and Rehabilitation / Closure Phases

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		Applicable Alternatives: • PL01 and PL02	Water flowing within the freshwater resources could possibly be diverted due to construction of roads/conveyors within the freshwater resource; Site clearing, the removal of vegetation and disturbance of soils, may enable the recruitment of alien and invasive vegetation, which decreases the available freshwater habitat and impacts on the ecological structure of the freshwater environment;				(Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*				Stop and control through planning and design Stop and control through training and procedures Remedy through rehabilitation	• Planning of temporary roads and access routes should take the site sensitivity plan into consideration, and wherever possible, existing roads should be utilised; • If additional roads are required, then wherever feasible such roads should be constructed outside of the buffer zone of the wetland resources and not directly adjacent thereto; • During the construction and operational phases, erosion control measures should be installed on roads to prevent gully formation and siltation of the freshwater resources; • Newly constructed roads should have erosion berms installed in order to reduce the speed of any surface runoff and limit the sedimentation of the freshwater environment; • Adequate storm water management must be incorporated into the design of the roads to prevent erosion and the associated sedimentation of the freshwater resources. Therefore: ➢ Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed; and ➢ Runoff from paved surfaces should be slowed down by the strategic placement of energy dispersing structures. • The design and layout of the road must ensure that permanent zones of the freshwater resources remain inundated with water after heavy rainfall events. In order to achieve this the following should be implemented: ➢ Construct a permeable pioneer layer using material such as coarse sand and rocks that do not form acid, to avoid contamination of water; ➢ The pioneering layers of the roadworks should be constructed as follows: Initially a rockgrid and biddum composite should be used as the base layer. A secondary layer consisting of crushed rock with coarse (>300mm at the base) and finer material nearer the top of the structure should be constructed over the entire length of the zone of the wetland where lateral movement of water is expected and except the active channel where culverts are proposed to allow flow of water through the watercourse in as natural a way as possible. The entire set of layer works should be placed on top of the wetland vegetation and associated soils; ➢ The structure on which the road crossing will be placed should span as far as possible outside the lateral flow of water area, in order to ensure that the					• National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	

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												flow of water underneath the road is not inhibited in anyway; and ➢ The design of the road should ensure that the soils within the permanent zones remain saturated throughout the year regardless of the season. • To ensure that permanent, seasonal and temporary wetland zone functionality is maintained, the pioneer layer should be constructed to ensure that soil wetness is maintained in the upper 50cm of the soil to ensure that facultative and obligate wetland vegetation species can still be supported. This will also ensure that soil wetting conditions are maintained; • Due to the length of the crossing a culvert should be placed every 50m along the wetland crossing to facilitate faunal movement across the road structure; • The design and layout of the road and the culvert must promote hassle free movement of more mobile faunal species; • The area in the vicinity of the newly constructed infrastructure (the culvert and the road) should be rehabilitated in a manner that simulate natural conditions in order to enhance or reinstate the ability of the watercourses to provide feeding and breeding sites; • Access roads for support vehicles, and vehicles used in the construction of the infrastructure and for daily use, should not encroach into the freshwater resources unnecessarily; • If crossings are required they should cross the system at right angles, as far as possible to minimise impacts in the receiving environment, and any areas where bank failure is observed due to the effects of such crossings should be immediately repaired by reducing the gradient of the banks to a 1:3 slope and where needed necessary, installing support structures. This should only be necessary if existing access roads are not utilised; • Areas where bank failure is observed as a result of such stream crossings should be immediately repaired (re-profiled at an 18 degree angle and revegetated with suitable indigenous plant species); • During decommissioning, rip and reprofile areas to ensure that no changes to runoff patterns occurs. Stabilize and revegetate these areas with biodegradable hessian and suitable indigenous plan species in order to limit sedimentation of the freshwater environment; and						

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												• Upon closure all haul and access roads which are no longer required, should be removed in order to minimise the impacts on the freshwater resources of the area beyond the life of mine.						
30	Wetlands	• ROM stockpiles • Product stockpiles Applicable Alternatives: • PL01 and PL02	Potential poor planning leading to the placement of stockpiles within freshwater habitat. During the construction phase, stripping/vegetation clearing and potential stockpiling adjacent to freshwater resources and the runoff thereof, could lead to sedimentation of the system, leading to altered water quality and smothering of wetland vegetation. Construction of stockpiles causes altered topography / geomorphology, which leads to altered runoff patterns and formation of preferential flow paths.	M	M	Construction to Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	2	M	Stop and control through berms and paddocks Stop and control through training and procedures Control through monitoring Control through topsoil management plan	• All stockpiles must have berms and/or catchment paddocks at their toe to contain runoff from the facilities; • Topsoil stockpiles are to be protected by means of protective coverings such as hessian sheeting; • Topsoil stockpiles are to be no more than 2m high; • Regular monitoring of stockpiles for seepage and erosion should be implemented, and implement corrective action plans that have been predetermined to be effective in reducing impacts from seepage; and • It is highly recommended that a Topsoil Management Plan be developed by a suitably qualified soil scientist, and implemented to aid in the conservation of soils.	2	2	L	Prevent the degradation of surface and groundwater quality of the freshwater system, and limit loss of habitat and ecological structure	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Planning, Construction, Operational and Rehabilitation / Closure Phases
31	Wetlands	• Crushing and Screening Plant Applicable Alternatives: • PL01 and PL02	Potential impact on surface and groundwater quality due to impaired water quality due to the discharge of pollutants from crushing and screening plant. Increased dust from processing plant, could settle within the freshwater resources, increasing the amount of sediment within the system.	M	M	Construction to Rehabilitation / Closure		3	2	M	Control through dust management Control through monitoring	• Areas surrounding the processing plant should be sprayed regularly with water in order to curb dust generation. These areas should not be over-sprayed causing water run-off and subsequent sediment loss into the freshwater resources; Ensure that the processing plant is well managed and have adequate storm water management incorporated into the design thereof, in order to prevent erosion and the associated sedimentation of the freshwater habitat; and • Regular monitoring of the plant for seepage, waste disposal and erosion should be implemented, and implement corrective action plans that have been predetermined to be effective in reducing these impacts.	2	2	L	Prevent the impact on the sediment balance and hydrological functioning of the freshwater system, and changes to the ecological functioning and socio-cultural services provision of the freshwater system.		Planning, Construction, Operational and Rehabilitation / Closure Phases
32	Wetlands	• Adit and decline shaft • Ventilation Shaft • Underground mining (bord and pillar)	The development of the underground workings may result in a possible reduction of groundwater level although the significance on the fractured zone aquifer and perched aquifers which are the larger drivers of the wetlands in the	M	M	Construction to Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans	3	2.5	M	Control through monitoring Remedy (if required) through groundwater	• The recommended action plans and management measures which applies to the impacts of the dewatering of the aquifer, as provided in the geohydrological report (Scholtz, 2016) should be adhered to;	2.3	2.3	M	Prevent negative impact on the hydrological functioning, water quality and sediment balance of	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA);	Planning, Construction, Operational and Rehabilitation / Closure Phases

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		Applicable Alternatives: • PL01 and PL02 • VL01 and VL02	area is significantly reduced in relation to the deeper aquifer and associated hydraulic head which in turn has the potential to lead to the dewatering of the shallow aquifer. The geohydrological assessment has determined that the area to be affected will be within 900m of the underground workings (Scholtz, 2016). This has the potential to lead to changes in the wetland hydroperiod and this the characteristics of the wetland resources in this affected area. Development of the underground mining could lead to eutrophication of the receiving environment and result in lowering the water quality of the surrounding freshwater system Even though the possibility of decant is unlikely, as suggested within the geohydrological report (Scholtz, 2016) during the decommissioning of the adit/shafts, the possibility still exists. In the case of possible decant, water will accumulate within the adit/shafts and eventually decant into nearby freshwater resources, thus resulting in salt rich and potentially low pH dirty water reaching the receiving environment.				(Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*				management programme Stop and control through restrictions on footprint Remedy through backfilling and re-shaping of subsidence areas	• Any area where decant points may possibly be determined by the geohydrological assessment (Scholtz, 2016), needs to be very carefully managed in perpetuity: ➢ Water levels need to be very strictly managed to keep water levels below any decant level while ensuring that a significant cone of depression impact does not take place; and ➢ If decant will occur all water is to be treated to background water quality values prior to release into the receiving environment. • Decant volumes and salt load could be reduced if an underground seal is installed; • Dewatering boreholes could be considered, if deemed necessary, in order to minimise the creation of dirty water within the shafts/adit, and this clean water should be used to recharge the natural systems within close vicinity of any of the activities; • Very strict control of water consumption and detailed monitoring must take place, and all water usage must continuously be optimised; • Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas which recharge the receiving freshwater environment; • In order to prevent subsidence sufficient pillars must be maintained in the underground workings to prevent subsidence; and • Subsided areas should be backfilled and re-shaped to correspond with the original pre-mining topography so as to recreate topography prior to mining activities.				the surrounding freshwater system.	• National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	
33	Wetlands	• Pollution Control Dams (PCD's) Applicable Alternatives: • PL01 and PL02	Potential inadequate design leading to a poorly functioning dirty water system. The presence of clean and dirty separation infrastructure within close vicinity to the freshwater system could cause a loss of	M	M	Construction to Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5)	3	2	M	Stop and control through planning and design Stop and control through storm water management plan	• Pollution control dam must have sufficient capacity to prevent any discharge for a minimum of a 1:50 year flood event in line with the requirements of regulation GN704 of the National Water Act; • All clean and dirty water areas need to be clearly separated in line with the requirements of regulation GN704 of the National Water Act;	2	2	L	Prevent possible degradation of surface and groundwater of the surrounding freshwater environment.	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA);	Planning, Construction, Operational and Rehabilitation / Closure Phases

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			catchment yield due to stormwater containment.				*Refer also to Table 5 (EIAR / EMPr)*				Stop and control through training and procedures Remedy through rehabilitation	• Potential loss of catchment yield to be determined by a suitably qualified hydrologist, following which suitable mitigation measures such as diversion of clean water to the freshwater system, must be implemented; • The pollution control dam for the facility must be lined with impermeable HDPE liner; • Contamination prevention measures should be addressed in the Environmental Management Programme (EMP) for the proposed mining activities, and this should be implemented and made available and accessible at all times to the contractors and construction crew conducting the works on site for reference; • A spill prevention and emergency spill response plan should be compiled to guide the operations; • During decommissioning, remove the pollution control sumps. Dispose of hazardous waste in the approved manner; and • Remove from site all pollution containment structures. Dispose of materials that will not be used again as hazardous waste.					• GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	
34	Air quality	• Site clearance • Stripping of soil • Construction of infrastructure • Excavation • Blasting and drilling • Use and establishment of roads <u>Applicable Alternatives</u>: • PL01 and PL02 • VL01 ad VL02	<u>Flora</u>: Exposure of vegetation to particulates leads phytotoxic responses, depending on the volume and chemical composition of the particles. Particulate deposition disrupts plant physiology and biochemistry and may cause physical damage by abrasive action during turbulent deposition. Particulate deposition may therefore affect the health of the remaining natural habitats (Open Grassland, Rocky Outcrop, Wetland, Modified Grassland).	H	L	Construction Phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	4	H	Control through monitoring Stop through design and construction Control through maintenance	<u>Material handling and stockpiling:</u> • Wetting and compacting Soft material shaft protection berm. • Establish vegetation on topsoil stockpile. • Good work practices when stockpiling, for example: ➢ Loading and unloading confined to the leeward (downwind) side of the pile; ➢ Drop height reduction etc. <u>Access road:</u> • Access road to be paved; • Paved roads to be maintained by preventing material deposition on the surface of the road, through: • Covering of loads in trucks;	3	3	M	Prevent the deterioration of air quality	GG 36974, R827, National Dust Control Regulations, 1 November 2013. GG 32816, N1210, National Ambient Air Quality Standards, 24 December 2009. GG 35463, GN 486, National Ambient Air Quality Standard for Particulate Matter with Aerodynamic Diameter less than 2.5 Micron Meters (PM2.5), 29 June 20012.	During the Construction Phase

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35	Air quality	• TA1, TA2 and TA3 • BA1 and BA2 • CA1 and CA2	<u>Fauna:</u> Nuisance and stress as a result of significant dust may result in reduced breeding rates in game species (e.g. Buffalo) and livestock. Birds have a higher breathing rate and spend more time in open air and may therefore be sensitive to high concentration of particulates in the atmosphere.	H	L	Construction Phase		5	4	H		• Clean up of spills and wind or water borne deposition before traffic resumes; • Install pipe-grid track out control device; • Install gravel bed track out apron; • Paved interior roads 100foot long and fill road width, or add 4-foot shoulder for paved roads; • Paving access areas to unpaved lots; • Wash vehicle tires; and • Remove silt build up from road by vacuum sweeping, water flushing and/or broom sweeping. <u>Monitoring:</u> • Undertake dust-fall out monitoring in terms of the National Dust Control Regulations. • Use of low Sulphur fuels; • Proper and regular maintenance of vehicles; and • Use of catalytic converters on vehicle exhaust emissions.	3	3	M			
36	Air quality		<u>Agriculture</u>: Particulate deposition disrupts plant physiology and biochemistry and may cause physical damage by abrasive action during turbulent deposition. Reduced photosynthesis results in reduced growth and productivity of crops. In agriculture the impact is felt by either the quantity of the output or yield being reduced or if the quality of the product lowered, this results in reduced nutritional quality and market value of agricultural crops.	H	L	Construction Phase		5	4	H			3	3	M			
37	Air quality		<u>Human receptors</u>: Health impacts on susceptible groups include the elderly, infants, persons with chronic cardiopulmonary disease, -pneumonia, -influenza and -asthma.	H	L	Construction Phase		5	4	H			3	1	L			
38	Air quality		<u>Human receptors</u>: Nuisance impact of dust on surrounding residences.	H	L	Construction Phase		5	4	H			3	1	L			
39	Air quality		Cumulative impact - Degradation of ambient air quality in an airshed priority area.	H	L	Construction Phase		5	4	H			3	3	M			

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40	Air quality		Cumulative impact - Degradation of ambient air quality in an airshed priority area.	H	L	Construction Phase		5	4	H			3	1	L	Reporting on NAEIS	Department of Environmental Affairs, Draft Technical Guidelines for Monitoring, Reporting and Verification of Greenhouse Gas Emissions by Industry, June 2016. National Greenhouse Gas Emission Reporting Regulations.	During the Construction Phase
41	Noise	• Use and development of roads • Excavation • Construction of Infrastructure Applicable Alternatives: • PL01 and PL02 • VL01 ad VL02 • TA1, TA2 and TA3 • BA1 and BA2 • CA1 and CA2	During the construction phase, the activities will involve significant noise and vibration generating mechanisms that can have a significant impact on the surrounding communities and the animal life. Extent of impact: All surrounding farms and portions that fall within the area of responsibility as indicated. The portions that will be most affected, are Portions 1, 11, 21, 22, 14, 24, 23, 13, and 26 on Winterhoek as well as Portion 9 on Leeuwkop and Portion 15 on Holspruit. Duration of impact: Lasting during the construction and erection of shaft, plant, buildings and other surface infrastructure. Degree to which impact can be reversed: It is envisaged that should people and animal life be allowed to remain on the property during these construction, development and implementation phases, the consequences will be very difficult to reverse.	M	H	Construction	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	3	H	Control through monitoring Stop and control through maintenance Stop and control through procedures	• Effective maintenance of vehicle engines and exhaust systems. • Hearing conservation programme as per DMR guidelines on Noise Control. • The use of approved hearing protection devices for personnel working in close proximity of the workings. • Incorporate sound attenuation measures to any equipment that could generate noise levels in excess of the statutory limits as published by the Department of Mineral Resources. • Legitimate procedures and standard should be followed by the contractors involved with the drilling and blasting and shaft sinking activities. • From an occupational perspective, the mine workers should be monitored with respect to their personal exposure levels should as part of the legal requirements of Section 12 of the Mine Health and Safety Act (MHSA). • Proper Risk Assessments, as per Section 11 of the MHSA, should be done before any activities commence to ensure that all possible mitigation and control measures are implemented and maintained.	3	3	M	Limit the generation of noise through the various mine and plant activities to prevent the causing of any possible disturbance or discomfort of wildlife species or communities as a result.	• Relevant sections of the National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations there under and amendments thereto • SABS Code of Practice 0103 of 2008: The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication. • SABS Code of Practice 0328 of 2008: Environmental Noise Impact Assessments	Mitigation measures need to be put in place before any activities commence and thereafter these measures need to be controlled, maintained and complied with on a continuous basis Regular environmental noise measurements should be conducted to ensure that the affected communities are not exposed to adverse noise levels during the day and night. Frequency of monitoring could be quarterly during construction, moving the frequency to bi-annually during normal operations.

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
42	Vibration and air blast	• Blasting	Air blast impact on houses. Impact is negligible.	H	L	Construction	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	1	L	Control through procedures and training Stop through relocation, if buffalo camp remains Control through monitoring	• Considering the effects from blasting operations no specific mitigations will be required regarding ground vibration, air blast or fly rock apart from best practice operations. The area is such that free blasting – minimum controls – will not be possible. A proper design and best practice will still need to be applied. • One aspect that will need to be mitigated and this may require further investigation is the buffalo camp that is next to box-cut area. It is uncertain what arrangements and negotiations are currently in place or will be anticipated regarding the buffalo camp. Should the buffalo camp remain it may be required to temporary relocated the animals out of the camp until blasting is completed. • Use correct product, control product quality, prevent sleep time for charged blast holes, same day charge and blast • It is highly recommended that the blast design be reviewed and a detail blasting code of practice be prepared and accepted for the development of the box-cut. Designing of blasts must consider the location of the blast and location of surface structures. The expected levels of ground vibration and air blast must be considered and calculated for the nearest surface structures. The design must consider final pattern, charging configurations and timing taken into account. • It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community of blasting dates and times. • A monitoring programme for recording blasting operations is recommended. This process will be mainly for the development of the box-cut. The following elements should be part of such a monitoring program: ➢ Ground vibration and air blast results ➢ Blast Information summary ➢ Meteorological information at time of the blast ➢ Video Recording of the blast ➢ Fly rock observations • Most of the above aspects do not require specific locations of monitoring. Ground vibration and air blast monitoring requires identified locations for monitoring. Monitoring of ground vibration and air blast is done to ensure that the generated levels of ground vibration and air blast comply with recommendations. Proposed positions were selected by the specialist to indicate the nearest points of interest at	3	1	L	Manage blasting activities in order to limit any impacts that may arise from such activity.	• Mine Health and Safety Act 29 of 1996 • Mine Health and Safety Regulations and amendments thereto • Mine's internal procedures • Procedures must comply with legislation	Construction Phase
43	Vibration and air blast	• Blasting	Fly rock impact on houses. Impact is negligible	H	L	Construction		3	1	L			3	1	L			
44	Vibration and air blast	• Blasting	Impact of fumes – houses. Impact is negligible	H	L	Construction		3	1	L			3	1	L			
45	Vibration and air blast	• Blasting	Impact on buffalo camp located on Portion 21 of the farm Winterhoek 214 IR.	H	L	Construction	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	2	M			1	1	L			

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												which levels of ground vibration and air blast should be within the accepted norms and standards as proposed in the specialist report. The monitoring of ground vibration will also qualify the expected ground vibration and air blast levels and assist in mitigating these aspects properly. This will also contribute to proper relationships with the neighbours. Three monitoring positions were identified around the mining area. These points will need to be re-defined with the initial first blast and consider the final blast design that will be applicable.						
46	Archaeology and heritage	• Mining and related activities (construction) Applicable Alternatives • PL01 and PL02 • TA1, TA2 ad TA3	Historical Remains: Farmstead Complex 01 (FC01) will not be affected by the Leslie 2 Project.	H	L	Construction to Rehabilitation/ Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	1	L	Control through training and procedures Control through maintenance Stop through protection	• FC01 may not be affected (altered) to suit the mine's needs or demolished. SAHRA will require that FC01 has to be studied and documented by a conservation architect before it is affected in any way. Hereafter SAHRA may issue a permit for alteration or demolishment.	1	1	L	Conserve Farmstead complex (FC01)	National Heritage Resources Act (Act No. 25 of 1999), and amendments thereto	Commence with construction phase (if mitigation required)
47	Archaeology and heritage	• Mining and related activities (construction) Applicable Alternatives • PL01 and PL02 • TA1, TA2 ad TA3	Historical Remains – Farmstead Complex 02: FC02.1 and FC02.5 are located approximately 180m to the west of the conveyor route. These two structures are part of a complex of structures which constitute FC02 which will not be directly impacted by the conveyer route	H	L	Construction to Rehabilitation/ Closure		3	1	L		• FC02 has been altered significantly during the more recent past. Its historical core may inform about the significance of the complex before (if at all) it is altered to suit the mine's needs or demolished. SAHRA will require that the structures to be affected (and the complex as such) have to be studied and documented by a conservation architect before it is affected where after SAHRA may issue a permit for alteration or demolishment.	1	1	L	Conserve Farmstead complex (FC02)		Commence with construction phase (if mitigation required)

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
48	Archaeology and heritage	• Mining and related activities (construction) Applicable Alternatives • PL01 and PL02 • TA1, TA2 ad TA3	Graveyard (GY) 03: GY03 is located approximately 85m to the east of the proposed conveyor route. Construction activities may impact on Graveyard 03, if mitigation measures are not implemented appropriately.	H	L	Construction to Rehabilitation/ Closure		3	2	M		• Implement precautionary measures: demarcate GY03 with red cautionary tape. • Place 'Danger Graveyard' signposts to avoid that graveyard be damaged by construction personnel and/or their vehicles. • Implement general mitigation measures as outlined for remaining graveyards (see Part 10.4.3) • Demarcate graveyards with fences or with walls. To be fitted with access gates. • Regulated visitor hours compatible with mine safety rules. Not necessary when graveyards are located next to national roads. • Maintain corridors of at least 20m between graveyards' fences and developments such as roads or infrastructure. • Inspect graveyards every three months. Note in inspection register. Must also outline state of graveyards during each inspection. Keep reports on damages. Follow with the necessary maintenance work. Must be recorded in register. • Kept tidy from any weeds and refuse.	1	1	L	To conserve GY03 as well as other graveyards in the project area		Commence with construction phase. Continue general mitigation measures during operational and decommissioning phase
49	Archaeology and heritage	• Mining and related activities (construction) Applicable Alternatives • PL01 and PL02 • TA1, TA2 ad TA3	Graveyards That remain unaffected: No impacts. GY01, GY02, GY04, GY05, GY06 and G01 will remain unaffected by the Leslie 2 Project	H	L	Construction to Rehabilitation/ Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	1	L		• Implement management measures outlined in Part 10.4.3 of the report: • Demarcate graveyards with fences or with walls. To be fitted with access gates. • Regulated visitor hours compatible with mine safety rules. Not necessary when graveyards are located next to national roads. • Maintain corridors of at least 20m between graveyards' fences and developments such as roads or infrastructure. • Inspect graveyards every three months. Note in inspection register. Must also outline state of graveyards during each inspection. Keep reports on damages. Follow with the necessary maintenance work. • Must be recorded in register. • Kept tidy from any weeds and refuse.	1	1	L	To conserve all unaffected graveyards in the project area		Commence with construction phase. Continue general management measures during operational and decommissioning phases

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50	Palaeontology	• Adit; decline shaft • Ventilation shaft • Pre-fabricated structures (offices, stores, workshops, change houses) • Screening and crushing plant • PCD's and water reticulation • Diesel generators • Potable water reservoirs • Construction of train loading spur • Storm- and process water pipelines • Hazardous storage facilities <u>Applicable Alternatives:</u> • TA1; TA2 and TA3 • PL01 and PL02 • VL01 and VL02 • BA1 and BA2	Surface infrastructure construction: The probability of a negative impact upon the palaeontological heritage of the surface 1-2 m of the bedrock and regolith strata is assessed as being nil.	H	L	Construction Phase to Rehabilitation/ Closure		1	1	L		No mitigation. Refer to impact and mitigation measures under Operational Phase below.	1	1	L	Prevent the destruction of and loss of sites of palaeontological importance.	National Heritage Resources Act (Act No. 25 of 1999), and amendments thereto	N/A
51	Traffic	Refer to impacts under the Operational Phase (below).																

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52	Visual	• Site clearing Applicable Alternatives: • PL01 and PL02	Removal of vegetation leading to increased visual contrast, loss of Visual Absorption Capacity of the landscape and visual intrusion on sensitive receptors. Extent of impact: Impacts are extended beyond the site boundaries (hundreds of meters) to include areas from where the impact is expected to be visible to sensitive receptors.	M	M	Construction	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	4	H	Control through restrictions and planning Stop and control through erosion measures Stop and control through procedures and training Stop through appropriate design and construction	• The development footprints and disturbed areas should be kept as small as possible and the areas cleared of natural vegetation/ agricultural land and topsoil must be kept to a minimum. • As far as possible, surface infrastructure should be placed in areas that have already been disturbed. • The extent of all surface infrastructure footprint areas and permanent structures must be minimised to what is absolutely essential. • It must be ensured that existing vegetation in the vicinity of surface infrastructure and along the main roads is retained during the construction phase to act as visual screens from surrounding receptor sites. • As far as possible, existing roads are to be utilised, also for construction purposes, to prevent additional site clearance.	3	3	M	To keep development footprint area as small as possible in order to present unnecessary loss of vegetation	• National Environmental Management Act (NEMA) (Act 107 of 1998). • National Heritage Resources Act (Act 25 of 1999 • Advertising on Roads and Ribbons Act (Act 21 of 1940) • Municipal Systems Act (Act 32 of 2000)	• Planning and Construction Phase
53	Visual	• Site clearing Applicable Alternatives: • PL01 and PL02	Erosion and loss of topsoil leading to increased visual contrast, loss of Visual Absorption Capacity of the landscape and visual intrusion on sensitive receptors. Extent of impact: Impacts are extended beyond the site boundaries (hundreds of meters) to include areas from where the impact is expected to be visible to sensitive receptors.	M	M	Construction		4	4	H		• Erosion, which may lead to high levels of visual contrast and further detract from the visual environment, must be prevented throughout the lifetime of the project by means of putting soil stabilisation measures in place and concurrent rehabilitation. • It must be ensured that topsoil stockpiles are not steeply sloped and it is recommended that such stockpiles be vegetated with an indigenous grass species to mining visual contrast and prevent soil losses.	3	3	M	To prevent erosion of soils and subsequent loss of valuable topsoil		• Planning and Construction Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
54	Visual	• Site clearing • Infrastructure placement Applicable Alternatives: • PL01 and PL02	Alteration of natural features as a result of infrastructure placement and positioning, including potential loss or alterations of wetlands in the vicinity of the overland conveyor and rocky areas, leading to loss of visual quality and visual exposure. Natural features act as visual resources and disturbance of such landscape features will also have an impact on landscape character and sense of place of the region. Extent of impact: Impacts are extended beyond the site boundaries (hundreds of meters) to include areas from where the impact is expected to be visible to sensitive receptors.	L	H	Construction	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	5	H	Control through restrictions and planning Stop and control through erosion measures Stop and control through procedures and training Stop through appropriate design and construction	• Placement of infrastructure outside of ridges and rocky outcrop areas and outside of other ecologically sensitive areas (such as wetland features in the vicinity of the overland conveyor) that also act as visual resources. • Conveyor design to span across wetland features as far as possible to minimise damage to wetland features. • Care to be taken during construction to limit alteration of wetlands and rocky areas as far as possible. • Appropriate rehabilitation actions to be taken where damage to natural visual resources has taken place.	3	4	H	To prevent loss of sensitive habitat feature act as visual resources within the study area and contribute to landscape character within the MRA		Planning and Construction Phase
55	Visual	• Excavation • Blasting Applicable Alternatives: • PL01 and PL02	Excavation and blasting during construction of mining infrastructure will lead to visual intrusion and visual exposure of sensitive receptors. Extent of impact: Impacts are extended beyond the site boundaries (hundreds of meters) to include areas from where the impact is expected to be visible to sensitive receptors.	M	M	Construction		3	3	M		• Excavated areas are to be infilled with available material during decommissioning and closure. • Blasting and excavation is to be kept to a minimum and limited to essential areas.	2	3	M	To minimise the visual impact from excavations and blasting		Planning and Construction Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
56	Visual	• Construction of infrastructure Applicable Alternatives: • PL01 and PL02 • VL01 and VL02 • TA1, TA2 and TA3 • CA1 and CA2	Topographical alteration as a result of construction activities leading to a change in the natural environment which will lead to increased level of visual intrusion and a potential impact on sense of place of the region. Extent of impact: Impact on local scale/ adjacent sites (km's). Alterations to the topography of the landscape is likely to be visible	M	M	Construction	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	5	H	Control through restrictions and planning Stop and control through erosion measures Stop and control through procedures and training Stop through appropriate design and construction	• As far as possible, natural contours must be followed during infrastructure placement and cut and fill activities should be kept to a minimum. • New roads are to follow the undulating contours of the landforms in order to make it less visually prominent and to reduce the need for cut and fill activities. Siting of roads should avoid steep side slopes. • During rehabilitation, the removal of infrastructure, backfilling into shaft, ripping of roads and reshaping of impacted areas should take place. • It must be ensured, wherever possible, that existing natural vegetation is to be retained and incorporated into the site rehabilitation especially in line of sight from sensitive receptors. • Screening possibilities through the placement of indigenous trees or the placement of berms where infrastructure will be visible from the N17 must be considered. • As far as possible, infrastructure should not be placed on ridgelines or other locations where they would be silhouetted against the sky. • Where mining infrastructure is sited within view of visually sensitive areas, it must be placed as far away as possible or within lower-lying areas where it may be screened by topography. Where full screening of infrastructure components is not possible, siting should take advantage of partial screening opportunities. • Where possible, placing of surface infrastructure in front of visually prominent landscape features, that naturally draw an observer's attention should be avoided. • The height of structures should be a low as possible, where this can be achieved without increasing the infrastructure footprint. • An ecological approach to any proposed landscaping is recommended. Should plants be introduced for this	4	3	H	To minimise construction activities and impacts from a project layout that will lead to high levels of topographical alteration		Planning and Construction Phase
57	Visual	• Construction of infrastructure Applicable Alternatives: • PL01 and PL02 • VL01 and VL02 • TA1, TA2 and TA3 • CA1 and CA2 • BA1 and BA2	Mine infrastructure including buildings being visible over long distances and creating strong contrast with the surrounding landscape. Extent of impact: Impact on local scale/ adjacent sites (km's).	M	M	Construction		4	4	H			4	3	H	To limit visual impacts as a result of mine surface infrastructure such as buildings		Planning and Construction Phase

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												purpose, choice should be guided by ecological rather than horticultural principles. • Stockpiles may be placed to screen mining activities from the potential viewers. • Painting or coating infrastructure components to match darker colours in the natural surroundings may reduce the distance required for effective screening. • Visually cluttered material storage yards and laydown areas should be screened through the use of material fencing, which will result in a more unified and tidy appearance. • It must be ensured that all buildings and other built structures fit its surroundings through the appropriate use of colour and material selection in order to lower the visibility of the proposed project. • Natural colours should be used in all instances and the use of highly reflective material should be avoided. Any metal surfaces should be painted to fit in with the natural environment in a colour that blends in effectively with the background. White structures are to be avoided as these will contrast significantly with the natural surroundings. • The identification of appropriate colours and textures for facility materials should take into account both summer and winter appearance. • Where a paved road surfaces are required, the colours of paving materials should complement the natural colour and texture of soils in the area. • The use of permanent signs and project construction signs should be minimised and visually unobtrusive. • Housekeeping of the site during construction and operational activities must be maintained at a high standard. • Once mining activities has been completed, it must be ensured that all infrastructure be removed and that efficient rehabilitation to take place within these areas. • It is recommended that a visual monitoring programme, to ensure that mitigation measures regarding visual impacts are implemented and maintained, be designed for implementation throughout all development phases. This programme would largely be based on visual						

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												reconnaissance at ground level and it must be noted that the monitoring plan must be continually updated and refined for site-specific requirements. The following points aim to guide the design of the monitoring plan: ➢ Development and implementation of a decommissioning and site revegetation plan in order to ensure that the area's pre-development scenic quality and integrity are restored and that the project area is visually integrated into the surrounding landscape setting. Important aspects addressed should include requirements that most aboveground and near-ground structures be removed, that the project site be re-graded, and that indigenous vegetation be re-established to be consistent with the surrounding landscape; ➢ The plan should include provisions for monitoring the efficacy of the proposed mitigation measures and determining compliance with the project's visual impact mitigation requirements; ➢ The method of monitoring must be designed to be subjective and repeatable in order to ensure consistent results; ➢ The selected KOPs should be used over the life of the project to review the success of the mitigation plan; ➢ Predevelopment visual conditions and the inventoried visual quality rating and scenic integrity should be reviewed after construction; ➢ The visual monitoring programme should be based on the following parameters: o Airborne dust (in line with air quality assessment) o Visibility of lights at night from surrounding receptors; o Number of lights visible; o Vegetation cover and height; and o Disturbance to receptors. ➢ Vegetation must be monitored annually in terms of vegetation growth, density, height, species analysis and soil fertility for a period of five years after closure and in line with the vegetation monitoring plan, to ensure that concurrent						

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												rehabilitation is taking place and that mine structure are revegetated; ➢ At closure the success of rehabilitation would be based on the rate and percentage of vegetation recovery. Monitoring is to continue beyond mine closure to ensure that the rehabilitation is successful and that the vegetation is self-sustaining. The success of rehabilitation will also largely be dependent upon the invasion of alien species; ➢ Maintenance of mining infrastructures and operations must be monitored; and ➢ Results of the monitoring activities must be taken into account during all phases of the proposed mining development and action must be taken to mitigate impacts as soon as negative effects from mining related activities become apparent.						
58	Economic	• Mining and related activities	GDP Impact (National): GDP is a good indicator of economic growth and welfare as it represents, among other, criteria, remuneration of employees and gross operating surplus (profits) as components of value added at all the levels of the economy. The direct impact generated during Year 2 is estimated at R110.27 million with the total GDP at R252.05 million in 2015 prices. GDP Impact (Provincial): The direct impact generated during Year 2 is estimated at R88 million with the total GDP at R141 million in 2016 prices.	-	-	Construction	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	Positive					Positive					

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
59	Economic	• Mining and related activities	<u>Capital formation (National):</u> The direct capital will be around R210.21 million supplemented by the indirect component of R117.32 million, the induced element of R249.38 million providing a total of R576.90 million. It is interesting to note that the original investment of R233 million is increased by a factor of 2.47 to R577 million. <u>Capital formation (Provincial):</u> The direct capital will be around R178 million supplemented by the indirect component of R56 million and the induced element of R55 million providing a total of R289. It is interesting to note that the original investment of R178 million is increased by a factor of 1.62 to R289 million.	-	-	Construction	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	Positive					Positive					
60	Economic	• Mining and related activities	<u>Employment created (National):</u> The direct employment of 250 is supplemented by 107 indirect and 214 induced opportunities providing a total of 571 opportunities. This is a 2.28 growth factor in terms of the direct jobs to the total opportunities created. <u>Employment created (Provincial</u>): The direct employment of 217 is supplemented by 103 indirect and 127 induced opportunities providing a total of 437 opportunities. This is a 201 growth factor in terms of the direct employment opportunities to the total opportunities created.	-	-	Construction		Positive					Positive					

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
61	Economic	• Mining and related activities	Impact on households (National): The total payments to households are estimated at R180.83 per annum with R29.47 million to low-income households, 16.3% to the low-income households. Impact on households (Provincial): The total payments to households is estimated at R65.33 million per annum with R16.87 million to low-income	-	-	Construction	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	Positive					Positive					

Table 66: Impacts and Risks identified: Operational Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
1	Geology	• Underground mining (bord and pillar)	A permanent impact on the localised geology of the areas associated with the proposed extension area will result from the mining and removal of coal.	N	Y	Operational, Rehabilitation and Closure; Post-closure	4 Seam Select: 30,532,655 MTIS[67] 2 Seam: 34,782,169 MTIS	5	3	H	Control through mine planning and scheduling	The mining activities will be limited to the mining rights boundary area and only to what is required in the mine plan (Mining Works Programme and Life of Mine Plan)	5	3	H	To minimise the destruction of the geological strata and to prevent the unnecessary loss of geology	• In compliance with the Mining Right in terms of the MPRDA (2002), and the EMPr (and its associated documentation)	During the Operational Phase

[67] Mineable tonnes in situ

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
2	Soil	• Use of roads / hauling activities	Heavy equipment traffic is anticipated to cause significant soil compaction. The severity of this impact is anticipated to be particularly highest in the vicinity of the proposed hauling and access roads. The extent of the impact is anticipated to be primarily limited to the immediate vicinity the proposed development areas. The duration of the impact is likely to persist beyond life of mine if left unrehabilitated.	M	M	Construction, Operational, Rehabilitation and Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	4	H	Control through planning and scheduling Stop through training and procedures	• Schedule vegetation clearance and soil stripping to coincide with the dry (low rainfall) season as far as possible; • Vehicular movement should be strictly prohibited over stockpiled soils; • Lightly rip stockpiles to at least 25 cm beneath the surface prior to re-vegetation; and • Rip the soils to at least 60 cm below ground surface following rehabilitation.	5	2	M	Maintain functional soil structure to sustain post-mining land capability	• Rehabilitation, Decommissioning- and Closure plan and Closure Objectives. • The mine's internal procedures.	During Construction, Operational and Rehabilitation / Closure Phases.
3	Soil	• Underground mining (bord and pillar) • Hazardous storage facilities • ROM and product stockpiling • Use of roads / hauling activities Applicable Alternatives PL01 and PL02 TA1	The soil contamination impact is largely dependent on the nature, volume and/or concentration of the contaminant of concern, and all of the identified soils are considered to be equally predisposed to contamination, as contamination sources are unpredictable and typically occur as incidental spills or leaks, and/or or decant of contaminated mine waste water. In addition, accumulative coal dust settling on the soil surface may cause significant soil contamination through leaching. The extent of the impact will likely spread to the surrounding areas depending on the nature (e.g. solid vs liquid) of the incident as well as volume and/or concentration of the contaminant source. The duration of the impact may persist for the duration of the mining activities.	M	L	Construction, Operational, Rehabilitation and Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	4	H	Stop through contamination prevention and emergency preparedness Stop through training Control through waste management	• Strict waste management and activity-specific • EMP guidelines should be adhered to throughout the project; • Contamination prevention measures should be addressed in the EMP for the proposed activity; • A spill prevention and emergency spill response plan with clean-up measures, to mitigate ingress of contaminants into the soils and potential leaching into groundwater should be incorporated to the safety protocols; • Burying of waste should be strictly prohibited, and all waste should be managed in accordance with the relevant legislative requirements; and • The accumulated coal dust layer over the soil surface should be excavated and disposed	3	3	M	Preserve healthy (non-toxic) growth medium for future land use	• Principles in the MPRDA, 2002, NEMA, 1998, NEM: WA, 2008, Regulations there under and amendments thereto. • National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GNR.331 of 2014), thereunder. • Rehabilitation, Decommissioning- and Closure plan and Closure Objectives. • The mine's internal procedures.	During Construction, Operational and Rehabilitation / Closure Phases.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
4	Soil	• Underground mining (bord and pillar)	Subsidence could potentially occur due to structural distortion of the support pillars and/or overlying strata of the underground mine roof. The extent of subsidence impact (if encountered) could potentially extend to the local surroundings of the MRA, depending on the source.	M	L	Operational, Rehabilitation and Closure		2	2	L	Stop through risk assessments Remedy through reshaping of topography	• Susceptible areas to subsidence should be identified during the geotechnical risk assessment prior to any underground mining activity; • No infrastructure (particularly hazardous waste facilities and offices) should be developed over the identified geotechnically susceptible areas; • A geotechnical risk assessment can be conducted after demolition and decommissioning of surface infrastructure and prior to abandonment of the underground mine to assess the potential risk of subsidence and associated implications for future land use opportunities; • Subsided areas can be backfilled and re-shaped to correspond with the original pre-mining topography to avoid ponding and waterlogging conditions.	2	2	L	Maintain a conducive landscape to enable pre-mining land uses	• Principles in the MPRDA, 2002, NEMA, 1998, NEM: WA, 2008, Regulations there under and amendments thereto. • The mine's internal procedures.	Rehabilitation / Closure Phases
5	Flora	• Conveyer system Applicable Alternatives CA1 and CA2 PL01 and PL02	Dust may be generated during the conveying of coal on the conveyor. This may result in a negative impact on the floral diversity and SCC on floral habitat in the immediate vicinity of the conveyor belt, by affecting the photosynthetic capability of flora. The impact is confined to the conveyor belt and the immediate vicinity	M	L	Operational	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5*	3	3	M		• Implement effective dust control, such as wetting of coal and dust covers over the conveyor. • Regularly monitor of vegetation in the immediate vicinity (within 50m) to determine any impact on floral habitat due to dust generation from the conveyor belt.	2	2	L	Limit dust and noise generation during the operational phase of the conveyor		During Planning, Construction, and Operational Phases.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
6	Fauna	• Conveyer system Applicable Alternatives CA1 and CA2 PL01 and PL02	Dust and noise may be generated during the conveying of coal on the conveyor belt. This may result in a negative impact on the faunal diversity and SCC. Faunal habitat in the immediate vicinity of the conveyor belt may be negatively affected, by affecting the photosynthetic capability of flora species that will provide habitat for faunal SCC. Noise and dust generated during the operational activities may also negatively affect the breeding potential of game species especially (Cape Buffalo) as stress levels have the potential to increase and lower the breeding rate of the animals. Extent of impact: The impact is confined to the conveyor belt and the immediate vicinity.	M	L	Operational	*(EIAR / EMPr)*	5	5	H		• Implement effective dust control, such as wetting of coal and dust covers over the conveyor; • Construction of a berm (2.5m high) on the western side of the proposed conveyor belt alignment, as to lower the noise generated during the operational phase of the conveyor belt; • Analysis of fresh dung samples from the *Syncerus caffer* must be collected 6months prior to any construction commences to test for stress levels and to set a benchmark before any mining activities commence. Once mining activities commence, these tests must be done on a 6months basis; and • Regularly vegetation monitor in the immediate vicinity (within 50m) to determine any impact on floral habitat due to dust generation from the conveyor belt, so that micro habitat for faunal SCC is not negatively impacted upon.	4	3	H	Limit dust and noise generation during the operational phase of the conveyor		During Planning, Construction, and Operational Phases.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
7	Surface water	• Underground mining (bord and pillar)	Coal mining operations may lead to interruption of surface and sub-surface flows, lead to the concentration of surface flow, change in flow pathways, flow impoundment, increased surface runoff due to hardened surfaces and an increase in erosion potential. <u>Surface water quality</u>: There may be a decrease in surface water quality when any surface water comes into contact with dust, eroded soil, carbonaceous materials or other pollutants generated during the operational phase of the Leslie 2 project. The sediment load within surface water runoff may increase if not prevented or mitigated, or the chemistry of surface water may be altered. <u>Surface water quantity</u>: Coal mining operations may isolate certain areas resulting in a reduction in the clean water catchment yield contributing runoff to clean water drainage lines during rainfall events. <u>Extent</u>: Impacts on extended area beyond the site boundary (hundreds of meters) <u>Duration</u>: Operational phase	M	M	Operational phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	2	M	Stop and control through containment Stop and control through diversion Control through erosion control measures	• Contain all affected water runoff from the proposed dirty water areas. • Divert all upstream clean water runoff away from the plant and shaft operation. • Construct a berm around the decline shaft to prevent surface water ingress into mining operations during heavy rainfall events. • Implement erosion protection measures where surface water flow is concentrated.	2	2	L	To prevent surface water quality deterioration and a reduction in surface water quantity towards the receiving clean water environment.	• DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	Operational phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
8	Surface water	• Conveyor system • PCD's • Water reticulation structures Applicable Alternatives: • PL01 and PL02	Failure of pipes transporting dewatered water from underground workings, overflow from pollution control dams, sumps / oil traps, accidental discharges of affected water and coal spillages underneath the conveyor may impact on the surrounding clean water environment. Surface water quality: Overflows and spillages from affected water facilities may lead to the deterioration in water quality affecting the use of surface water as a natural resource. Extent: Impacts on extended area beyond the site boundary (hundreds of meters) Duration: Operational phase	H	L	Operational phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	3	M	Control through inspections Stop through correct design and construction Stop through pollution control equipment Control through spillage management	• Conduct regular inspections on all affected water systems and the conveyor system. • Construct HDPE lined pollution control dams to limit seepage to groundwater resources. • Maintain a freeboard of at least 0.8 metres on all pollution control dams to comply with the GN 704 Regulations. • Implement level control on pollution control dams. • Install pumping infrastructure in the proposed sumps to pump affected water to the pollution control dams for reuse. • Attend to any spillages as soon as possible.	2	2	L	To prevent surface water quality deterioration and a reduction in surface water quantity towards the receiving clean water environment.	• DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	Operational phase
9	Surface water	• Waste management Applicable Alternatives: • PL01 and PL02 • VL01 and VL02	Dumping of waste or any foreign material into drainage lines and wetlands may impact on surface water resources and aquatic biodiversity and ecosystems. Surface water quality: The abovementioned impact may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems. Extent: Impacts on extended area beyond the site boundary (hundreds of meters)	M	M	Operational phase		4	4	H	Control and stop through proper waste management Stop through correct storage	• Implement good housekeeping practises during the operational phase of the Leslie 2 project. • Separate different types of waste. • Store all hazardous waste in designated areas and dispose of accordingly. • Avoid the location and placement of any waste in close proximity of any water resource outside of demarcated areas.	2	4	M	To prevent surface water quality deterioration and degradation of aquatic biodiversity and ecosystems.		Operational phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
10	Surface water	Crushing and Screening Plant (Plant Complex) Shaft Complex Applicable Alternatives: PL01 and PL02	Upstream clean surface runoff may be exposed to contaminants and bare surfaces within the shaft and plant areas. Surface water quality: Deterioration of water quality due to exposure to possible contaminants and bare surfaces that may result in a decrease in surface water quality towards the natural clean water resources in the vicinity of the operation. Extent: Impacts on extended area beyond the site boundary (hundreds of meters)	H	M	Operational phase.	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	2	M	Control through diversion of clean water	• Divert all upstream surface runoff away from the mining operations. • The construction of culverts is proposed at areas where access roads might get damaged during heavy rainfall events. • Contain all affected water runoff within the dirty water areas. • Concrete lined drainage channels are proposed within the dirty water areas identified for the plant and shaft areas to convey affected water runoff towards proposed sumps for re-use. • All coal stockpiles to be placed on impermeable surfaces to limit seepage and possible contamination of groundwater resources. • Implement a surface water monitoring programme.	2	2	L	Prevent affected storm water discharge into the receiving clean water environment.	• DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	Operational phase.
11	Surface water	Vehicle wash bays Applicable Alternatives: PL01 and PL02	Ineffective containment of dirty wash water towards the receiving clean water environment. Surface water quality: Discharge of affected water from the vehicle wash bays may contain hazardous substances that may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems. Extent: Impacts on extended area beyond the site boundary (hundreds of meters)	M	M	Operational phase.		4	2	M	Control and stop through training and procedures Stop through proper design and construction	• Ensure that water draining through the vehicle wash bays and workshops pass through oil traps and oil separators. • Re-use affected water as far as possible.	2	2	L	To prevent surface water quality deterioration and degradation of aquatic biodiversity and ecosystems.		Operational phase.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
12	Surface water	Maintenance activities • Workshops Applicable Alternatives PL01 and PL02	Maintenance activities resulting in spillage of oil, fuel, grease during mining operations. Surface water quality: Spillages of substances that contains hydrocarbons may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems. Extent: Impacts on extended area beyond the site boundary (hundreds of meters)	H	L	Operational phase.	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	3	M	Control and remedy through procedures Stop through bunding and storage	• Treat all hydrocarbon spills as hazardous waste and dispose of accordingly. • Store fuel and oil is designated bunded areas. • Refuelling of vehicles and equipment to take place on an impermeable surface with a sump. • Emergency spills to be cleaned up quickly and effectively with approved absorbent material.	2	2	L	To prevent surface water quality deterioration and degradation of aquatic biodiversity and ecosystems.	• DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	Operational phase.
13	Surface water	Off-loading and refuelling activities Applicable Alternatives PL01 and PL02	Accidental spillages of fuel on site and incorrect storage practises may impact on the surrounding clean surface water environment. Surface water quality: Incorrect fuel storage, handling and accidental spillages as a result during operations may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems. Extent: Impacts on extended area beyond the site boundary (hundreds of meters)	M	M	Operational phase.		3	4	H	Stop through proper constructed facilities Stop and control through training and procedures	• Fuel storage tanks should be within a bunded area. • The bunded area should at least contain the contents of one storage tank. • Emergency spills kits should be available. • Refuelling of vehicles to take place on an impermeable surface fitted with a sump to contain any spillages. • Do not locate any fuel depot within the 1:100 year flood line or a horizontal distance of 100 m.	2	4	M	To prevent surface water quality deterioration and degradation of aquatic biodiversity and ecosystems.		Operational phase.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
14	Surface water	• Shaft Complex • Crushing and Screening Plant (Plant Complex) • Conveyor system Applicable Alternatives • PL01 and PL02	Spillages of hazardous materials used during the operation of the plant, conveyor, shaft and workshops may impact on the surrounding clean water environment. Surface water quality: Deterioration of water quality due to chemical contamination affecting the use of surface water as a natural resource. Extent: Impacts on extended area beyond the site boundary (hundreds of meters)	H	L	Operational phase.	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	2	M	Stop and control through maintenance Stop through proper storage Control through dust control measures	• Regular maintenance of all equipment and close monitoring of their movement to minimize any discharges of hydrocarbons from machinery during operations, any spills detected will be cleaned up immediately. • Ensure that all hazardous chemicals are stored in designated, bunded areas of which access is controlled. • All vehicle and equipment usage is to limited to designated areas only. • Limit the disturbance of sensitive areas such as steep slopes, soils susceptible to erosion and drainage lines. • Implement dust control measures. • Implement stream bank stabilisation measures.	2	2	L	To prevent surface water quality deterioration and a reduction in surface water quantity towards the receiving clean water environment.	• DWS Best Practice Guidelines, to prevent and minimise impacts and to ensure the separation of clean and dirty water management areas • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist recommendations • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	Operational phase.
15	Groundwater	• Adit berm and hard pads at Shaft Complex	Impact on the groundwater only occurs through leachate formation from surface. Impact thus only occurs because of rainfall recharge or when water is introduced in some form where leachate can form that seeps to the groundwater regime. The artificial recharge and mounding concept does not come into play with dry sources and therefore the intensity and rate of transport of contamination is far less significant than at wet sources.	H	M	Operational extending to rehabilitation / Closure		3	3	M	Stop and control through storm water management Control through monitoring	• Implement and maintain proper storm water management infrastructure. • Any leachate from mine residue deposits should be contained. • Continuous monitoring of groundwater quality through purpose drilled groundwater monitoring boreholes to ensure early detection of negative impacts. • Update groundwater model (flow and transport) when new data becomes available.	2	2	L	To minimise the extent of disturbance of the aquifer. To limit degeneration of groundwater quality.	• DWS Best Practice Guidelines • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan	Operational phase.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
			The geochemical assessment of overburden that will likely be encountered and utilised to construct the storm water berm at the adit and the hard coal stockpile pads is relatively inert and do potentially contain sufficient buffer minerals to neutralise any acid that may form if any sulphide remnants are present. However, continuous monitoring of groundwater quality through purpose drilled groundwater monitoring boreholes would be necessary to ensure early detection of negative impacts. It is probable that the overburden berm will contain some carbonaceous and coal remnants. Although it is expected that the berm will contain sufficient neutralising minerals to buffer any acidification should it form, the interaction of surface/rain water with the overburden berm, could lead to recharge of groundwater with sulphate-rich water beneath the sources. Any plume that may develop will be limited in terms of concentrations and extent and will be localised to immediate vicinity of the adit. <u>Duration of impact</u>: Operational phase extending to rehabilitation phase.													and / or amendments thereto • Specialist recommendations • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation. • Mine residue classification and characterisation in compliance with GNR 635 of August 2013, "National Norms and Standards for the Assessment of waste for landfill disposal" and GNR 636 of August 2013, "National Norms and Standards for disposal of waste to landfill", in terms of NEMWA, 2008	

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
16	Groundwater	• Stockpiling of coal at the Plant Complex and Shaft Complex (ROM, Plant feed and product) Applicable Alternatives • PL01 and PL02	Impact on the groundwater only occurs through leachate formation from surface. Impact thus only occurs because of rainfall recharge or when water is introduced in some form where leachate can form that seeps to the groundwater regime. The coal stockpiled at the project area will be potentially acid generating and leachate will potentially be sulphate-rich. With its high acid potential and low buffer capacity, the coal can be regarded as high risk towards the receiving surface and groundwater environment. Contaminants of concern (CoC) that could potentially be mobilised include, barium (Ba), copper (Cu), cobalt (Co), chromium (Cr), manganese (Mn), nickel (Ni), lead (Pb), vanadium (V) and zinc (Zn). Duration of impact: Operational phase extending to post rehabilitation phase.	M	M	Operational extending to post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	4	H	Stop and control through storm water management Stop through liners Control through monitoring	• Implement and maintain proper storm water management infrastructure. • Interception drainage around the adit – apply best-practice water management at the adit, i.e. clean- and dirty water separation and appropriate containment of affected storm water. • Groundwater infiltration should be controlled and can be achieved through installation of liners and sufficient surface drainage. • Continuous monitoring of groundwater quality through purpose drilled groundwater monitoring boreholes to ensure early detection of negative impacts. Refer to the geohydrological assessment report (attached hereto) for the proposed locations / coordinates of the groundwater monitoring boreholes. • Update groundwater model (flow and transport) when new data becomes available.	2	3	M	To minimise the extent of disturbance of the aquifer. To limit degeneration of groundwater quality.	• DWS Best Practice Guidelines • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist recommendations • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	Operational phase.
17	Groundwater	• Underground mining (bord and pillar)	Coal surfaces exposed to the atmosphere within underground workings can potentially generate acid mine drainage (AMD). Humidity in air and groundwater seepage running down walls can react with coal surfaces. Both the S4s and S2 will be mined from the decline shaft, and coal remaining in the pillars and walls of these seams, as well as dust on the floor, can be exposed to the atmosphere. The open underground workings will be a source of contaminated water during operation and for a period following closure. Since dewatering occurs up until mine closure, the pollution plume will not move away from the source as the groundwater flow gradients are still	M	H	Operational extending to post-closure		4	2	M	Stop and control through storm water management Control through monitoring	• Implement and maintain proper storm water management infrastructure. • Continuous monitoring of groundwater quality through purpose drilled groundwater monitoring boreholes to ensure early detection of negative impacts. • Update groundwater model (flow and transport) when new data becomes available.	3	2	M	To minimise the extent of disturbance of the aquifer. To limit degeneration of groundwater quality.		Operational phase.

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
			towards the mine workings. The plume in the deeper aquifer is expected to be limited to the mine boundaries for a considerable time after closure. The plume will not migrate as the mine workings act as a groundwater sink. The water levels are expected to take more than a century to recover and pollution movement away from the mine will only start to occur once the mine has filled to near surface/pre-mining elevations. The TDS concentrations within the void are however expected to increase as time progresses post-closure. Although several receptors are overlying the proposed workings the deteriorating water quality in the underground workings is not expected to have an adverse effect on the users. The boreholes are not drilled down to the depth of the coal seams and exploit groundwater from the shallower aquifer mostly less than 60 mbs. As such, little or no effect is expected on the existing users. <u>Duration of impact:</u> Operational phase extending to post rehabilitation phase.															
18	Groundwater	• Underground mining (bord and pillar)	During the operational phase the mining will be active that will require dewatering of the deep aquifer(s). This will result in a cone of depression and a decline in water levels with a subsequent loss in resource for users. The presence of dolerite sills may render certain boreholes isolated from effects of dewatering, but, this would need to be confirmed with monitoring. If impact is confirmed by monitoring, impacts to the community's and farmer's water supply must be	M	H	Operational extending to post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	4	H	Control through monitoring Stop and control through sealing of weathered aquifer	• Sealing of the weathered aquifer within the dewatering borehole/s may reduce the effect of drawdown within the weathered aquifer. • Groundwater levels near the planned mine should be monitored on a regular basis throughout construction, operation and post closure phases. • If impact is confirmed by monitoring, impacts to the community's and farmers' water supply must be mitigated by the client providing an alternative reliable, clean water supply. • Routinely refine, update and validate the conceptual and numerical models developed in this study by incorporation of ongoing monitoring data.	3	2	M	To minimise the extent of disturbance of the aquifer. To limit degeneration of groundwater quality.	• DWS Best Practice Guidelines • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or	Operational phase.

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			mitigated by the applicant providing an alternative reliable, clean water supply. The localised dewatering of the deep aquifer cannot be prevented. Since mining will be underground, it can be expected that the mining will be below the static groundwater levels. It is expected that the deeper aquifer will be drawn down to the bottom of No. 2 Seam. No boreholes are drilled down to this depth with most boreholes exploiting groundwater from the shallower aquifer mostly less than 60 mbs. Groundwater users that extract groundwater from the shallow weathered aquifer are not expected to be significantly impacted on in terms of water levels or quality but this should be confirmed with ongoing and long-term monitoring. If impact is confirmed by monitoring, impacts to the community's and farmers' water supply must be mitigated by the applicant providing an alternative reliable, clean water supply. If dewatering is to take place from dewatering boreholes, the weathered aquifer could be sealed off, thereby protecting it from the effects of drawdown. Water level impacts are expected to be restricted to within the deeper fractured rock aquifer, which is currently not being utilised by the surrounding groundwater users. The effect of bord-&-pillar on shallow aquifer recharge is expected to be minimal due to the depth of mining														amendments thereto • Specialist recommendations • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	

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			and the fact that stooping is not planned for the mining operation. The recharge to the deep, secondary aquifer is expected to be less than 1% especially due to the depth and the overlaying dolerite sills. The underground mine was designed for zero subsidence. With the 50% extraction ratio bord-&-pillar mining planned subsidence or cracking is not expected; this will also limit drawdown within the shallow aquifer. Reasons for the localisation of the groundwater level impacts are: • The depth at which the planned mining will take place. • The prevention of subsidence and subsequent fracture formation. • The overall low aquifer transmissivity.															
19	Groundwater	• Groundwater abstraction for potable use	Groundwater abstraction will result in a conical (theoretical) cone of depression that will extend from the source to the zone of extent. The result of the cone of depression is a lowering of groundwater levels that is included in the zone of extent. This extent of the influence zone will ultimately depend on factors such as abstraction rate within the borehole and the hydraulic properties of the aquifer. This study and various other studies conducted in the vicinity on the Karoo aquifer indicate that the hydraulic conductivity/transmissivity of the aquifer is low. This together with the	M	H	Operational Phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	3	H [68]	Monitor through pump testing Control through placement of boreholes (if required) Remedy through provision of clean water supply to farmers (if impact occurs)	• Boreholes must be pump tested to determine aquifer properties and sustainable yields. This must be determined by a professional geohydrologist and must not be exceeded. • Geophysical methods must be used to site boreholes which should be pump tested to determine hydraulic properties and depression cones. • Boreholes must be sited and drilled at distances so that abstraction do not to impact on privately owned boreholes. • If impact is confirmed by monitoring, impacts to the community's and farmers' water supply must be mitigated by the client providing an alternative reliable, clean water supply.	2	2	L	To minimise the extent of disturbance of the aquifer.	• DWS Best Practice Guidelines • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto	Operational; Rehabilitation / Closure and Post-closure Phases

[68] An alternative strategy for potable water requirements on the mine would be to tap into the existing Rand Water pipeline. This would reduce the impact on the groundwater regime to negligible (Shangoni AquiScience, 2016)

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			yield requirement of 40 Kl per day, will result in localised cone of depression. However, specialist studies must nevertheless be conducted to determine the sustainable yield of the boreholes and the cone of depression so as not impact on adjacent users.														• Specialist recommendations • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	
20	Groundwater	• Underground mining (bord and pillar)	Coal surfaces exposed to the atmosphere within underground workings can potentially generate acid mine drainage. Following full recovery, the contaminants will start to migrate away from the mine site. No vertical migration of contaminants is expected to occur and therefore the contamination plume will not move towards the top weathered aquifer even after 100 years of model simulation. Given the depth of receptor boreholes, no contamination from the underground workings will reach nearby private boreholes even in the long-term. If future abstraction boreholes are drilled to this depth (>150 mbs), the water will be of poor unsuitable quality.	M	L	Rehabilitation / Closure extending into Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	2	4	M	Control through monitoring Stop and control through planning Control through placement of boreholes (if required) Remedy through provision of clean water supply to farmers (if impact occurs)	• Effectiveness of existing monitoring borehole positions should be re-evaluated. • Continuation of the monitoring programme to establish post decommissioning trends. • Water abstraction from deep boreholes that are close to the mine workings should be avoided so that contaminants will not migrate towards the abstraction boreholes, and away from the mine voids. • Groundwater levels near the planned mine should be monitored on a regular basis throughout decommissioning and post closure phases. • If impact is confirmed by monitoring, impacts to the community's and farmers' water supply must be mitigated by the client providing an alternative reliable, clean water supply. • Routinely refine, update and validate the conceptual and numerical models developed in this study by incorporation of ongoing monitoring data.	2	2	L	To minimise the extent of disturbance of the aquifer. To limit degeneration of groundwater quality.		Operational; Rehabilitation / Closure and Post-closure Phases
21	Groundwater	• Underground mining (bord and pillar)	Decant is not expected for the Leslie 2 project since no roof collapse with associated cracking/fracturing of roof strata or subsidence is expected because of the proposed bord-&-pillar mining. The mine plan was designed in such a manner as to prevent the destabilisation of the roof. With the 51 to 53% extraction ratio bord-&-pillar mining planned for Leslie 2, no subsidence or cracking is expected. Decant only occurs when the mining activities cause such an increase in recharge that the aquifer(s) downgradient from the mine cannot accommodate the increased volumes	M	L	Rehabilitation / Closure extending into Post-closure		2	4	M	Remedy through rehabilitation / treatment Control through monitoring	• Re-establish surface drainage to the pre-mining conditions as far as practical. • Restore normal infiltration rates to areas where recharge was reduced due to surface compaction, such as at the shaft infrastructure areas. • Effectiveness of existing monitoring borehole positions should be re-evaluated. • Continuation of the monitoring programme to establish post decommissioning trends. • Groundwater levels near the planned mine should be monitored on a regular basis throughout decommissioning and post closure phases. • Should decanting occur, passive or active treatment plants should be considered.	2	2	L	To minimise the extent of disturbance of the aquifer. To limit degeneration of groundwater quality		Operational; Rehabilitation / Closure and Post-closure Phases

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			of water generated because of the mine. The effective recharge to the deep aquifer at Leslie 2 is not expected to increase and horizontal groundwater flow is expected to resume through the receiving aquifer(s) once the water levels have recovered. If the effects of only the project area are considered, no decant at the shaft will take place. However, when the cumulative effect of the nearby mines and mine hydraulic connectivity are considered decant at the shaft could be possible. With the implementation of such precautionary mitigation methods in place, the environmental impacts of any potential decants (if they occur) can be reduced to negligible.										• Routinely refine, update and validate the conceptual and numerical models developed in this study by incorporation of ongoing monitoring data.						

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22	Groundwater	• Underground mining (bord and pillar)	When coal, rock or mineral ore is removed from an underground mine, the overlying earth can sink, i.e. subsidence. The extent of mine subsidence depends on the mining method, local geology, depth of mining and amount of material extracted. Mine subsidence can affect built features, like homes or roads, and environmental features like surface freshwater resources and aquifers.	M	M	Rehabilitation / Closure extending into Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	2	4	M	Control through mine planning Control through inspections and monitoring Remedy (if occurs) through rehabilitation	• With the 50-52% extraction ratio bord-&-pillar mining and mining deeper than 150 meters below surface proposed for Leslie 2, no subsidence, cracking or sinkhole formation are expected. • Conduct surface inspections to ensure that surface subsidence does not occur. • If subsidence occurs and sinkholes are formed during operation or after closure, they should be rehabilitated as soon as possible to minimise water and oxygen inflow from the surface. This will minimise or avoid oxidation reactions and potential acid generation	1	1	L	To minimise the extent of disturbance of the aquifer. To limit degeneration of groundwater quality.	• DWS Best Practice Guidelines • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist recommendations • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	Operational; Rehabilitation / Closure and Post-closure Phases

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23	Aquatic environment	• Underground mining (bord and pillar)	Development of the underground mine workings may result in the formation of a cone of depression in the shallow aquifer. The cone of depression has been determined by the geohydrologist (Scholtz, 2016) likely to be of up to 1m in depth and extending within 900m of the underground mine workings. Impacts to the riparian zones of the local streams are deemed likely in terms of moisture stress and a loss in base flow are deemed likely due to loss of stream recharge from the shallow aquifer. Decant impacts resulting from the development of the underground workings are likely to impact the deep groundwater aquifers present if suitable mitigation measures are not implemented. However, should adequate mitigation measures and appropriate seals be implemented, impacts may be significantly reduced; Mine residue stockpiles resulting from the development of the underground mine workings may result in altered runoff patterns, generation and seepage of pollutants resulting in impaired water quality. <u>Extent of impact:</u> The extent of the impact extends to local and regional areas	M	M	Operational to Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	3	H	Control And remedy through ground water management programme Control through monitoring Control through design and layout (planning)	• Any area where possible decant points may be determined by the geohydrological assessment, needs to be very carefully managed in perpetuity: ➢ Water levels need to be very strictly managed to keep water levels below any decant level while ensuring that a significant cone of depression impact does not take place; and ➢ If decant will occur all water is to be treated to background water quality values prior to release into the receiving environment. • Dewatering boreholes should be considered in order to minimise the creation of dirty water within the underground mine workings, and this clean water should be used to recharge the natural systems within close vicinity of any of the activities; • Very strict control of water consumption and detailed monitoring must take place, and all water usage must continuously be optimised; • Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas which recharge the receiving freshwater environment;	4	2	M	Prevent impacts to aquatic environment	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Commence during Planning, and Construction, Operation Rehabilitation / Closure phases
24	Aquatic environment	• Operation of machinery.	Development of the underground mine workings may result in the formation of a cone of depression in	M	M	Operational to Post-closure	Refer to footprint sizes on the Shaft	5	3	H	Control And remedy through ground water	• Limit the footprint area of the operational activities to what is absolutely essential in order to minimise the loss of clean	4	2	M	Prevent impacts to aquatic environment	• National Environmental	Commence during Planning, and Construction,

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		• Underground mining (bord and pillar). • Removal of waste rock. • Transport activities. • Processing activities. <u>Applicable Alternatives</u> • PL01 and PL02 • TA1, TA2, TA3	the shallow aquifer. The cone of depression has been determined by the geohydrologist (Scholtz, 2016) likely to be of up to 1m in depth and extending within 900m of the underground mine workings. Impacts to the riparian zones of the local streams are deemed likely in terms of moisture stress and a loss in base flow are deemed likely due to loss of stream recharge from the shallow aquifer. Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution. Loss of MAR from dirty water areas may impact on the instream flow of the surface water systems. Loss of water through clean and dirty water separation may alter instream flow of the surface water systems. Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area, with special mention of the formation of an ever increasing cone of depression over the life of the proposed mining project as a result of mining activities and water abstraction, may lead to altered instream flow. Intercepting run-off around mining activities and infrastructure could reduce the amount of time that water would take to reach the Steenkoolspruit and the Blesbokspruit and their associated tributaries and may lead to “flash flood” events on varying scales.				and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*				management programme Control through monitoring Control through design and layout (planning) Control through storm water management Control through training and procedures Remedy through emergency and spill management	water runoff areas and the concomitant recharge of streams in the area; • The Shaft complex directly impacts on the aquatic ecology of the Steenkoolspruit and its associated tributaries, disturbance must be minimised as far as possible and suitably rehabilitated; • Ensure that no incision and canalisation of the aquatic resources present takes place as a result of operational activities; • All erosion noted within the study area should be remedied immediately and included as part of the ongoing rehabilitation plan; • During the construction and operational phases of the proposed mining project, erosion berms should be installed on roadways to prevent gully formation and siltation of the aquatic resources. The following points should serve to guide the placement of erosion berms: ➢ Where the track has slope of less than 2%, berms every 50m should be installed; ➢ Where the track slopes between 2% and 10%, berms every 25m should be installed; ➢ Where the track slopes between 10%-15%, berms every 20m should be installed; ➢ Where the track has slope greater than 15%, berms every 10m should be installed; • Ensure that all mine residue stockpiles and topsoil stockpiles are well managed and have measures such as berms and hessian sheets implemented to prevent erosion and sedimentation which may ultimately lead to transformation of aquatic habitat areas; • As much vegetation growth as possible should be promoted within the proposed development area during the operational phase in order to protect soils and vegetation clearance should be kept to a minimum; • No use of clean surface water or any groundwater which potentially recharges the watercourses in the area should take place. In this regard specific mention is made of any water use which will affect the instream flow in the Steenkoolspruit and the Blesbokspruit River and the associated tributaries; • Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised					Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Operation Rehabilitation / Closure phases

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			Capture of run-off and capture of rainfall (inundation) in the 'dirty'/impacted areas would lower instream flow in the receiving environment. Clean and dirty water systems not being maintained and operated to the required specifications to prevent contamination of clean water areas may impact on water quality. Potential poor housekeeping and management during operational phase may lead to impacts on water quality. Major earthworks and operational activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting. Ongoing disturbance of soils during general operational activities may alter the aquatic habitat and result in a loss in aquatic biodiversity. Inadequate separation of clean and dirty water areas may alter the aquatic habitat and result in a loss of biodiversity during the operational phase. Mining related activities leading to increased disturbance of soils and drainage lines may alter the aquatic habitat.									• Any area where decant points may be determined by a geohydrology assessment, needs to be very carefully managed in perpetuity: ➢ Water levels need to be very strictly managed to keep water levels below any decant level while ensuring that a significant cone of depression impact does not take place; and ➢ If decant will occur all water is to be treated to background water quality values prior to release into the receiving environment. • Decant volumes and salt load could be reduced if an underground seal is installed; • Upstream dewatering boreholes should be considered in order to minimise the creation of dirty water within the underground mine working area, and this clean water should be used to recharge the natural systems downstream of the mining rights areas; • Monitor all affected riparian systems for moisture stress; • Monitor all potentially affected riparian zones for changes in riparian vegetation structure; • An extensive monitoring programme will need to be implemented to track the cone of depression on an ongoing basis for the life of the mine and suitable mitigation measures will be required to protect surface water recharge in the vicinity of the proposed mining project; • Permit only essential personnel within 100m of all riparian systems; • All areas of increased ecological sensitivity should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel during the operational phase of the proposed mining project; • No crossing of the aquatic resources should take place and the substrate conditions of the aquatic resources and stream connectivity must be maintained; • No material may be dumped or stocklined within any rivers, tributaries or drainage lines in the vicinity of the proposed mining project; • Any pollution control facilities should be lined with an HDPE liner system to prevent seepage; • Clear separation of clean and dirty water must take place and diversion of clean water around operational areas (if applicable) must ensure minimisation of the loss of catchment yield;						

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			Spills and other unplanned events during operational phase may impact on water quality. Any activities which lead to the reduction of flow in the system with special mention of the use of surface and groundwater sources for production water may alter the aquatic habitat. It is considered likely that the operational activities will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat. Loss of instream flow due to abstraction for water for production may lead to a loss in aquatic biodiversity. Seepage from the mine residue stockpiles may lead to a loss in aquatic biodiversity. Alien vegetation encroachment will impact on and alter the aquatic habitat. Potential discharge from the mine process water system with special mention of RWD and any PCD's may lead to a loss in aquatic biodiversity. Sewage discharge from mine offices and camps may lead to a loss in aquatic biodiversity. Acidification as a result of pyrite oxidation and the release of metals									• Very clear and well managed clean and dirty water separation must take place in line with the requirements of regulation GN704 of the national Water Act; • Prevent run-off from dirty water areas entering stream systems through ensuring clear separation of clean and dirty water areas; • All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs; • Infrastructure must be monitored for seepages and erosion; • Ensure that the mine process water system is managed in such a way as to prevent discharge to the receiving environment and to prevent discharge of dirty water; • Dirty water must be recycled back into the mining system; • Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime; • All vehicles must be regularly inspected for leaks; • Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil; • It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage; • All hazardous chemicals must be stored on specified surfaces; • All spills should be immediately cleaned up and treated accordingly; • Appropriate sanitary facilities must be provided for the duration of the operational activities and all waste must be removed to an appropriate waste facility; • Close monitoring of water quality (surface water, groundwater and process water) must take place. Monitoring of water quality should take place at a minimum frequency of once a month (when surface water is present) during which time major salts and basic metals, are monitored along with basic parameters such as pH, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS), dissolved oxygen and Electrical Conductivity (EC); • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor; • Ongoing aquatic biomonitoring should take place in order to identify any emerging issues in the receiving environment; Toxicity testing of the proposed mining project's dirty water facilities should take place quarterly and concurrently with the biomonitoring program in order to						

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			due to tillage and blasting may lead to a loss in aquatic biodiversity. <u>Extent of impact:</u> The extent of the impact has the potential to affect both local and regional areas									monitor the toxicological risk of the dirty water system to the receiving environment and in particular the groundwater resources. Tests should include the following test organisms as a minimum: Vibrio fischeri, Daphnia pulex; and Algal Growth Potential; • Any potential groundwater pollution plume should be modelled and appropriately monitored. Any impacts to the groundwater resources in the vicinity of the proposed mining project will need to be suitably and timeously mitigated to prevent impacts further downstream and potentially on a regional scale; The proposed mining project must be managed as a zero discharge facility, however definitive toxicological testing according to the Direct Estimation of Ecological Effect Potential (DEEEP) protocol should take place should it become evident that dirty water discharge or decant of groundwater will occur in order to define safe discharge volumes and ensure sufficient dilution.						
25	Wetlands	• Pre-fabricated structures (offices, stores, workshops, change houses etc.), • Stockpiles • Roads • Conveyor system • PCD • Adit and shafts • Potential rail spur <u>Applicable Alternatives</u>: • PL01 and PL02 • VL01 and VL02 • TA1, TA2, TA3 • BA1 and BA2 • CA1 and CA2	Altered drainage patterns due to increased impermeable surfaces and installation of culverts/pipes for stream crossings. This would alter the flow and wetting patterns leading to changed wetland vegetation communities. Potential inadequate design of a storm water management plan surrounding the structures and parking areas, leading to altered water quality and hydrology, erosion and sedimentation of the surrounding freshwater environment. Potential risk of spillage/leakages from waste management infrastructure associated with the proposed structures (e.g. sewage infrastructure) leading to contamination of the receiving freshwater environment.	M	M	Operational to Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	3	H	Stop and control through seasonal restrictions Stop and control through planning Stop and control through training and procedures Stop and Control through storm water management plan Control through alien invasive vegetation control plan	• As far as possible, all construction activities should occur in the low flow season, during the drier winter months; • Freshwater resource sensitivity maps have been developed for the MRA, indicating the freshwater resources, their relevant buffer zones and regulatory zones in accordance with the National Environmental Management Act (Act 107 of 1998). It is recommended that these sensitivity maps be considered during all phases of the development and with special mention of the planning of infrastructure layout, to aid in the conservation of the freshwater resources habitat and environmental resources within the MRA; • Permit only essential construction personnel within 32m of the freshwater resource habitat, if absolutely necessary that they enter the regulatory zone; • All development footprint areas should remain as small as possible and should not encroach onto surrounding more sensitive areas. It must be ensured that the freshwater resources, and their associated buffer zones are off-limits to construction vehicles and personnel; • The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas; • All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and maintenance vehicles and personnel;	3	2	M	Prevent the loss of freshwater habitat and ecological structure, changes to ecological and social-cultural services provision and alteration of the hydrological functioning and sediment balance of the freshwater system, beyond the infrastructure footprint area	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act	Planning, Construction, Operational and Rehabilitation / Closure Phases

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												• The duration of possible impacts on the freshwater system should be minimised as far as possible by ensuring that the duration of time in which possible flow alteration and sedimentation will take place is minimised; • Appropriate sanitary facilities must be provided for the life of the construction and all waste removed to an appropriate waste facility; • All hazardous chemicals should be stored on bunded surfaces and no storage of such chemicals should be permitted within the freshwater resources buffer zones; • Adequate storm water management must be incorporated into the design of the proposed activities development in order to prevent erosion and the associated sedimentation of the freshwater resources. In this regard, special mention is made of: • Sheet runoff from cleared areas and impermeable surfaces needs to be curtailed; and • Runoff from paved surfaces should be slowed down by the strategic placement of berms. • No informal fires should be permitted in or near the construction areas; • Ensuring that an adequate number of rubbish and “spill” bins are provided will also prevent litter and ensure the proper disposal of waste and spills; • Edge effects of activities, particularly erosion and alien/weed control need to be strictly managed; and Implement an alien vegetation control program within freshwater resources areas, throughout the life of mine.					(MPRDA) (Act 28 of 2002)	
26	Wetlands	• Use of roads • Use of conveyor system Applicable Alternatives: • PL01 and PL02	Loss of connectivity of freshwater resources as a result of road and conveyor crossings through the freshwater habitat, resulting in altered hydrological patterns and fragmented habitats; Water flowing within the freshwater resources could possibly be diverted due to construction of roads/conveyors within the freshwater resource.	M	M	Operational to Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	3	H	Stop and control through restrictions Stop and control through seasonal restrictions Stop and control through planning and design Stop and control through training and procedures	• During construction phase, no vehicles should be allowed to indiscriminately drive through the freshwater environment and vehicles must remain on designated roadways; • Planning of temporary roads and access routes should take the site sensitivity plan into consideration, and wherever possible, existing roads should be utilised; • If additional roads are required, then wherever feasible such roads should be constructed outside of the buffer zone of the wetland resources and not directly adjacent thereto; • During the construction and operational phases, erosion control measures should be installed on roads to prevent gully formation and siltation of the freshwater resources;	5	2	M	Prevent the loss of freshwater system connectivity, hydrological functioning and loss of habitat.	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for	Planning, Construction, Operational and Rehabilitation / Closure Phases

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											Remedy through rehabilitation	• Newly constructed roads should have erosion berms installed in order to reduce the speed of any surface runoff and limit the sedimentation of the freshwater environment; • Adequate storm water management must be incorporated into the design of the roads to prevent erosion and the associated sedimentation of the freshwater resources. Therefore: ➢ Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed; and ➢ Runoff from paved surfaces should be slowed down by the strategic placement of energy dispersing structures. • The design and layout of the road must ensure that permanent zones of the freshwater resources remain inundated with water after heavy rainfall events. In order to achieve this the following should be implemented: ➢ Construct a permeable pioneer layer using material such as coarse sand and rocks that do not form acid, to avoid contamination of water; ➢ The pioneering layers of the roadworks should be constructed as follows: Initially a rockgrid and biddum composite should be used as the base layer. A secondary layer consisting of crushed rock with coarse (>300mm at the base) and finer material nearer the top of the structure should be constructed over the entire length of the zone of the wetland where lateral movement of water is expected and except the active channel where culverts are proposed to allow flow of water through the watercourse in as natural a way as possible. The entire set of layer works should be placed on top of the wetland vegetation and associated soils; ➢ The structure on which the road crossing will be placed should span as far as possible outside the lateral flow of water area, in order to ensure that the flow of water underneath the road is not inhibited in anyway; and ➢ The design of the road should ensure that the soils within the permanent zones remain saturated throughout the year regardless of the season. • To ensure that permanent, seasonal and temporary wetland zone functionality is maintained, the pioneer layer should be constructed to ensure that soil wetness is maintained in the upper 50cm of the soil to ensure that					mining related activities aimed at the protection of water resources; and Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	

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												facultative and obligate wetland vegetation species can still be supported. This will also ensure that soil wetting conditions are maintained; • Due to the length of the crossing a culvert should be placed every 50m along the wetland crossing to facilitate faunal movement across the road structure; • The design and layout of the road and the culvert must promote hassle free movement of more mobile faunal species; • The area in the vicinity of the newly constructed infrastructure (the culvert and the road) should be rehabilitated in a manner that simulate natural conditions in order to enhance or reinstate the ability of the watercourses to provide feeding and breeding sites; • Access roads for support vehicles, and vehicles used in the construction of the infrastructure and for daily use, should not encroach into the freshwater resources unnecessarily; • If crossings are required they should cross the system at right angles, as far as possible to minimise impacts in the receiving environment, and any areas where bank failure is observed due to the effects of such crossings should be immediately repaired by reducing the gradient of the banks to a 1:3 slope and where needed necessary, installing support structures. This should only be necessary if existing access roads are not utilised; • Areas where bank failure is observed as a result of such stream crossings should be immediately repaired (re-profiled at an 18 degree angle and revegetated with suitable indigenous plant species); • During decommissioning, rip and reprofile areas to ensure that no changes to runoff patterns occurs. Stabilize and revegetate these areas with biodegradable hessian and suitable indigenous plan species in order to limit sedimentation of the freshwater environment; and • Upon closure all haul and access roads which are no longer required, should be removed in order to minimise the impacts on the freshwater resources of the area beyond the life of mine.						

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27	Wetlands	• ROM stockpiles • Product stockpiles Applicable Alternatives: • PL01 and PL02	Runoff from stockpiles, could during the operational phase result in additional water inputs into freshwater resources and could cause potential contamination of the surface and groundwater.	M	M	Operational to Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	2	M	Stop and control through berms and paddocks Stop and control through training and procedures Control through monitoring Control through topsoil management plan	• All stockpiles must have berms and/or catchment paddocks at their toe to contain runoff from the facilities; • Topsoil stockpiles are to be protected by means of protective coverings such as hessian sheeting; • Topsoil stockpiles are to be no more than 2m high; • Regular monitoring of stockpiles for seepage and erosion should be implemented, and implement corrective action plans that have been predetermined to be effective in reducing impacts from seepage; and • It is highly recommended that a Topsoil Management Plan be developed by a suitably qualified soil scientist, and implemented to aid in the conservation of soils.	2	2	L	Prevent the degradation of surface and groundwater quality of the freshwater system, and limit loss of habitat and ecological structure	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Planning, Construction, Operational and Rehabilitation / Closure Phases
28	Wetlands	• Crushing and Screening Plant Applicable Alternatives: PL01 and PL02	Potential impact on surface and groundwater quality due to impaired water quality due to the discharge of pollutants from crushing and screening plant. Increased dust from processing plant, could settle within the freshwater resources, increasing the amount of sediment within the system.	M	M	Operational to Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	2	M	Control through dust management Control through monitoring	• Areas surrounding the processing plant should be sprayed regularly with water in order to curb dust generation. These areas should not be over-sprayed causing water run-off and subsequent sediment loss into the freshwater resources; Ensure that the processing plant is well managed and have adequate storm water management incorporated into the design thereof, in order to prevent erosion and the associated sedimentation of the freshwater habitat; and • Regular monitoring of the plant for seepage, waste disposal and erosion should be implemented, and implement corrective action plans that have been predetermined to be effective in reducing these impacts.	2	2	L	Prevent the impact on the sediment balance and hydrological functioning of the freshwater system, and changes to the ecological functioning and socio-cultural services provision of the freshwater system.		Planning, Construction, Operational and Rehabilitation / Closure Phases

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29	Wetlands	• Adit and decline shaft • Ventilation Shaft • Underground mining (bord and pillar) Applicable Alternatives: PL01 and PL02 VL01 and VL02	The development of the underground workings may result in a possible reduction of groundwater level although the significance on the fractured zone aquifer and perched aquifers which are the larger drivers of the wetlands in the area is significantly reduced in relation to the deeper aquifer and associated hydraulic head which in turn has the potential to lead to the dewatering of the shallow aquifer. The geohydrological assessment has determined that the area to be affected will be within 900m of the underground workings (Scholtz, 2016). This has the potential to lead to changes in the wetland hydroperiod and this the characteristics of the wetland resources in this affected area. Development of the underground mining could lead to eutrophication of the receiving environment and result in lowering the water quality of the surrounding freshwater system Even though the possibility of decant is unlikely, as suggested within the geohydrological report (Scholtz, 2016) during the decommissioning of the adit/shafts, the possibility still exists. In the case of possible decant, water will accumulate within the adit/shafts and eventually decant into nearby freshwater resources, thus resulting in salt rich and potentially low pH dirty water reaching the receiving environment; and	M	M	Operational to Post-closure		3	2.5	M	Control through monitoring Remedy (if required) through groundwater management programme Stop and control through restrictions on footprint Remedy through backfilling and re-shaping of subsidence areas	• The recommended action plans and management measures which applies to the impacts of the dewatering of the aquifer, as provided in the geohydrological report (Scholtz, 2016) should be adhered to; • Any area where decant points may possibly be determined by the geohydrological assessment (Scholtz, 2016), needs to be very carefully managed in perpetuity: ➢ Water levels need to be very strictly managed to keep water levels below any decant level while ensuring that a significant cone of depression impact does not take place; and ➢ If decant will occur all water is to be treated to background water quality values prior to release into the receiving environment. • Decant volumes and salt load could be reduced if an underground seal is installed; • Dewatering boreholes could be considered, if deemed necessary, in order to minimise the creation of dirty water within the shafts/adit, and this clean water should be used to recharge the natural systems within close vicinity of any of the activities; • Very strict control of water consumption and detailed monitoring must take place, and all water usage must continuously be optimised; • Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas which recharge the receiving freshwater environment; • In order to prevent subsidence sufficient pillars must be maintained in the underground workings to prevent subsidence; and • Subsided areas should be backfilled and re-shaped to correspond with the original pre-mining topography so as to recreate topography prior to mining activities.	2.3	2.3	M	Prevent negative impact on the hydrological functioning, water quality and sediment balance of the surrounding freshwater system.	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Planning, Construction, Operational and Rehabilitation / Closure Phases

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30	Wetlands	• Pollution Control Dams (PCD's) Applicable Alternatives: PL01 and PL02	Seepage and spillage of PDC during operational phase, which could have an increased risk of pollution of surface water. A further increased risk of pollution of groundwater due to dirty discharges (by accidental instances or storm events), potentially leading to the formation of a contaminated groundwater plume, which may migrate downgradient of the PCD, thus possibly affecting the freshwater system. The presence of clean and dirty separation infrastructure within close vicinity to the freshwater system could cause a loss of catchment yield due to storm water containment.	M	M	Operational to Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	2	M	Stop and control through planning and design Stop and control through storm water management plan Stop and control through training and procedures Remedy through rehabilitation	• Pollution control dam must have sufficient capacity to prevent any discharge for a minimum of a 1:50 year flood event in line with the requirements of regulation GN704 of the National Water Act; • All clean and dirty water areas need to be clearly separated in line with the requirements of regulation GN704 of the National Water Act; • Potential loss of catchment yield to be determined by a suitably qualified hydrologist, following which suitable mitigation measures such as diversion of clean water to the freshwater system, must be implemented; • The pollution control dam for the facility must be lined with impermeable HDPE liner; • Contamination prevention measures should be addressed in the Environmental Management Programme (EMP) for the proposed mining activities, and this should be implemented and made available and accessible at all times to the contractors and construction crew conducting the works on site for reference; • A spill prevention and emergency spill response plan should be compiled to guide the operations; • During decommissioning, remove the pollution control sumps. Dispose of hazardous waste in the approved manner; and • Remove from site all pollution containment structures. Dispose of materials that will not be used again as hazardous waste.	2	2	L	Prevent possible degradation of surface and groundwater of the surrounding freshwater environment.	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Planning, Construction, Operational and Rehabilitation / Closure Phases

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31	Air quality	• Material handling • Material transfer • Conveyor system • Crushing and Screening Plant • Use of roads Applicable Alternatives • PL01 and PL02 • TA1, TA2, TA3 • BA1 and BA2 • VL01 and VL02 • CA1 and CA2	<u>Flora:</u> Exposure of vegetation to particulates leads phytotoxic responses, depending on the volume and chemical composition of the particles. Particulate deposition disrupts plant physiology and biochemistry and may cause physical damage by abrasive action during turbulent deposition. Particulate deposition may therefore affect the health of the remaining natural habitats (Open Grassland, Rocky Outcrop, Wetland, Modified Grassland).	H	L	Operational	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	5	H	Control through monitoring Stop and control through training and procedures Stop and control through maintenance Stop through proper design and construction	<u>General:</u> • Develop and implement maintenance plan for underground mining activities, conveyors and plant; • Schedule and conduct repairs to coincide with plant offline times; • Develop a dust management plan in line with the National Dust Control regulations and • Conduct quarterly consultative community meetings. <u>Underground mining:</u> • Continuous miners should have water sprays on their cutting heads and an exhaust scrubber system. The water sprays apply water to the face where the coal is cut and the exhaust scrubber system collects the dust, scrubs the dust out, wets it and places it back on the flight conveyor of the Continuous miner for loading into the shuttle cars; and • Roof bolters for roof support should apply wet drilling with water applied through the drill rod and drill bit in the hole. <u>Conveyors:</u> • Require construction of 3-sided enclosures with water sprays applied to transfer points; and • Transfer points over stockpiles should be fixed with Telescopic chutes with water sprays. <u>Stockpiles:</u> • Improve supply and demand forecasting to reduce coal stockpile size and limit coal stockpile retention time. <u>Material handling:</u> • Good work practices when stockpiling, for example: • Loading and unloading confined to the leeward (downwind) side of the pile; and • Drop height reduction etc. <u>Access road and haul roads:</u> • Access road and haul roads to be paved; • Paved roads to be maintained by preventing material deposition on the surface of the road, through:	3	3	M	Prevent the deterioration of air quality	• GG 36974, R827, National Dust Control Regulations, 1 November 2013. GG 32816, N1210, National Ambient Air Quality Standards, 24 December 2009. GG 35463, GN 486, National Ambient Air Quality Standard for Particulate Matter with Aerodynamic Diameter less than 2.5 Micron Meters (PM2.5), 29 June 2012.	Throughout the Operational Phase
32	Air quality		<u>Fauna:</u> Nuisance and stress as a result of significant dust may result in reduced breeding rates in game species (e.g. Buffalo) and livestock. Birds have a higher breathing rate and spend more time in open air and may therefore be sensitive to high concentration of particulates in the atmosphere.	H	L	Operational		5	5	H			3	3	M			
33	Air quality		<u>Agriculture</u>: Particulate deposition disrupts plant physiology and biochemistry and may cause physical damage by abrasive action during turbulent deposition. Reduced photosynthesis results in reduced growth and productivity of crops. In agriculture the impact is felt by either the quantity of the output or yield being reduced or if the quality of the product lowered, this results in reduced nutritional quality and market value of agricultural crops.	H	L	Operational		5	5	H			3	3	M			
34	Air quality		<u>Human receptors:</u> Health impacts on susceptible groups include the elderly, infants, persons with chronic cardiopulmonary disease, -pneumonia, -influenza and -asthma.	v	L	Operational		5	5	H			3	1	L			

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35	Air quality		<u>Human receptors:</u> Nuisance impact of dust on surrounding residences.	H	L	Operational		5	5	H		• Covering of loads in trucks; • Clean up of spills and wind or water borne deposition before traffic resumes; • Install pipe-grid track out control device; • Install gravel bed track out apron; • Paved interior roads 100-foot long and fill road width, or add 4-foot shoulder for paved roads; • Paving access areas to unpaved lots; • Wash vehicle tires; and • Remove silt build up from road by vacuum sweeping, water flushing and/or broom sweeping. <u>Monitoring:</u> • Undertake dust fall out monitoring in terms of the National Dust Control Regulations. • Develop and implement a site energy efficiency plan; • Operate plant with minimum disruption e.g. back-up plan for energy consumption/ generation. • Develop fugitive emission management plan; • Use of low Sulphur fuels; • Plan and carry out regular fleet maintenance; • Use of catalytic converters on vehicle exhaust emissions; • Develop a leak detection and repair programme for all fuel and other petrochemical handling and storage tanks/equipment/facilities; and • Investigate air quality offsets.	3	1	L	Reporting on NAEIS	• Department of Environmental Affairs, Draft Technical Guidelines for Monitoring, Reporting and Verification of Greenhouse Gas Emissions by Industry, June 2016. • National Greenhouse Gas Emission Reporting Regulations. • Department of Environmental Affairs, Air Quality Offsets Guideline, 18 March 2016.	Throughout the Operational Phase
36	Air quality		Cumulative impact - Degradation of ambient air quality in an airshed priority area.	H	L	Operational		5	5	H			3	3	M			
37	Air quality	• Fuel use by generators, LDV's, trucks and other mobile equipment <u>Applicable Alternatives</u> • PL01 and PL02 • TA1, TA2, TA3	Cumulative impact – Combustion gases generated. Contribution to acid rain as a result of SOx and NOx emitted into the atmosphere. Degradation of ambient air quality in an airshed priority area.	H	L	Operational		3	3	M			3	1	L			

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38	Air quality	• Stockpiles (ROM and product) Applicable Alternatives • PL01 and PL02	Cumulative impact – Spontaneous combustion of coal stockpiles Degradation of ambient air quality in an airshed priority area.	H	L	Operational		3	3	M		Excavation of hot or burning material; • Small-scale fires in stockpiles or areas exposed by mining should be extinguished by flooding with water. Caution must be taken when fighting spontaneous combustion fires with water as a dangerous reaction between the water and the heated coal can occur; • Routine site inspections that will allow for early detection and reporting of spontaneous combustion; • Investigate air quality offsets; and • Promote research needs regarding spontaneous combustion. • Develop and implement a site energy efficiency plan; • Operate plant with minimum disruption e.g. back-up plan for energy consumption/ generation. • Develop fugitive emission management plan; • Plan and carry out regular fleet maintenance; • Investigate air quality offsets; • Investigate methane abatement and capture technologies; • Develop a Greenhouse gas emission inventory; and • Report Greenhouse gas emissions on the National Atmospheric Emission Inventory System (Mine source).	3	1	L	Reporting on NAEIS	• Department of Environmental Affairs, Draft Technical Guidelines for Monitoring, Reporting and Verification of Greenhouse Gas Emissions by Industry, June 2016. • National Greenhouse Gas Emission Reporting Regulations. • Department of Environmental Affairs, Air Quality Offsets Guideline, 18 March 2016.	Throughout the Operational Phase
39	Air quality	• Use of electricity and fuel Applicable Alternatives PL01 and PL02 TA1, TA2 ad TA3	Cumulative impact – Greenhouse gases generated Degradation of ambient air quality in an airshed priority area.	H	L	Operational		3	3	M			3	1	L	Reporting on NAEIS	• Department of Environmental Affairs, Draft Technical Guidelines for Monitoring, Reporting and Verification of Greenhouse Gas Emissions by Industry, June 2016. • National Greenhouse Gas Emission Reporting Regulations. • Department of Environmental Affairs, Air Quality Offsets Guideline, 18 March 2016.	Throughout the Operational Phase

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40	Noise	• Crushing and screening • Use of roads • Conveyor system • Coal loading activities <u>Applicable Alternatives</u> • PL01 and PL02 • TA1, TA2 ad TA3 • CA1 and CA2	On completion of the construction and implementation of the Surface infrastructure, the day to day running of the mine will commence. The mining and plant activities will involve significant noise generating mechanisms that can have a significant impact on the surrounding communities and the animal life. <u>Extent of impact:</u> All surrounding farms and Portions that falls within the area of responsibility as indicated. The Portions that will be most affected, are Portions 1, 11, 21, 22, 14, 24, 23, 13, and 26 on Winterhoek as well as Portion 9 on Leeuwkop and Portion 15 on Holspruit. <u>Duration of impact:</u> Lasting Life of Mine <u>Degree to which impact can be reversed</u>: It is envisaged that should people and animal life be allowed to remain on the property when the actual mining commence, the consequences will be very difficult to reverse. The impact on humans and animals will be more from an emotional and psychological perspective, than from a physical perspective.	M	H	Operational Phase	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	3	H	Control through monitoring Stop and control through maintenance Stop and control through procedures and risk assessments	• Effective maintenance of vehicle engines and exhaust systems. • Hearing conservation programme as per DMR guidelines on Noise Control. • The use of approved hearing protection devices for personnel working in close proximity of the workings. • Incorporate sound attenuation measures to any equipment that could generate noise levels in excess of the statutory limits as published by the Department of Mineral Resources. • From an occupational perspective the mine workers should be monitored with respect to their personal exposure levels should as part of the legal requirements of Section 12 of the MHSA. • Proper Risk Assessments, as per Section 11 of the MHSA, should be done before any activities commence to ensure that all possible mitigation and control measures are implemented and maintained. • Regular environmental noise measurements should be conducted to ensure that the affected communities are not exposed to adverse noise levels during the day and night, should the project continue.	3	3	M	Limit the generation of noise through the various mine and plant activities to prevent causing any possible disturbance or discomfort of wildlife species or communities as a result.	• Relevant sections of the National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations there under and amendments thereto • SABS Code of Practice 0103 of 2008: The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication. • SABS Code of Practice 0328 of 2008: Environmental Noise Impact Assessments	Mitigation measures need to be put in place before any activities commence and thereafter these measures need to be controlled, maintained and complied with on a continuous basis during the Operational and Rehabilitation / Closure phases.
41	Vibration and air blast	During the operational phase, mining will be done mechanically. No drilling and blasting is anticipated as part of the operational phase.																

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42	Archaeology and heritage	• Mining and related activities Applicable Alternatives • PL01 and PL02 • TA1, TA2 ad TA3	Historical Remains: Farmstead Complex 01 (FC01) will not be affected by the Leslie 2 Project.	H	L	Construction to Rehabilitation/ Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	1	L	Control through training and procedures Control through maintenance Stop through protection	FC01 may not be affected (altered) to suit the mine's needs or demolished. SAHRA will require that FC01 has to be studied and documented by a conservation architect before it is affected in any way. Hereafter SAHRA may issue a permit for alteration or demolishment.	1	1	L	Conserve Farmstead complex (FC01)	• National Heritage Resources Act (Act No. 25 of 1999), and amendments thereto	Commence with construction phase (if mitigation required)
43	Archaeology and heritage	• Mining and related activities Applicable Alternatives • PL01 and PL02 TA1, TA2 ad TA3	Historical Remains – Farmstead Complex 02: FC02.1 and FC02.5 are located approximately 180m to the west of the conveyor route. These two structures are part of a complex of structures which constitute FC02 which will not be directly impacted by the conveyer route	H	L	Construction to Rehabilitation/ Closure		3	1	L		FC02 has been altered significantly during the more recent past. Its historical core may inform about the significance of the complex before (if at all) it is altered to suit the mine's needs or demolished. SAHRA will require that the structures to be affected (and the complex as such) have to be studied and documented by a conservation architect before it is affected where after SAHRA may issue a permit for alteration or demolishment.	1	1	L	Conserve Farmstead complex (FC02)		Commence with construction phase (if mitigation required)
44	Archaeology and heritage	• Mining and related activities Applicable Alternatives • PL01 and PL02 TA1, TA2 ad TA3	Graveyard (GY) 03: GY03 is located approximately 85m to the east of the proposed conveyor route. Construction activities may impact on Graveyard 03, if mitigation measures are not implemented appropriately.	H	L	Construction to Rehabilitation/ Closure		3	2	M		• Implement precautionary measures: demarcate GY03 with red cautionary tape. • Place 'Danger Graveyard' signposts to avoid that graveyard be damaged by construction personnel and/or their vehicles. • Implement general mitigation measures as outlined for remaining graveyards (see Part 10.4.3) • Demarcate graveyards with fences or with walls. To be fitted with access gates. • Regulated visitor hours compatible with mine safety rules. Not necessary when graveyards are located next to national roads. • Maintain corridors of at least 20m between graveyards' fences and developments such as roads or infrastructure. • Inspect graveyards every three months. Note in inspection register. Must also outline state of graveyards during each inspection. Keep reports on damages. Follow with the necessary maintenance work. Must be recorded in register. Kept tidy from any weeds and refuse.	1	1	L	To conserve GY03 as well as other graveyards in the project area		Commence with construction phase. Continue general mitigation measures during operational and decommissioning phase

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45	Archaeology and heritage	• Mining and related activities Applicable Alternatives • PL01 and PL02 • TA1, TA2 ad TA3	Graveyards That remain unaffected: No impacts. GY01, GY02, GY04, GY05, GY06 and G01 will remain unaffected by the Leslie 2 Project	H	L	Construction to Rehabilitation/ Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	1	L		• Implement management measures outlined in Part 10.4.3 of the report: • Demarcate graveyards with fences or with walls. To be fitted with access gates. • Regulated visitor hours compatible with mine safety rules. Not necessary when graveyards are located next to national roads. • Maintain corridors of at least 20m between graveyards' fences and developments such as roads or infrastructure. • Inspect graveyards every three months. Note in inspection register. Must also outline state of graveyards during each inspection. Keep reports on damages. Follow with the necessary maintenance work. • Must be recorded in register. • Kept tidy from any weeds and refuse.	1	1	L	To conserve all unaffected graveyards in the project area		Commence with construction phase. Continue general management measures during operational and decommissioning phases
46	Palaeontology	• Underground mining (bord and pillar)	The probability of a negative impact upon the palaeontological heritage of the coal-bearing Vryheid Formation strata underlying the regional scale dolerite sill is assessed as being probable. However, this categorisation does not apply to the coal itself, but rather to any siliciclastic sediment partings they may contain. The severity of the possible negative impacts upon the palaeontological heritage caused by the underground mining activities was assessed as being high.	M	H	Operational to Post-closure		5	4	H	Stop and control through inspections and excavations	• It is recommended that a member of staff (e.g., the Environment Officer) who is able to have access to the working face of the various stopes of the colliery be trained to recognise the types of plant macrofossils that may be exposed via the mining operations and how to excavate and curate them. • This officer should make inspections of newly exposed siliciclastic rock partings before they are coated with fire retardant material to identify if scientifically • significant fossils have been exposed. • The fossil material could then be excavated, its exact location (including height • in the coal seam, coal seam number, and the identification number of the stope recorded. • The fossils should then be stored in a safe place. • An experience Karoo palaeo-botanist must be mandated by the colliery to inspect the fossils, ascertain their significance and to make any necessary recommendations concerning their preservation. • While it would clearly be better for an experience palaeontologist to make regular examinations of the working mine faces this is deemed, herein, to be very difficult to recommend as a workable option.	5	3	H	Prevent the destruction of and loss of sites of palaeontological importance.	• National Heritage Resources Act (Act No. 25 of 1999), and amendments thereto as well as NEMA, 1998 (as amended)	During the Operational Phase
47	Traffic	Transportation of coal product off-site	Traffic will occur over the life of mine or as long as operations occur	H	L	Operational Phase	Refer to footprint sizes on the Shaft and Plant	5	2	M		• The use of acceleration and deceleration lanes at the access gate should assist in reducing severe braking (e.g. trucks engine breaks) and acceleration and therefore reduce the noise impact at the access gate.	3	2	M	Prevent / manage any impacts on traffic	• Requirements of the Gauteng Department of Roads and	During the Operational Phase

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		<u>Applicable Alternatives</u> • TA1, TA2 ad TA3	Minor traffic generated and congestion levels have been modelled and are acceptable Traffic already on the R29. Traffic only generated over life of mine and will cease to be generated upon closing the mine R29 already exists and not a considerable volume of traffic added by the mine				Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*					• Access is proposed off the R29 and the exact location of the access will need to be confirmed as part of a detailed access design submitted to the Gauteng Department of Roads and Transport (GDRT). The design speed along this road is 120km/hr and the following geometric parameters (not limited to, but includes these elements) need to be considered at detailed design. • The minimum radii of intersections on curves is 2200m – there is a horizontal curve on the R29 past the proposed site and the Radius of this bend will need to be confirmed. • The spacing of the access from other intersections needs to be as far apart as possible from other intersections. Since this road is classified as a rural highway (Class 2), the access spacing requirement is 800m. • The GDRT will allow a temporary access off the R29 to be obtained prior to the finalisation of the preliminary design for the upgrade of the R29 to a K-route that will determine the permanent access position of the mine. Currently there are a number of farm roads and so the 800m access spacing may not be achieved until the K-route upgrade takes place. • For new intersections such as the proposed access, the crossing angle should preferably be in the range of 75 to 120 degrees. • For high speed roads such as the R29, the approach grades to the access should not exceed 3%. This is especially relevant due to the expected heavy vehicles that will access this development. • Sight distance is an important factor to consider and is the distance required by a driver in order to make appropriate decisions and take action. • In terms of access into the mine, it is likely a single ingress lane and egress lane will be used. Office workers are expected to have tags where they can easily gain access and this is equivalent to a service rate of 400 vehicles per hour. Trucks belonging to the mine will most likely be recognised by the guard and allowed to enter the mine and this is equivalent to a service rate of say 300 vehicles per hour. Visitors are expected to sign a register to gain access into the mine and this is equivalent to a service rate of 80 vehicles per hour. • Public transport lay-byes are to be provided downstream of the access junction in accordance with the requirements of the Gauteng Department of Roads and Transport – please					Transport (GDRT). • standards of the COTO Traffic Impact and Site Traffic Assessments and Requirements Manual • NEMA, 1998	

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												refer to the typical detail in Appendix G for further reference and information. Consideration should also be given to the provision of an on-site public transport drop-off facility • In terms of non-motorised transport, pedestrian walkways are to be provided between the public transport lay-byes and the access gate leading into the mine. The pedestrian walkways should be in accordance with the standards of the COTO Traffic Impact and Site Traffic Assessments and Requirements Manual. Since this road is a rural freeway, a buffer strip of 6.5m should be used between the road pavement and pedestrian walkway and the width of the pedestrian walkways should ideally be 1.8m wide. • Parking will need to be provided for the staff workers of the mine in accordance with the relative Town Planning Scheme that applies in accordance with the Lesedi District Municpalities requirements. • In general, the parking for offices needs to be provided at four (4) spaces per 100m^2 be provided. The number of required parking can also be calculated based on employee numbers and earlier assumptions on the number of employees that will use private vehicles. The number of staff expected to make use of cars was estimated to be 77 persons and so at least 77 parking bays should be provided for staff. An assumption is also made that a further 20% of parking bays need to be provided for visitors and this is equivalent to 15 visitor bays. • The parking demand for the mine can therefore be estimated to be 92 parking bays or in the order of 100 parking bays.					
48	Visual	• Conveyor system • Shaft Complex • Plant Complex • Ventilation Shaft • Access and haul roads Applicable Alternatives • PL01 and PL02 • VL01 and VL02 • CA1 and CA2 • BA1 and BA2	Continual stockpiling of material, including the resource and increasing heights of stockpiles during operational activities. Extent of impact: Impact on local scale/ adjacent sites (km's). Stockpiles of significant vertical heights are likely to be visible over significant distances.	M	M	Operational	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	4	H	Control through restrictions and planning Stop and control through erosion measures Stop and control through procedures and training	• It is recommended that stockpiles be vegetated with indigenous grasses in order to blend more easily into the existing landscape and for screening purposes. • The design and height increase of stockpiles must be monitored to ensure that these components relate to acceptable environmental standards in terms of slope and elevation. • Stockpiles are ideally to be shaped at an adequate slope from the commencement of the project to ensure that it integrates more successfully into the natural topography of the visual landscape. • All stockpiles must be shaped and rounded to blend in with the surrounding undulating landscape and to minimise visual contrast.	3	3	M	To limit visual impacts as a result of stockpiling of material	• National Environmental Management Act (NEMA) (Act 107 of 1998). • National Heritage Resources Act (Act 25 of 1999 • Advertising on Roads and Ribbons Act (Act 21 of 1940)	Operational Phase

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49	Visual		Conveying of coal from the shaft complex to the plant complex is likely to lead to visual impacts on adjacent receptors. Extent of impact: Impact on local scale/ adjacent sites (hundreds of meters). Due to the conveyor being of a relatively low height, it is not expected to be highly visible, however it is 2.5km long, which increases its potential to lead to visual intrusion.	M	M	Operational		3	3	M	Stop through appropriate design and construction Control through dust suppression methods and dust management plan Control through monitoring	• It must be ensured, wherever possible, that existing natural vegetation is retained in the vicinity of the central conveyor line. • Where possible, screening of the conveyor line should be implemented through vegetatiion.	3	3	M	To limit impacts on the visual environment from coal conveying activities	• Municipal Systems Act (Act 32 of 2000)	Operational Phase
50	Visual		Generation of dust leading to visual intrusion, visual exposure of receptors and impacts on the overall landscape character. Extent of impact: Impact on local scale/ adjacent sites (km's), due to dust potentially being visible over significant distances.	M	M	Operational		4	3	H		• Internal roads should be surfaced to minimise dust. • During the construction phase all dirt and haul roads will require effective dust suppression such as regular watering. • An effective dust management plan taking into account stockpile areas, the plant infrastructure area (stockpiles and transfer points), as well as haul/ access roads must be designed and implemented in order to mitigate the impact of dust on sensitive receptors throughout all mining phases. • Soil stockpiles must be kept damp during the dry season , and preferably be vegetated in order to minimise the potential for dust generation. • Access roads must be suitably maintained to limit erosion and dust pollution. • Vehicle speed on unpaved roads must be reduced to limit dust generation.	3	3	M	To limit the presence of dust throughout the mining operations		Operational Phase
51	Visual		Additional vehicular traffic and potential railway activities impacting on the rural character of the region and leading to visual exposure of receptors further from the MRA to coal mining activities. Extent of impact: Impact on local scale/ adjacent sites (km's), due to movement of vehicles and train over long distances.	H	L	Operational	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	4	H	Control through restrictions and planning Stop and control through erosion measures Stop and control through procedures and training Stop through appropriate	• As far as possible, existing roads are to be utilised, also for construction purposes, to prevent. cumulative impacts from roads and traffic. • Transport of the mined resource should be optimised as far as possible to limit the number of additional vehicles on local and district roads. • After closure, this impact will not further occur.	4	2	M	To limit visual impacts from additional vehicles on local and district road and to limit additional railway activity to what is essential		Operational Phase
52	Visual		Night time lighting due to operations impacting on receptors accustomed to a low district brightness during night time.	H	L	Operational		4	4	H		• A lighting engineer may be consulted to assist in the planning and placement of light fixtures for the mining facility and all ancillary infrastructures in order to reduce visual impacts associated with glare and light trespass.	4	2	M	To limit visual impacts from night time lighting		Operational Phase

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			Extent of impact: Impact on local scale/ adjacent sites (km's) due to night time lighting potentially being visible over significant distances.								design and construction Control through dust suppression methods and dust management plan Control through monitoring	• As far as possible, construction activities should take place during the daylight hours, in order to limit the use of bright floodlighting and to avoid the use of additional night-time lighting which may lead to skyglow. • Outdoor lighting must be strictly controlled. • The use of high light masts and high pole top security lighting should be avoided along the periphery of the operations. Any high lighting masts should be covered to reduce sky glow. • Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surrounding of the mining infrastructure, thereby minimising the light spill and trespass; • Care should be taken when selecting luminaries to ensure that appropriate units are chosen and that their location will reduce spill light and glare to a minimum. Only "full cut-off" light fixtures that direct light only below the horizontal must be used on the building (Figure 26 of the attached VIA); • Censored and motion lighting may be installed at office areas, workshops and other buildings to prevent use of lights when not needed. • Selective lighting must be used for the construction and contractor camps and other secured areas. • Minimum wattage light fixtures should be used, with the minimum intensity necessary to accomplish the light's purpose. • Vehicle-mounted lights or portable light towers are preferred over permanently mounted lighting for night-time maintenance activities. If possible, such lighting should be equipped with hoods or louvers and be aimed toward the ground to avoid causing glare and skyglow (BLM, 2013). • The use of low-pressure sodium lamps, yellow LED lighting, or an equivalent reduces skyglow and wildlife impacts. Bluish-white lighting is more likely to cause glare and attract insects, and is associated with other human physiological issues (BLM, 2013). • After closure, this impact will not further occur.						

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53	Socio-economic	Mining and related activities	Impact on groundwater: Mining activity is a source of potential pollutant to underground water resources.	M	L	Construction and Operational	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	Refer to geohydrological assessment ratings			Control through communication and forums	• Mitigation against the contamination of underground mining must be applied in line with best practice, relevant specialist studies and in consultation with local farmers. • Establish an environmental forum to discuss water and other environmental issues and involve farmers in environmental monitoring process	Refer to geohydrological assessment ratings			To prevent contamination of water resources.	• DWS Best Practice Guidelines • GN704, dated 1999 • NWA (1998) and Regulations there under and amendments thereto • The storm water management plan and / or amendments thereto • Specialist recommendations • The mine's internal water management and maintenance procedures. • Procedures to be in line with the latest legislation.	Preconstruction. The MOU with farmers should take place prior to commencement of construction.

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54	Socio-economic	Mining and related activities	<u>Impact on arable land and current farming activities:</u> The project will have an impact on current farming activity which will be rendered uneconomical. Most of the farms in the area surrounding the Leslie 2 application area would be able to maintain production with minor adjustments to their business plan and way of operation. The cattle farming operation on Portion 22 of the farm Winterhoek 314 IR may be able to continue with limited impact possibly due to coal dust from the shaft stockpile and conveyor belt. The buffalo rearing enterprise on Portion 21 of the farm Winterhoek 316 IR as well as the cattle feedlots will have to be relocated. The continuous noise from the conveyor belt as well as the possibility of dust related problems will in the economic specialist's opinion have a negative impact on the two activities.	M	M	Construction to Rehabilitation/ Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	3	H	Control through agreements and committee	• Agreements with directly affected must be reached. These agreements must discuss compensation. Compensation should not be limited to only land, but should include compensation for the business, for loss of current and future income as well as for compensation of all structures, livestock etc. In terms of farm workers who will lose their jobs as a result of the project, it is advisable that these workers are given priority to access economic opportunities offered by the Leslie 2 mine. • Establish a farmer and farm worker committee that meets once a month during the construction phase and for the first two years of mining. Thereafter the committee may choose how often to meet. The committee should enable farmers and farmworkers the opportunity to present solutions to impacts associated by mining activities. AOL should at least provide administrative support to resolving the matters raised by the committee and must report back on matters at each meeting. Grievances should be recorded and logged for review and discussion at each meeting to track the progress of each complaint. A dedicated communications officer should be appointed to support the committee and perform any functions necessary to resolve grievances raised by the committee. • Before decommissioning starts, a meeting with farms on site should take place to obtain input on the rehabilitation process. The applicant must work closely with farmers to ensure that rehabilitation takes place in a manner than supports future agricultural activity.	5	3	H	Compensation to affected parties for loss of arable land.	• Mineral and Petroleum Resources Development Act, 2002 and the regulations there under, and amendments thereto.	It is imperative that Agreements with landowners and the placement of retrenched staff are finalised before construction commences. The farmers Committee established Before construction. All rehabilitation Programmes should be agreed to with farmers prior o decommissioning the mine.

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55	Socio-economic	Mining and related activities	Increased dust: The creation of dust during mining activities such as transport, blasting, drilling etc. will have an impact on the quality and growth of crops as well as the quality of grazing. This has the ability to affect farmers yield and growth of livestock.	M	M	Construction to Rehabilitation/ Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	4	H	Control through dust management measures, communication monitoring	• Mitigation measures related to dust as per best practice and relevant studies must apply. • In terms of the protection of crops, the EMPr must apply best practice to dust suppression measures. • AOL should work with local farmers to ensure that dust suppression methods are working. • Put dust buckets on all neighbouring properties and monitor on a monthly basis or as specialist studies apply.	4	3	H	Limit the degree of pollution and its social and economic implications on those affected.	• GG 36974, R827, National Dust Control Regulations, 1 November 2013. GG 32816, N1210, National Ambient Air Quality Standards, 24 December 2009 • GG 35463, GN 486, National Ambient Air Quality Standard for Particulate Matter with Aerodynamic Diameter less than 2.5 Micron Meters (PM2.5), 29 June 2012.	Duration of all mining activity.

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56	Socio-economic	Mining and related activities	<u>Nuisance factors</u>: Mining will result in a number of nuisance factors which will affect local and residents and have the potential to disrupt social activity. These include blasting, noise and dust. Drilling; blasting and construction activities will create noise pollution which may affect schools, churches and private residents. Noise pollution can be disturbing and inconvenient to the community.	H	L	Construction to Rehabilitation/ Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	3	H	Control through schedules, training and procedures Control through communication with interested and affected parties	• Distribute blasting schedule to neighbouring properties. • A pre-blast survey is required on all structures within a 2km of blasting activity. This will allow AOL to effectively manage complaints which can be judged against a status quo prior to new blasting. Pre-blasting survey should include GPS • points of infrastructure like boreholes, and photographic evidence of all infrastructures. A copy of the study should be kept by the mine and another copy by the farmer. • Where AOL will be responsible for blasting activity as a result of the proposed project, AOL must ensure that compensation is provided to the affected parties. The compensation must be equal to or more than the damage incurred. No affected party should be undercompensated for damage to infrastructure cause by Leslie 2. All affected communities should be forewarned of blasting that will take place at AOL. • Adequate warning of potential noise pollution through blasting should be communicated to the affected communities. • Traffic will be temporary and mitigation can be done well in advance through awareness programs. • Trucks should not enter residential areas. AOL should implement strict enforcement over all drivers to stick to speed limit and obey traffic laws. • Where possible, haul routes should be shared with the farmers internal road network to avoid impact on crops, livestock and other farming activity. • Develop detailed traffic control plans with input from the traffic police to minimise road and traffic disruptions. • Provide advanced communication (i.e. signage, advertisements in local papers) about changes to local access, potential road hazards and expected traffic volumes during construction • Encourage workforce to live in established residential areas. Provide transport from these areas to the mine.	3	2	M	Limit the degree of pollution and its social and economic implications on those affected	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Operational to Rehabilitation / Closure Phases

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
57	Socio-economic	Mining and related activities	Impact on health: As a result of more people moving into the area, the constraints on the health system are likely to worsen. Health services in the area are insufficient. The closest health facility is in the town of Devon. Health issues also arise from social conditions. The influx of prospective workers, particularly of men, can cause social ills. The number of men in the mining area is already significantly higher than the number of women. HIV/Aids are likely to increase with the introduction of a transient population. As a result of mining activities, the air quality in the area can deteriorate. It was reported that lung diseases are common the area. These problems were associated with the close proximity of mining activity to residential areas.	M	M	Construction to Rehabilitation/ Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	4	H	Control through monitoring Control through dust mitigation Stop through training and procedures and programs	• Air quality monitoring and reporting must take place to determine the impact of the mine on increased dust levels. • Dust mitigation measures should be undertaken as per the relevant specialist studies and best practice. • Mine workers and their families should be provided with mine based healthcare to lessen the burden placed on public healthcare facilities. • HIV and Aids campaigns must be undertaken to ensure safe practice. • Substance abuse awareness programs should be undertaken to serve as a deterrent.	4	3	H	To mitigate against the health implications during the construction and operation of the mine.	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002) • National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations there under and amendments thereto • Social and Labour Plan	Mitigation measures should be Implemented preconstruction and for the duration of all mining activity as relevant
58	Socio-economic	Mining and related activities	Impact on farm workers: Persons currently employed by the farm may potentially lose their jobs as a result of mining activity.	M	M	Construction to Rehabilitation/ Closure		4	4	H	Control through employment-related measures and communication	• Farm workers should be given priority to all upskilling and employment opportunities generated by Leslie 2. Where this is not possible, alternative employment opportunities should be sourced. • Refrain from employing farm workers for short term positions.	2	3	M	Limit socio-economic impacts		Planning to Rehabilitation / Closure Phases
59	Socio-economic	Mining and related activities	Inward migration: Mining activity will attract potential job-seekers in the area. This will cause a disruption to the current social structure of the communities	M	M	Construction to Rehabilitation/ Closure		5	4	H		• The local employment pool should be restricted to long-term residents of the town of Devon, Leandra and surrounding farms. • Encourage employees to set up residence in local towns. Prioritise economic opportunities (employment, training and business) to the local community. Work with the local community structures to ensure transparent employment process. Ensure a community liaison officer is employed to facilitate matters and for the community to express their grievances. Hostel like accommodation should be avoided.	5	3	H	To prevent social ills that are associated with inward migration of potential jobseekers.		Construction and preconstruction announcement s should take place.

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
60	Socio-economic	Mining and related activities	<u>Employment and skills transfer</u>: The proposed mine will generate local employment opportunities and skills development opportunities. Employment will contribute to household wealth. Households will spend more money which will stimulate the local economy. This stimulus will generate more wealth and opportunity for the local community during the construction phase. Training and upskilling not only increase a person's chance of accessing employment opportunities, but also can raise the income of the person. ***It is noted that the impact is positive, hence the final score has increased***	N/A		Construction and Operational	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	2	1	L	Control through employment-related measures and communication	• Ensure local employment within a 10km radius of the mine. • Employ females as well as males. • Ensure a transparent employment system is in place with a CLO to manage the process. • The beneficiaries of local economic opportunities must be from the local community and not from migrant labour. • Work with local structures to ensure transparency. • Develop a recruitment policy that allows equal opportunity to all people (woman, disabled) and give preference to local labour. • Refrain from employing farm workers for short term positions	3	3	M [69]	To maximise economic opportunities for local employment and development.		Duration of mine
61	Economic	Mining and related activities	<u>National and Provincial effectiveness criteria:</u> A comparison of the coal mines GDP/Capital ratio with the average for the total South African economy indicates that for every R1 million of capital invested in the coal mine, it generates an overall GDP ratio of 0.51 compared to the average for the national economy of 0.45 and 0.51 for the provincial economy. This suggests that the coal mine utilises capital more effectively than other sectors in the national economy. When a similar comparison of the Labour/Capital ratio is made, the coal mine will generate more employment opportunities, i.e. 1.01 jobs created	-	-	Operational		Positive			N/A	No mitigation measures.	Positive			To maximise economic opportunities	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002) • National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations there	Duration of mine

[69] Positive impact

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
			for every R1 million invested in this project, in comparison with the national average of 0.88 jobs created. Employment created compares well with the provincial ratio of 1.21. In terms of the income portion that is distributed to the low-income households, it is well above the national average at 16.2% and very comparable with the provincial basis of 24.2%.														under and amendments thereto • Social and Labour Plan	
62	Economic	Mining and related activities	<u>Social impact</u>: It is calculated that the amount of R214 million will be paid annually to the Fiscus expressed in 2016 prices. The issue then arises what can be done with an additional R214 per annum paid into the Fiscus? As many as 332 additional educators and 11 medical doctors can be appointed, while simultaneously servicing 122 additional hospital beds and 125 low-cost houses.	-	-	Operational	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	Positive			N/A	No mitigation measures.	Positive			To maximise economic opportunities		Duration of mine
63	Economic	Mining and related activities	<u>Sectoral Impact:</u> As per the provincial sectorial GDP Impact figures provided in Annexure H14, 71.69% of the GDP impact is in the mining sector, with the balance spread between the different sectors. The second and third largest impact is in Community Services with 9.99% and Trade with 6.76%.	-	-	Operational		Positive			N/A	No mitigation measures.	Positive			To maximise economic opportunities		Duration of mine

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
64	Economic	Mining and related activities	Overall the mining option is economically the preferable option as it will provide economic growth now, as needed provincial and country wide. The following is noteworthy: • Poverty alleviation will be supported with 396 net additional direct jobs plus low-income households' receiving an additional R82.87 million annually expressed in 2016 prices. • The total employment created in the two provinces is estimated to be around 958 and additional GDP R433.50 million.	-	-	Operational	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	Positive			N/A	No mitigation measures.	Positive			To maximise economic opportunities	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002) • National Environmental Management: Air Quality Act (Act No 39 of 2004); Regulations there under and amendments thereto • Social and Labour Plan	Duration of mine

Table 67: Impacts and Risks identified: Rehabilitation / Closure and Post-Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
1	Soil	• Use of roads / hauling activities	Heavy equipment traffic is anticipated to cause significant soil compaction. The severity of this impact is anticipated to be particularly highest in the vicinity of the proposed hauling and access roads. The extent of the impact is anticipated to be primarily limited to the immediate vicinity the proposed development areas. The duration of the impact is likely to persist beyond life of mine if left unrehabilitated.	M	M	Construction, Operational, Rehabilitation and Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	4	H	Control through planning and scheduling Stop through training and procedures	• Schedule vegetation clearance and soil stripping to coincide with the dry (low rainfall) season as far as possible; • Vehicular movement should be strictly prohibited over stockpiled soils; • Lightly rip stockpiles to at least 25 cm beneath the surface prior to re-vegetation; and • Rip the soils to at least 60 cm below ground surface following rehabilitation.	5	2	M	Maintain functional soil structure to sustain post-mining land capability	• Rehabilitation, Decommissioning- and Closure plan and Closure Objectives. • The mine's internal procedures.	During Construction, Operational and Rehabilitation / Closure Phases.
2	Flora	• Mine Closure and Rehabilitation	Removal of infrastructure and rehabilitation may result in a loss of floral habitat, diversity and floral SCC, if not performed according to a detailed rehabilitation plan. <u>Extent of impact</u>: The impact is not limited to infrastructure laydown areas, but can extend to the surrounding natural areas.	M	M	Rehabilitation / Closure, Post-closure		4	4	H	Remedy through rehabilitation Stop through restrictions and procedures	• Footprint areas of demolition activities must be kept as small as possible; • Rehabilitation of disturbed areas must be implemented and grass seeds of species indigenous to the area must be used; • Disturbed areas caused during the demolition activities need to be ripped and rehabilitated and seeded with grass seeds indigenous to the area; and • Care must be taken when rehabilitation activities need to be performed within wetlands and associated buffer zones, as well as rocky outcrop areas as these areas are sensitive and manual labour needs to be the preferred option.	3	2	M	Prevent any further disturbance to habitat considered sensitive or in a good ecological condition and ensure effective rehabilitation of disturbed areas		Rehabilitation / Closure Phase
3	Flora and fauna	• Mine Closure and Rehabilitation	Ineffective rehabilitation of disturbed areas may result in alien and invasive species proliferation, which might spread to surrounding undisturbed areas.	M	M	Rehabilitation / Closure, Post-closure		4	4	H	Control through monitoring Remedy through rehabilitation	• Monitoring and control of Alien and Invasive Species Programme (AIP) must be done during the decommissioning and closure phase; • All mitigations and recommendations set out in the AIP Control Plan must be adhered to; • Seed dispersal of AIP must be prevented as far as possible caused by operational activities; • AIP control must be carried out by a registered contractor; • Care must be taken when rehabilitation activities need to be performed within wetlands and associated buffer zones, as well as rocky outcrop areas as these areas are sensitive and manual labour needs to be the preferred option. • As much vegetation growth as possible should be promoted within the proposed development area in order to protect soils and to reduce the percentage of the surface area which is paved. In this regard special mention is made	2	3	M	Ensure effective rehabilitation of disturbed areas.		Rehabilitation / Closure Phase

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												of the need to use indigenous vegetation species as the first choice during landscaping; • All areas of disturbed and compacted soils need to be ripped and reprofiled and reseeded in ingenious grass species; and • All areas affected by construction should be rehabilitated upon closure of the mining operations. Areas should be reseeded with indigenous, locally occurring grasses as required. All rehabilitated areas should be rehabilitated to a point where natural processes will allow the pre-development ecological functioning and biodiversity of the area to be re-instated. • Permanent monitoring plots must be established in areas surrounding the surface infrastructure and rehabilitated areas. These plots must be designed to accurately monitor the following parameters on an annual basis: ➢ Measurements of crown and basal cover; ➢ Species diversity; ➢ Species abundance; ➢ Impact of dust on flora; ➢ Recruitment of indigenous species; ➢ Alien vs. Indigenous plant ratio; ➢ Recruitment of alien and invasive species; ➢ Erosion levels and the efficacy of erosion control measures; and ➢ Vegetation community structure including species composition and diversity which should be compared to pre-development conditions. • Monitoring of rehabilitation trials in light of the above parameters must also take place throughout all phases of the proposed mining development and for a period of 5 years after decommissioning and closure; • The rehabilitation plan must be continuously updated in accordance with the monitoring results in order to ensure that optimal rehabilitation measures are employed; • Results of the monitoring activities must be taken into account during all phases of the proposed mining development and action must be taken to mitigate impacts as soon as negative effects from mining related activities become apparent; and • The method of monitoring must be designed to be subjective and repeatable in order to ensure consistent results.						

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
4	Fauna	• Mine Closure and Rehabilitation	Removal of infrastructure and rehabilitation may result in a loss of faunal habitat, diversity and faunal SCC, if not performed according to a detailed rehabilitation plan. Extent of impact: The impact is not limited to infrastructure laydown areas, but can extend to the surrounding natural areas.	M	M	Rehabilitation / Closure, Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	4	H	Control through monitoring Remedy through rehabilitation	• Footprint areas of demolition activities must be kept as small as possible; • Rehabilitation of disturbed areas must be implemented and grass seeds of species indigenous to the area must be used in order to keep preferred faunal habitat intact; • Disturbed areas caused during the demolition activities need to be ripped and rehabilitated and seeded with grass seeds indigenous to the area; and • Care must be taken when rehabilitation activities need to be performed within wetlands and associated buffer zones, as well as rocky outcrop areas as these areas are sensitive and manual labour needs to be the preferred option.	3	2	M	Prevent any further disturbance to habitat considered sensitive or in a good ecological condition and ensure effective rehabilitation of disturbed areas	• Rehabilitation, Decommissioning- and Closure plan and Closure Objectives. • The mine's internal procedures.	Rehabilitation / Closure Phase
5	Aquatic Environment	• Rehabilitation activities	impact on the flow even after operational phase. Loss of water to inadequately rehabilitated areas may still have an impact on the flow post operational phase. Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post operational phase. Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as mine residue stockpiles and latent dirty water areas such as filled underground mine working areas may impact on water quality. Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality. Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	M	M	Rehabilitation / Closure, Post-closure		4	3	H	Control through monitoring Remedy through rehabilitation Control through storm water management Control through erosion control measures Stop and control through training	• Ensure that as far as possible all infrastructures are removed and footprint areas are suitably rehabilitated; • It is considered essential that no decommissioning activities take place within the drainage and river areas; • In particular mention is made of the need to not encroach on the riparian systems near the Steenkoolspruit and the Blesbokspruit River and the associated tributaries with a minimum buffer of 100m around all riparian systems maintained in line with the requirements of regulation GN704 of the national Water Act; • Ensure that sound environmental management is in place during the decommissioning phase; • No dirty water should be allowed to come into contact with the receiving environment during the decommissioning phase of the proposed mining project; • Prevent run-off from dirty water areas entering stream systems through ensuring clear separation of clean and dirty water areas; • Pollution control dams must be adequately designed to contain a 1 in 50 year 24 hour storm water event; • Any remaining infrastructure must be monitored for seepage of water of impaired quality and erosion; • Ensure that any latent dirty water systems are managed in such a way as to prevent discharge to the receiving environment and to prevent discharge of dirty water; • Ongoing monitoring of water quality (surface water, groundwater and process water) must take place. Monitoring of water quality should take place at a minimum frequency of once a month (when surface water is present) during which time major salts and basic metals, are monitored along with basic parameters such as pH, Total	3	1	L	Prevent impacts to aquatic environment		Commence during Planning, and Construction, Operation Rehabilitation / Closure phases

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
			Potential poor housekeeping and management during decommissioning phase may lead to further impacts on water quality. Spills and other unplanned events during decommissioning phase may impact on water quality. Disturbance of soils as part of demolition activities may alter the aquatic habitat. Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat. Alien vegetation encroachment will impact on and alter the aquatic habitat. <u>Extent of impact:</u> The extent of the impact has the potential to affect both local and regional areas									Suspended Solids (TSS) and Total Dissolved Solids (TDS), dissolved oxygen and Electrical Conductivity (EC); • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor in order to identify any emerging issues in the receiving environment; • Toxicity testing of the proposed mining project's process water facilities should take place quarterly and concurrently with the biomonitoring program in order to monitor the toxicological risk of the process water system to the receiving environment and in particular the groundwater resources. Tests should include the following test organisms as a minimum: Vibrio fischeri, Daphnia pulex and Algal Growth Potential; • Any impacts to the groundwater resources in the vicinity of the proposed mining project will need to be suitably and timeously mitigated to prevent impacts further downstream and potentially on a regional scale; • Limit the footprint area of the decommissioning activity to what is absolutely essential in order to minimise the loss of clean water runoff areas and the concomitant recharge of streams in the area; • If it is absolutely unavoidable that either the Steenkoolspruit and the Blesbokspruit or their associated tributaries will be affected, disturbance must be minimised and suitably rehabilitated; • Ensure that no incision and canalisation of the aquatic resources present takes place as a result of decommissioning activities; • All erosion noted within the study area should be remedied immediately and included as part of the ongoing rehabilitation plan; • Ensure that decommissioning of all stockpiles are well managed and have measures such as berms and hessian sheets implemented to prevent erosion and sedimentation which may ultimately lead to transformation of aquatic habitat areas; • As much vegetation growth as possible should be promoted within the proposed development area during the decommissioning phase in order to protect soils and vegetation clearance should be kept to a minimum; • Ongoing adherence to the alien vegetation control program within the riparian zones with special mention of water						

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												loving tree species and invasive species such as Arundo donax and Typha capensis; • Monitor all affected riparian systems for moisture stress; ➢ Monitor all potentially affected riparian zones for changes in riparian vegetation structure; ➢ Permit only essential personnel within 100m of all riparian systems; ➢ All areas of increased ecological sensitivity should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel during the decommissioning phase of the proposed mining project; ➢ No crossing of the aquatic resources should take place and the substrate conditions of the aquatic resources and stream connectivity must be maintained; ➢ No material may be dumped within any rivers, tributaries or drainage lines in the vicinity of the proposed mining project; • Ensure that all spills are immediately cleaned up; • All hazardous chemicals must be stored on specified surfaces.						
6	Aquatic Environment	• Post-closure – Monitoring and Maintenance of latent impacts	Loss of MAR from latent dirty water areas may still impact on the flow even after decommissioning phase. Loss of water to inadequately rehabilitated areas may still have an impact on the flow post decommissioning phase. Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post decommissioning phase. Ongoing erosion and sedimentation of the aquatic resources, which will result in a loss of instream flow due to inadequate rehabilitation of affected areas. Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	M	M	Rehabilitation / Closure, Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	3	H	Control through monitoring Remedy through rehabilitation Control through storm water management Control through erosion control measures Stop and control through training	• Any area where possible decant points may be determined by a geohydrology assessment, needs to be very carefully managed in perpetuity: ➢ Water levels need to be very strictly managed to keep water levels below any decant level while ensuring that a significant cone of depression impact does not take place; and ➢ If decant will occur all water is to be treated to background water quality values prior to release into the receiving environment. • Decant volumes and salt load could be reduced if an underground seal is installed; • Any impacts to the groundwater resources in the vicinity of the proposed mining project will need to be suitably and timeously mitigated to prevent impacts further downstream and potentially on a regional scale; • Ongoing monitoring of the dirty water system and selected boreholes should take place for a period of at least three years post closure to monitor and mitigate any groundwater contamination plume post-closure as a result of seepage from latent dirty water areas;	3	1	L	Prevent impacts to aquatic environment		Commence during Planning, and Construction, Operation Rehabilitation / Closure phases

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			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
			Inadequate closure and rehabilitation leading to ongoing pollution and seepage from contaminating sources such as mine residue stockpiles and latent dirty water areas may impact on water quality, with special mention of contaminated dirty water decant generated from underground mine workings. Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality. inadequate separation of clean and dirty water areas may alter the aquatic habitat and result in a loss of aquatic biodiversity. Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present. Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat. Potential post closure impacts on water quality may lead to a loss in aquatic biodiversity. Alien vegetation encroachment will impact on and alter the aquatic habitat. <u>Extent of impact</u>: The extent of the impact has the potential to affect both local and regional areas									• Ensure that no incision and canalisation of the aquatic resources present takes place as a result of inadequately rehabilitated mining areas; • All erosion noted within the study area should be remedied immediately and included as part of the ongoing rehabilitation plan for a period of at least three years post-closure; • As much vegetation growth as possible should be promoted to protect soils and vegetation clearance should be kept to a minimum; • An ongoing alien vegetation control programme should be put in place for a period of at least three years post-closure; • Monitor all affected riparian systems for moisture stress; • Monitor all potentially affected riparian zones for changes in riparian vegetation structure; • Permit only essential personnel within 100m of all riparian systems; • No crossing of the aquatic resources should take place and the substrate conditions of the aquatic resources and stream connectivity must be maintained; • Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime as a result of latent dirt water facilities; • Close monitoring of water quality (surface water, groundwater and process water) must take place; • Monitoring of water quality should take place at a minimum frequency of once a month (when surface water is present) during which time major salts and basic metals, are monitored along with basic parameters such as pH, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS), dissolved oxygen and Electrical Conductivity (EC) should take place for a period of at least 3 years post closure * Should any areas of contaminated decant be identified, this will need to be pumped and suitably treated prior to release into the receiving environment; • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor to identify any emerging issues in the receiving environment for a period of at least 3 years post-closure.						
7	Wetlands	• Pre-fabricated structures (offices, stores, workshops,	Decommissioning activities may lead to further wetland habitat transformation and	H	L	Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant	4	3	H	Stop and control through seasonal restrictions	• As far as possible, all construction activities should occur in the low flow season, during the drier winter months; • Freshwater resource sensitivity maps have been developed for the MRA, indicating the freshwater	3	2	M	Prevent the loss of freshwater habitat and ecological structure, changes	• National Environmental Management Act,	Planning, Construction, Operational and

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		change houses etc.), • Stockpiles • Roads • Conveyor system • PCD • Adit and shafts • Potential rail spur Applicable Alternatives: • PL01 and PL02 • VL01 and VL02 • TA1, TA2, TA3 • BA1 and BA2 • CA1 and CA2	increased alien plant species proliferation is areas are not revegetated and compacted areas ripped.				Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr))*				Stop and control through planning Stop and control through training and procedures Stop and Control through storm water management plan Control through alien invasive vegetation control plan	resources, their relevant buffer zones and regulatory zones in accordance with the National Environmental Management Act (Act 107 of 1998). It is recommended that these sensitivity maps be considered during all phases of the development and with special mention of the planning of infrastructure layout, to aid in the conservation of the freshwater resources habitat and environmental resources within the MRA; • Permit only essential construction personnel within 32m of the freshwater resource habitat, if absolutely necessary that they enter the regulatory zone; • All development footprint areas should remain as small as possible and should not encroach onto surrounding more sensitive areas. It must be ensured that the freshwater resources, and their associated buffer zones are off-limits to construction vehicles and personnel; • The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas; • All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and maintenance vehicles and personnel; • The duration of possible impacts on the freshwater system should be minimised as far as possible by ensuring that the duration of time in which possible flow alteration and sedimentation will take place is minimised; • Appropriate sanitary facilities must be provided for the life of the construction and all waste removed to an appropriate waste facility; • All hazardous chemicals should be stored on bunded surfaces and no storage of such chemicals should be permitted within the freshwater resources buffer zones; • Adequate storm water management must be incorporated into the design of the proposed activities development in order to prevent erosion and the associated sedimentation of the freshwater resources. In this regard, special mention is made of: • Sheet runoff from cleared areas and impermeable surfaces needs to be curtailed; and • Runoff from paved surfaces should be slowed down by the strategic placement of berms. • No informal fires should be permitted in or near the construction areas;				to ecological and social-cultural services provision and alteration of the hydrological functioning and sediment balance of the freshwater system, beyond the infrastructure footprint area	1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and • Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Rehabilitation / Closure Phases

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												• Ensuring that an adequate number of rubbish and "spill" bins are provided will also prevent litter and ensure the proper disposal of waste and spills; • Edge effects of activities, particularly erosion and alien/weed control need to be strictly managed; and • Implement an alien vegetation control program within freshwater resources areas, throughout the life of mine.						
8	Wetlands	• Use of roads Applicable Alternatives: • PL01 and PL02	Decommissioning activities may lead to further wetland habitat transformation and increased alien plant species proliferation if inadequate site rehabilitation does not take place (i.e. Ripping and re-profiling of compacted soils and revegetation with suitable wetland species). Also, concentration of flow erosion and sedimentation of the system is possible where roads within existing wetland resources are being decommissioned.	M	M	Rehabilitation / Closure to Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	5	3	H	Stop and control through restrictions Stop and control through seasonal restrictions Stop and control through planning and design Stop and control through training and procedures Remedy through rehabilitation	• During construction phase, no vehicles should be allowed to indiscriminately drive through the freshwater environment and vehicles must remain on designated roadways; • Planning of temporary roads and access routes should take the site sensitivity plan into consideration, and wherever possible, existing roads should be utilised; • If additional roads are required, then wherever feasible such roads should be constructed outside of the buffer zone of the wetland resources and not directly adjacent thereto; • During the construction and operational phases, erosion control measures should be installed on roads to prevent gully formation and siltation of the freshwater resources; • Newly constructed roads should have erosion berms installed in order to reduce the speed of any surface runoff and limit the sedimentation of the freshwater environment; • Adequate storm water management must be incorporated into the design of the roads to prevent erosion and the associated sedimentation of the freshwater resources. Therefore: ➢ Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed; and ➢ Runoff from paved surfaces should be slowed down by the strategic placement of energy dispersing structures. • The design and layout of the road must ensure that permanent zones of the freshwater resources remain inundated with water after heavy rainfall events. In order to achieve this the following should be implemented: ➢ Construct a permeable pioneer layer using material such as coarse sand and rocks that do not form acid, to avoid contamination of water; ➢ The pioneering layers of the roadworks should be constructed as follows: Initially a rockgrid and biddum composite should be used as the base layer. A secondary layer consisting of crushed rock with	5	2	M	Prevent the loss of freshwater system connectivity, hydrological functioning and loss of habitat.	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Planning, Construction, Operational and Rehabilitation / Closure Phases

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												coarse (>300mm at the base) and finer material nearer the top of the structure should be constructed over the entire length of the zone of the wetland where lateral movement of water is expected and except the active channel where culverts are proposed to allow flow of water through the watercourse in as natural a way as possible. The entire set of layer works should be placed on top of the wetland vegetation and associated soils; ➢ The structure on which the road crossing will be placed should span as far as possible outside the lateral flow of water area, in order to ensure that the flow of water underneath the road is not inhibited in anyway; and ➢ The design of the road should ensure that the soils within the permanent zones remain saturated throughout the year regardless of the season. • To ensure that permanent, seasonal and temporary wetland zone functionality is maintained, the pioneer layer should be constructed to ensure that soil wetness is maintained in the upper 50cm of the soil to ensure that facultative and obligate wetland vegetation species can still be supported. This will also ensure that soil wetting conditions are maintained; • Due to the length of the crossing a culvert should be placed every 50m along the wetland crossing to facilitate faunal movement across the road structure; • The design and layout of the road and the culvert must promote hassle free movement of more mobile faunal species; • The area in the vicinity of the newly constructed infrastructure (the culvert and the road) should be rehabilitated in a manner that simulate natural conditions in order to enhance or reinstate the ability of the watercourses to provide feeding and breeding sites; • Access roads for support vehicles, and vehicles used in the construction of the infrastructure and for daily use, should not encroach into the freshwater resources unnecessarily; • If crossings are required they should cross the system at right angles, as far as possible to minimise impacts in the receiving environment, and any areas where bank failure is observed due to the effects of such crossings should be immediately repaired by reducing the gradient of the banks to a 1:3 slope and where needed necessary, installing						

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												support structures. This should only be necessary if existing access roads are not utilised; • Areas where bank failure is observed as a result of such stream crossings should be immediately repaired (re-profiled at an 18 degree angle and revegetated with suitable indigenous plant species); • During decommissioning, rip and reprofile areas to ensure that no changes to runoff patterns occurs. Stabilize and revegetate these areas with biodegradable hessian and suitable indigenous plan species in order to limit sedimentation of the freshwater environment; and • Upon closure all haul and access roads which are no longer required, should be removed in order to minimise the impacts on the freshwater resources of the area beyond the life of mine.						
9	Wetlands	• Water management	Even though the possibility of decant is unlikely, as suggested within the geohydrological report (Scholtz, 2016) during the decommissioning of the adit/shafts, the possibility still exists. In the case of possible decant, water will accumulate within the adit/shafts and eventually decant into nearby freshwater resources, thus resulting in salt rich and potentially low pH dirty water reaching the receiving environment. Subsidence after decommissioning of the underground mining areas are also unlikely to occur, as determined by the geohydrologist (Scholtz, 2016). However, the possibility still exists. Possible subsidence could potentially impact on the hydrology of the freshwater resources within the MRA, but also impact on the catchments hydrology.	M	M	Rehabilitation / Closure to Post-closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	3	2.5	M	Control through monitoring Remedy (if required) through groundwater management programme Stop and control through restrictions on footprint Remedy through backfilling and re-shaping of subsidence areas	• The recommended action plans and management measures which applies to the impacts of the dewatering of the aquifer, as provided in the geohydrological report (Scholtz, 2016) should be adhered to; • Any area where decant points may possibly be determined by the geohydrological assessment (Scholtz, 2016), needs to be very carefully managed in perpetuity: ➢ Water levels need to be very strictly managed to keep water levels below any decant level while ensuring that a significant cone of depression impact does not take place; and ➢ If decant will occur all water is to be treated to background water quality values prior to release into the receiving environment. • Decant volumes and salt load could be reduced if an underground seal is installed; • Dewatering boreholes could be considered, if deemed necessary, in order to minimise the creation of dirty water within the shafts/adit, and this clean water should be used to recharge the natural systems within close vicinity of any of the activities; • Very strict control of water consumption and detailed monitoring must take place, and all water usage must continuously be optimised; • Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas which recharge the receiving freshwater environment;	2.3	2.3	M	Prevent negative impact on the hydrological functioning, water quality and sediment balance of the surrounding freshwater system.	• National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); • National Water Act, 1998 (Act 36 of 1998) (NWA); • GN 509 of 2016– requirements for Water Use Authorisation in terms of the NWA. • GN 704 of 1999 – Regulations on the use of water for mining related activities aimed at the protection of water resources; and Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)	Planning, Construction, Operational and Rehabilitation / Closure Phases

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
												• In order to prevent subsidence sufficient pillars must be maintained in the underground workings to prevent subsidence; and • Subsided areas should be backfilled and re-shaped to correspond with the original pre-mining topography so as to recreate topography prior to mining activities. •						
10	Vibration and air blast	During the closure phase no mining, drilling and blasting operations are expected. It is uncertain if any blasting will be done for demolition. If any demolition blasting will be required it will be reviewed as civil blasting and addressed accordingly.																
11	Visual	• Demolition of surface infrastructure and rehabilitation activities	Removal of infrastructure and general decommissioning and closure activities leading to visual intrusion on sensitive receptors. Extent of impact: Impact on local scale/ adjacent sites (km's).	M	M	Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	4	H	Control through restrictions Remedy through appropriate rehabilitation	• Decommissioning footprints and disturbed areas should be kept as small as possible and no further indigenous vegetation should be cleared or soils exposed for this purpose. • All areas where infrastructure is removed must be resloped to resemble the pre-development landscape and revegetated as soon as possible.	3	3	M	To limit visual impacts as a result of mine surface infrastructure decommissioning	• National Environmental Management Act (NEMA) (Act 107 of 1998). • National Heritage Resources Act (Act 25 of 1999 • Advertising on Roads and Ribbons Act (Act 21 of 1940) • Municipal Systems Act (Act 32 of 2000)	Rehabilitation / Closure Phase
12	Visual	Demolition of surface infrastructure and rehabilitation activities	Ineffective rehabilitation leading to landscape scarring, permanent visual contrast and a permanent alteration of the landscape character and sense of place within the region. Extent of impact: Impact on local scale/ adjacent sites (km's).	L	M	Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	4	H	Control through restrictions Remedy through appropriate rehabilitation	• Concurrent/ progressive rehabilitation must be implemented and disturbed areas must be rehabilitated as soon as possible and as soon as areas become available by replacing topsoil and revegetating disturbed areas. • Indigenous and locally occurring plant species selected for use in re-vegetation should be selected taken quick growth rates into consideration in order to cover bare areas and prevent soil erosion. • Upon final rehabilitation, it must be aimed to remove all much surface infrastructure, including berms and to reshape the landscape to pre-development conditions.	3	3	M	To ensure that effective rehabilitation takes place in such a way as to prevent permanent visual impacts remaining post-closure	• National Environmental Management Act (NEMA) (Act 107 of 1998). • National Heritage Resources Act (Act 25 of 1999 • Advertising on Roads and Ribbons Act (Act 21 of 1940) • Municipal Systems Act (Act 32 of 2000)	Rehabilitation / Closure Phase

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversible	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
13	Socio-economic	Mining and related activities	Mine Closure: During and subsequent to the cessation of mining activities, a loss of jobs may occur which may not only impact on the employees but on the socio-economic status of the local community and economy.	L	H	Rehabilitation / Closure	Refer to footprint sizes on the Shaft and Plant Complex Site plans (Figures 4 and 5) *Refer also to Table 5 (EIAR / EMPr)*	4	3	H	Stop and Control through SLP implementation	• Implement the plans and programmes contained in the Social and Labour Plan (SLP).	3	2	M	To prevent or minimise the impacts on the local community and economy as a result of the cessation of mining activities during Closure	• DMR Guideline for Consultation with communities and Interested and Affected Parties. As required in terms of Sections 16(4)(b) or 27(5)(b) of the Mineral and Petroleum Resources Development Act (Act 28 of 2002). • Mine Health and Safety Regulations under the Mine Health and Safety Act (1996); MPRDA, 2002; National Road Traffic Act; Regulations there under and amendments thereto. • The mine's internal procedures (communication, incident reporting, etc.). • Procedures to be in line with the latest legislation.	Operational to Rehabilitation / Closure Phase

Table 68: Cumulative impacts

Environmental component (Aspects affected)	Activity	Potential Impact description
Geology	All mining activities conducted in a regional context.	The proposed mining activities as well as the surrounding mining (existing and proposed) activities will cumulatively have an impact on the regional geological strata.
Topography	Mining and agricultural activities.	The proposed mining activities and the current agricultural activities conducted on the proposed Leslie 2 project area may cumulatively alter the topography within the area.
Soil	Mining and agricultural activities.	Erosion may occur as a result of mining and related activities. This could cumulatively lead to large disturbed areas which subsequently results in dust generation, increased runoff and silt content in surface water as well as the ineffective establishment of vegetation after rehabilitation.
		The utilisation of fertilisers for agricultural purposes as well as chemicals and hydrocarbon materials utilised by the mine may cumulatively impact on the quality of the soil in the event of large spillages.
Surface- and groundwater	Contaminated surface water runoff and contaminated groundwater impacts as a result of the mining and agricultural activities.	Water resources may become contaminated in the event that contaminated surface water runoff from the mining areas and agricultural areas enter the receiving environment.
		Decant is not expected for the Leslie 2 project since no roof collapse with associated cracking/fracturing of roof strata or subsidence is expected because of the proposed bord-&-pillar mining. The mine plan was designed in such a manner as to prevent the destabilisation of the roof. With the 51 to 53% extraction ratio bord-&-pillar mining planned for Leslie 2 project, no subsidence or cracking is expected. Decant only occurs when the mining activities cause such an increase in recharge that the aquifer(s) downgradient from the mine cannot accommodate the increased volumes of water generated because of the mine. The effective recharge to the deep aquifer at Leslie 2 is not expected to increase and horizontal groundwater flow is expected to resume through the receiving aquifer(s) once the water levels have recovered. If the effects of only the project area are considered, no decant at the shaft will take place. However, when the cumulative effect of the nearby mines and mine hydraulic connectivity are considered decant at the shaft could be possible.

Environmental component (Aspects affected)	Activity	Potential Impact description
Flora and Fauna	Mining and agricultural related activities.	With the proposed Leandra Mine of South 32 in close proximity, cumulative impacts on the floral ecology of the region will lead to an increase in the loss of floral SCC and their habitat, increased fragmentation of sensitive habitat areas, and a loss of sensitive floral habitat such as rocky outcrop and wetland habitat. It will further result in increased disturbance of areas considered representative of the Soweto Highveld Grassland Vegetation type, and an increase in floral alien species from direct and indirect mining related activities, such as operation of the mines, as well as an increase in the transportation of mining products such as coal to Eskom for further processing.
Wetlands	Mining and agricultural related activities	Due to extensive mining activities within the region, along with extensive agriculture, the regional cumulative impacts as a result of loss of freshwater resources is considered to be significant. Cumulative impacts associated with the proposed project include contribution to the loss of freshwater resource habitat, functioning and eco-service provision as a result of mining activities within the region, which may in turn impact on water resources and vegetation structure. Loss of wetland connectivity and direct destruction of wetlands due to mining activities will have a detrimental impact on faunal and floral species utilising the freshwater resources as migratory corridors and the overall biodiversity in the area. Dewatering of the freshwater resources, possible decant, general dirty water areas, as well as spillages of hydrocarbons, has the potential to contaminate the groundwater environment which in turn can affect water quality in surface water sources in the area..
Air quality	Mining and related activities	Although the proposed Leslie 2 Project falls outside the air quality hotspot areas defined in the Highveld Air Quality Management Plan, graphs illustrating daily ambient PM10 concentrations at Phola, Secunda, Balfour and Leandra ambient air quality monitoring stations show that the PM10 concentrations in these areas exceed the national ambient air quality standards for PM10. This together with the circumstance of South 32 SA Coal Holdings (Pty) Limited's mining right application for the prospecting rights for the Leandra coal reserve forewarns that the construction phase of the proposed Leslie 2 project is at risk of contributing to a cumulative impact on the ambient air quality in the area.
Noise	Traffic and noise generation from mining	Nuisance to community and neighbouring residents could result due to the generation of environmental noise and an increase in

Environmental component (Aspects affected)	Activity	Potential Impact description
Traffic	activities and vehicles travelling on the R29 and N17 roads	traffic from the mining operation, along with current noise and traffic related impacts from vehicles travelling on the R29 and N17 roads
Visual	Mining and related activities	Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative visual impacts resulting from landscape modifications and topographic alterations as a result of the proposed project in conjunction with further planned mining activity within the region is likely to be of high significance, even more so due to the fact that no existing mining activities are currently present within the larger region. The cumulative impact of additional traffic and the constant movement of heavy vehicles through the area on the local and regional roads as well as combined impacts from night-time lighting will also affect the sense of place of the larger region. The rapid introduction of large-scale infrastructure within a largely rural landscape will also contribute to cumulative impacts.
Socio-economic	Mining and related activities	The negative cumulative impacts as mentioned above, may result in an overall cumulative impact on the local communities and surrounding farmers and residents within the area, in terms of dust generation, noise generation, impact on agricultural land and the associated economic environment, traffic, and influx of people. Positive socio-economic impacts include job opportunities and skill transfer opportunities from the various proposed mining operations in the area, and which in turn is also anticipated to stimulate the local economy.

7.6 Methodology used in determining and ranking potential environmental impacts and risks

7.6.1 Methodology applied

The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk.

Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, predication and evaluation;
- Specification of the impact identification techniques;
- Criteria to evaluate the significance of impacts;
- Design of mitigation measures to lessen impacts;
- Definition of the different types of impacts (indirect, direct or cumulative); and
- Specification of uncertainties.

After all impacts have been identified, the nature and scale of each impact can be predicted. The impact prediction will take into account physical, biological, socio-economic and cultural information and will then estimate the likely parameters and characteristics of the impacts. The impact prediction will aim to provide a basis from which the significance of each impact can be determined and appropriate mitigation measures can be developed.

The risk assessment methodology is based on defining and understanding the three basic components of the risk, i.e. the source of the risk, the pathway and the target that experiences the risk (receptor). Refer to Figure 88 below for a model representing the above principle (as contained in the DWA's Best Practice Guideline: G4 – Impact Prediction.

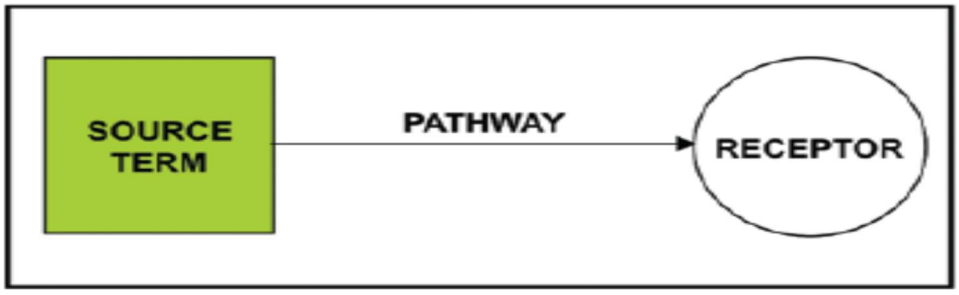

Figure 88: Impact prediction model

Table 69 and Table 70 below indicate the methodology to be used in order to assess the Probability and Magnitude of the impact, respectively, and Table 71 provides the Risk Matrix that will be used to plot the Probability against the Magnitude in order to determine the Severity of the impact.

Table 69: Determination of Probability of impact

SCORE	FREQUENCY OF ASPECT / UNWANTED EVENT	AVAILABILITY OF PATHWAY FROM THE SOURCE TO THE RECEPTOR	AVAILABILITY OF RECEPTOR
1	Never known to have happened, but may happen	A pathway to allow for the impact to occur is never available	The receptor is never available
2	Known to happen in industry	A pathway to allow for the impact to occur is almost never available	The receptor is almost never available
3	< once a year	A pathway to allow for the impact to occur is sometimes available	The receptor is sometimes available
4	Once per year to up to once per month	A pathway to allow for the impact to occur is almost always available	The receptor is almost always available
5	Once a month - Continuous	A pathway to allow for the impact to occur is always available	The receptor is always available

***Step 1**: Determine the **PROBABILITY** of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor.*

Table 70: Determination of Magnitude of impact

Score	SOURCE				RECEPTOR	
	Duration of impact	Extent	Volume / Quantity / Intensity	Toxicity / Destruction Effect	Reversibility	Sensitivity of environmental component
1	Lasting days to a month	Effect limited to the site. (metres);	Very small quantities / volumes / intensity (e.g. < 50L or < 1Ha)	Non-toxic (e.g. water) / Very low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes will remain unaltered.	Current environmental component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity
2	Lasting 1 month to 1 year	Effect limited to the activity and its immediate surroundings. (tens of metres)	Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha)	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components.
3	Lasting 1 – 5 years	Impacts on extended area beyond site boundary (hundreds of metres)	Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha)	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some environmental sensitivity (scarce / valuable environment etc.).
4	Lasting 5 years to Life of Organisation	Impact on local scale / adjacent sites (km's)	Very large quantities / volumes / intensity (e.g. 5000 L – 10 000L or 8Ha– 12Ha)	Toxic (e.g. diesel & Sodium Hydroxide)	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	Current environmental component(s) are in a natural state. Environmentally sensitive environment / receptor (endangered species / habitats etc.).
5	Beyond life of Organisation / Permanent impacts	Extends widely (nationally or globally)	Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha)	Highly toxic (e.g. arsenic or TCE)	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, protected habitats etc.)

***Step 2**: Determine the **MAGNITUDE** of the impact by calculating the average of the factors above.*

Table 71: Determination of Severity of impact

ENVIRONMENTAL IMPACT RATING / PRIORITY					
	MAGNITUDE				
PROBABILITY	**1 Minor**	**2 Low**	**3 Medium**	**4 High**	**5 Major**
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium

***Step 3**: Determine the **SEVERITY** of the impact by plotting the averages that were obtained above for Probability and Magnitude.*

DMR impact assessment and mitigation measures table template requirements

In terms of section 16(3)(b) of the Environmental Impact Assessment (EIA) Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) of the Regulations. The Department of Mineral Resources (DMR) therefore instructed that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, the template provided by the Competent Authority.

It is the purpose of this section of this report to provide the Competent Authority with the detail associated with the impact assessment table template (as provided in this EIAR / EMPr below).

The following column headings (shown in Table 72 below), form part of the Shangoni risk assessment table template, which takes into account the DMR's EIAR / EMPr template (refer to the full completed table in Section 7.5 above).

For ease of reference, the various table columns, as required by the DMR, have been incorporated into one integrated risk assessment table, as is presented in Table 72 and Section 7.5 (Part A) above.

Table 72: Shangoni risk assessment table template in relation to the requirements as per the DMR report template and table content[70]

NO.	ASPECTS AFFECTED	ACTIVITY whether listed or not listed	POTENTIAL IMPACT			PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	MITIGATION MEASURES	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact description	Reversibility[71]	Irreplaceable loss[72]			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
For referencing purposes	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(i) of Part A • Section 1 (e) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A • Section 1(d) (ix) of Part B • Section 1 (e) of Part B • Section 1 (f) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A • Section 1 (e) of Part B • Section 1 (f) of Part B			As required in the following sections of the DMR EIAR / EMPr template: • Section 3(i) of Part A • Section 1 (e) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 1(d) (ix) of Part B.	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A This also takes *Duration* into account			As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A • Section 1 (e) of Part B • Section 1 (f) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 1(d) (ix) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 3(g) (v) of Part A • Section 3(i) of Part A This also takes *Duration* into account			As required in the following sections of the DMR EIAR / EMPr template: • Section 1 (e) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 1(d) (ix) of Part B. • Section 1 (f) of Part B	As required in the following sections of the DMR EIAR / EMPr template: • Section 1(d) (ix) of Part B. • Section 1 (f) of Part B

[70] Headings of tables in Section 5 relate to the *phase of the operation in which the activity will take place* (as required in Section 1 (ix) of Part B of the DMR EIAR / EMPr template)

[71] L = Low, M = Medium, H = High

[72] L = Low, M = Medium, H = High

7.6.2 The need to review the initial site layout

The initial site layout (during the Scoping Phase) corresponded to Plant Location Alternative 1 (PL01) (Figure 17). However, during the EIA Phase various specialist studies were conducted, as well as an alternative assessment process. During the mentioned phase, sensitivities in terms of wetlands and ecological sensitivities initiated the assessment of Plant Location Alternative 02 (PL02) (Figure 18). With this alternative, the proposed plant infrastructure would not be located within rocky outcrop areas, in close proximity to freshwater resources and within important area(s) (as per the Gauteng C-plan).

The ecological specialists provided a preliminary sensitivities map, which was communicated to other specialists during the process. All specialists provided an alternative assessment statement as part of their study report in terms of which Plant location alternative would be best suited (taking their respective fields of study into account). The various specialist alternative discussions were used in the overall scoring system (contained in the Alternatives Assessment Report in Annexure F). Plant Location Alternative 02 (PL02) scored higher than PL01, and was therefore indicated to be the preferred alternative. Therefore, the initial site layout needed to be reviewed. The final site layout pan is shown in Figure 4.

7.7 Positive and negatives that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and community affected.

A full description on the positive and negative implications of both the proposed activities and the alternatives has been provided as part of the Alternative Assessment Report attached hereto as Annexure F. The positive and negative implication of the proposed activity and the alternatives identified have however also been provided below.

Table 73: Advantage and disadvantages of the proposed activities and alternatives

Alternative		Advantages	Disadvantages
Activity alternatives (mining method alternatives)	**Alternative MM1:** Opencast (surface) mining methods	• May have less safety related issues than with underground mining. • Less methane emissions than underground mining operations. • No shaft sinking activities. Less construction noise • Reduced risk for subsidence.	• 4 Seam Select and 2 Seam too deep for opencast mining methods. • More significant surface disturbance than underground mining (vegetation clearing of a larger surface area). • Greater disturbance of agricultural land and conflicting land use as a result of mining activity. • More particulate emissions than underground mining operations. • Larger affected water containment facilities and storm water diversion measures would be needed for the safe continuation of mining activities and will entail higher cost implications than the underground mining method. • It will also have a larger impact on the clean water catchment yield towards the natural drainage lines. • Surface noise due to vehicle activities and blasting activities. • Higher visual exposure of sensitive receptors towards mining activities;
	Alternative MM2: Undergorund mining method (board and pillar)	• Minimal surface disturbance. The post closure impact on land use will not be as significant as with opencast mining. • Technologies exits to capture methane and use it as a fuel source. • Less particulate emissions than opencast mining methods.	• May have more safety related issues than with opencast mining. • More methane emissions than opencast mining methods. • Vegetation clearing for surface infrastructure areas will still take place.

Alternative		Advantages	Disadvantages
		• Underground mining would result in smaller dirty water areas in which affected surface runoff need to contained and re-used. • Less surface noise that could cause a concern to the community. • Lowered loss of landscape character, sense of place and Visual Absorption Capacity. • Fewer sensitive visual receptors impacted and exposed to mining activities. • Lowered visual intrusion.	• More initial construction that can disturb the community and the fauna and flora in terms of noise levels. • Greater subsidence risk relative to opencast mining. • Visual impacts will still take place due to surface infrastructure being present.
Market and process alternatives	**Alternative MA1**: Producing a washed Eskom 24 percent Ash and less than (<) one percent Sulphur product		• Higher capital expenditure due to cost of washing plant, discard dump and larger PCD associated with the product requirements. • Higher environmental impact and dirty area footprint due to the extent of washing plant, discard dump and larger PCD associated with the product requirements. • Higher surface water impact and dirty area footprint.
	Alternative MA2: Producing a raw 20 MJ/kg, 30 percent Ash, < one percent Sulphur Eskom product	• Mining and blending the 4 Seam Select and 2 Seam produces a consistent product with a CV of + 20 MJ/kg, Ash below 30 percent, and the Sulphur content below one percent. This product can be supplied to Eskom (opencast coal replacement) Power Stations. • Producing a raw crushed product eliminates the need for a discard dump, which significantly reduces the dirty area footprint and the environmental impact. • Lower capital expenditure.	
	Alternative MA3: Producing a 15 percent Ash export product.		• The price for the 15 percent Ash export coal has reduced significantly.

Alternative		Advantages	Disadvantages
			• The yield for a 15 percent Ash product is too low to produce this export product at a cost that is economically viable. • Higher capital expenditure due to cost of washing plant, discard dump and larger PCD associated with the product requirements • Higher environmental impact and dirty area footprint due to the extent of washing plant, discard dump and larger PCD associated with the product requirements. • Higher surface water impact and dirty area footprint.
Transport alternatives	**Alternative TA1**: Hauling via road	• No construction of a train loading spur and additional section of conveyor over / under the R29 required. • No capital expenditure for the construction of a loading spur (as with rail option). • No approval is required from Transnet Freight Rail. • For all three price options the economic price analysis for the road transport option is positive. • No rail construction and train locomotive noise generation. • Livestock access to grazing pastures and water points not significantly affected.	• When compared to the other transport alternatives, TA1 is expected to generate the most particulate emissions. Air emission related impacts associated with transport via truck • There will be an increase in trucks in the area which will impact traffic as well as the condition of roads. • Haul roads also impact on farming activities, result in additioanl loss of arable land and required additioanl access control measures. • High Fuel consumption costs. • High vehicle maintenance costs. • Road damage and excessive vehicle noise. • Accumulative compaction may be severe. • Erosion and dust emission risks from roads • Increased road traffic will lead to an increased visual impact.
	Alternative TA2: Transport via rail.	• Some environmental and socio-related impacts (associated with truck	• Construction of a train loading spur train loading spur and additional section of conveyor over / under the R29 required.

Alternative		Advantages	Disadvantages
		transport)(including health concerns) may be eliminated or minimised. • When compared to the other transport alternatives, TA2 is expected to generate the least amount of particulate emissions. • Roads are less used with this option, resulting in less traffic noise. • Reduced erosion and dust emission during operational phase. • No significant increase in road traffic.	• Permission required from Transnet. • Capital expenditure for the construction of the mentioned traing loading spur. • Construction of rails. Excessive train locomotive noise generation. • Additional capital to be spent on the rail option forces the cost benefit analysis parameters downward • In order to use the railway approval is required from Transnet Freight Rail. • Land fragmentation may restrict access for agricultural implements. • May also restrict livestock access to grazing pastures and drinking water to a certain extent. • Construction of a train loading spur required, which may act as an additional visual impact. • Increased railway usage, which may also have a visual impact visual impact further from the mining rights application area.
	Alternative TA3: Combination of road and rail	• Environmental impacts from road and rail will be present but in a lower frequency for each. • May decrease the stress on both rail and road infrastructure and traffic. • Transport alternative TA3 is expected to generate less particulate emissions than TA1. • Visual impacts from both road and rail will be present but in lower frequencies.	• In order to use the railway approval is required from Transnet Freight Rail. • When compared to the other transport alternatives, TA3 is expected to generate the second most particulate emissions. • Excessive noise generation both ways. • Impacts on visual receptors will occur from both roads and railway usage.

Alternative		Advantages	Disadvantages
Design alternatives	**Alternative DA1**: Construction of permanent buildings	• Could possibly be used more effectively after the mine has closed depending on the post closure land use.	• Construction costs are higher. • Degree of disturbance is higher than with pre-fabiricated structures • Higher decomissioning cost of buildings that can not be used post closure. • Rehabilitation will be more difficult and time consuming. • Vertic soils may cause structural damages on the concrete structures due to shrink and swell properties of the vertic soils. • May cause severe sol compaction during foundation layout
	Alternative DA2: Placement of pre-fabricated structures	• Less disturbance on environmental aspects as structures are constructed elsewhere, and only require assemblage on-site. • Rehabilitation upon mine closure considered easier, as infrastrcture can easily be removed. • Reduced soil compaction impacts. • Raised structures are considered unlikely to be significantly impacted by the shrink and swell properties	• May be damaged or destroyed more easily after Closure. • Potential health and safety implications as structures are temporary. • Site clearance and removal of topsoil, for placement of portable infrastructure, will stll take place and some visual impact is expected due to these structures being on the surface.
	Alternative CA1: Conveyor over the R29 (if rail transport options TA2 or TA3 are implemented)	• Construction risks are anticipated to be less for over the R29 than under the R29. • Disturbed footprint anticipated to be less when compared to the conveyor crossing under the R29. • Ease of integration with existing infrastructure when compared to CA2. • Easier to remove during rehabilitation.	• The proposed conveyor bridge where it crosses the R29 will be highly visible when driving on the R29. • Some construction- and operational risks will still be applicable in terms of safety of road users.
	Alternative CA2: Conveyor under the R29 (if rail transport options TA2 or TA3 are implemented)	• The proposed conveyor where it crosses under the R29 will not be visible when driving on the R29. • Less operational risk.	• Earthworks associated with the excavation works, may temporarily have a visual impact on road users.

Alternative		Advantages	Disadvantages
		• Less risk in terms of safety of road users. • Anticipated higher rehabilitation cost.	• Need for construction underneath the existing road may pose construction risks. • Dificulty in terms of ease of integration with existing infrastructure.
Infrastructure location alternatives	**Alternatve PL01:** Plant Location south of the R29	• Plant location alternative PL01, combined with transport alternative TA2, is expected to result in the lowest dustfall rates and particulate ground level concentrations. • Although the overland conveyer traverses sensitive wetland and rocky outcrop habitat units, the overland conveyor will be constructed adjacent to the existing farm road where disturbance is already present. • Screening and crushing Plant south of R29 where no heritage resources were observed. • Plant infrastructure alternative 1 is located outside of the 1:100-year flood line. • Alternative 1 allows for a more compact infrastructure layout with a smaller footprint area for the generation of affected surface water runoff. • The topography allows for a smaller amount of clean surface runoff that will need to be diverted from the dirty water area during rainfall events. • A smaller plant footprint, due to the compact infrastructure layout, allows for a lesser amount of affected runoff reporting to the proposed silt and oil trap that will be pumped to the PCD. • The proposed dirty water area has a low impact on the clean water catchment yield of the surrounding area due to its small size.	• Plant and office complex infrastructure located within the sensitive rocky outcrop habitat unit and within the 32m (NEMA) and 100m (GN 704) zones of regulation of the wetland habitat unit, leading to a loss of floral SCC and loss of floral habitat of specialised floral species adapted to specific soil conditions. • Overland Conveyor traversing sensitive wetland and rocky outcrop habitat units. • Haul road located 180m to the east of FC02 and 85m to the west of GY03. • Artificial levelling of the natural topography will have to take place that may lead to undesired ponding of surface water. • Coal handling activities will result in the generation of areas with the potential to pollute clean surface runoff. • Affected runoff will have to be contained and reused. The latter has financial implications associated with the construction of channels and diversion berms as well as pumping infrastructure in sumps/oil traps. • Occupants and wildlife South of the R29 will experience more noise disturbance. • If this scenario is implemented where access is taken off the southern side of the R29 then the access should not be located on the bend

Alternative		Advantages	Disadvantages
		• Occupants and wildlife North of the R29 will experience less noise disturbance. • Low land capability impacts on the shallow Mispah/Glenrosa soil forms.	of the R29. This would be dangerous in that the access would be inside the curve and would limit the sight distance of approaching vehicles along the R29. • The proposed plant and main offices stores infrastructure will be highly visible from both the R29 and the N17 roadways. • The office and plant complex-infrastructure footprint is in relative close proximity a freshwater resource (albeit separated by a road). Leakages and runoff from the operational plant could negatively impact on this freshwater resource, especially on its surface and groundwater. • Overland Conveyor traverses a hillslope seep wetland resource.
	Alternative PL02: Plant location north of the R29	• The plant and office complex, as well as the Alternative 2 overland conveyor extension is located outside of the sensitive rocky outcrop habitat unit and within the modified habitat unit considered to be of a low ecological sensitivity. As a result the impact on the floral ecology within the plant and office complex infrastructure footprint areas is considered to be low, as this habitat does not provide suitable habitat for floral SCC[73], nor is the habitat integrity considered to be significant. • Although the overland conveyer traverses sensitive wetland and rocky outcrop habitat units, the overland conveyor will be constructed	• Plant location alternative PL02, combined with transport alternative TA1, is expected to result in the highest dustfall rates and particulate ground level concentrations of all alternatives. • As the majority of the overland conveyor remain the same as for Alternative 1, with the exception of the extension to the Alternative 2 plant feed stockpile, the overland conveyor traverses sensitive wetland and rocky outcrop habitat units. • The office and plant complex-infrastructure footprint is in relative close proximity to the Rocky Outcrop and Wetland habitat units, which provide suitable habitat for species

[73] SCC – Species of conservation concern

Alternative		Advantages	Disadvantages
		adjacent to the existing farm road where disturbance is already present. • Screening and crushing Plant directly north of R29 where no heritage resources were observed. • Plant infrastructure alternative 2 is located outside of the 1:100 year flood line. • The proposed dirty water area has a low impact on the clean water catchment yield of the surrounding area due to its small size. • Occupants and wildlife south of the R29 will experience less noise disturbance. • The plant and office complex is located outside of any freshwater resources, and not in close proximity to any freshwater resources, thus no impacts regarding the placement of these infrastructures is expected on the freshwater ecology of the area.	such as Gladiolus robertsoniae, Nerine gracilis, Kniphofia typhoides and Stenostelma umbelluliferum, which should they be present within these habitat units will require a 400m buffer around the population. • New road located 180m to the east of FC02 and 85m to the west of GY03. • Alternative 2 consists of a larger footprint area in terms of the proposed infrastructure layout with a larger area for the generation of affected surface water runoff to be contained. • There is a larger clean water catchment area located on the north-eastern side of the proposed infrastructure. Runoff from the catchment will have to be diverted away towards the proposed shaft access road. • A storm water culvert may have to be constructed to limit damage to the proposed shaft access road. • Artificial levelling of the natural topography will have to take place that may lead to undesired ponding of surface water. • Coal handling activities will result in the generation of areas with the potential to pollute clean surface runoff. • Affected runoff will have to be contained and reused. The latter has financial implications associated with the construction of channels and diversion berms as well as pumping infrastructure in sumps/oil traps. • Occupants and wildlife north of the R29 will experience more noise disturbance. • The majority of the infrastructure will be located on the Arcadia soil form, with limited

Alternative		Advantages	Disadvantages
			disturbance of the sensitive rocky outcrop areas. This will have a medium-low impact on the land capability for the Arcadia soil forms, and low impact on the Mispah/Glenrosa soil form. • Susceptibility of the vertic Arcadia soils to shrink under dry conditions and swell under moist conditions may cause undesired damage on the structural integrity of the surface infrastructure; and the structural integrity of these soils is anticipated to deteriorate during stockpiling while awaiting rehabilitation. • The proposed plant and main offices stores infrastructure will be highly visible from both the R29 and the N17 roadways. • Overland Conveyor traverses a hillslope seep wetland resource.
	Alternative VL01: Ventilation shaft within the wetland and 1:100 year flood line	• No heritage resources will be affected at this location.	• The up-cast and downcast shafts are located within the 1:100 year flood line and wetland area.
	Alternative VL02: Ventilation shaft outside the wetland and 1:100 year flood line	• No heritage resources will be affected at this location. • The up-cast and downcast shafts are located outside the 1:100 year flood line and wetland area.	
Water supply alternatives	**Alternative WS1:** Rand water supply	• Water supply via the Rand water line would reduce the impact on the groundwater regime to negligible. • Construction time and potential construction risks for pipelines to be established / linked.	• Cost associated with integration of existing infrastructure as well as operational cost. • Potential pipe leaks and wastage of water (operational risks).

Alternative		Advantages	Disadvantages
	Alternative WS2: Borehole water supply	• Less surface disturbance when compared to the establishment of pipeline to tap into rand water line. • Construction time if boreholes are to be drilled. • Costs will be less than with WS1.	• Vryheid Formation sandstones/shales are generally not good yielding aquifers and that exploitable quantities are generally only held in fractures. Although the matrix may store significant quantities of water, it can only be tapped if fractures are intersected during drilling. Therefore, if geophysical methods are used to target these fractures the potable requirement of 40 Kl/d could be obtained from water supply boreholes. • Potential impacts on surrounding groundwater users due to abstraction.
Development versus no-go alternative	**Alternative NG1**: Mining and related activities (development)	• Mining of the available reserves to supply Eskom will contribute toward energy security. • Job opportunities • Benefits arising from the SLP such as LED projects, learnerships etc.	• A number of environmental impacts will arise from the development • Permits and licences required. • Mining is a conflicting land use to current agricultural activities.
	Alternative NG2: No go option	• The *status quo* environmental conditions within the MRA will persist, i.e. no land capability impacts will occur.	• Refer to possible impacts, if not managed appropriately, in Table 14 above. • Another company may mine the reserves • No job opportunities. • No benefits arising from the SLP.

7.8 Possible mitigation measures that could be applied and the level of risk

Table 74 below provides a summary of the issues and concerns as raised by affected parties and an assessment of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered.

Table 74: Summary of issues and concerns raised by I&APs

Concerns / Comments	Mitigation measures or site alternative
Refer to Section 7.3 (Part A)	

This table will be finalised subsequent to the public review period and prior to submission of the final EIAR / EMPr to DMR.

7.9 Motivation where no alternative sites were considered

No alternative site locations in terms of the location of the proposed Leslie 2 mining poject could be considered due to the locality of the mineral deposit. However, other infrastructure location alternatives were considered in order to compile a final site plan, taking into account all sensitivities on-site as per input from the various specialist studies, as well as economic, social and technical aspects. The location alternatives have been discussed in Section 7.1 (Part A).

7.10 Statement motivating the alternative development location within overall site

Evaluating the alternatives, through evaluating the risks pertaining to the various options, and the concerns as raised by the affected parties and the mitigation measures or site alternatives, the preferred options are:

Preferred alternative	Motivation
Preferred (only) site for mining activity ***(no other alternatives could be considered due to the location of the mineral deposit)***	
• The proposed activity entails underground coal mining at the Leslie 2 mining rights application area.	As per the Socio-economic Impact Assessment, conducted by Nemai Consulting and the Land trade-off study and macro-economic assessment conducted by Mosaka Economic Consultants, the local economy will benefit considerably when the mine is operational. The following is noteworthy: • Poverty alleviation will be supported with 396 net additional direct jobs plus low-income households' receiving an additional R82.87 million annually. • The total employment created in the two provinces (Mpumalanga and Gauteng) is estimated to be around 958 and additional GDP R433.50 million. • The proposed mine will generate local employment opportunities and skills development opportunities. Employment will contribute to household wealth which in turn will stimulate the local economy.
Preferred Infrastructure Location Alternatives	
• The preferred Plant Location Alternative is PL02 (refer to Figures 3 above and 5 below). • The preferred Ventilation Shaft Location Alternative is VL02 (refer to Figure 5 below).	• The plant and office complex is located outside of the sensitive rocky outcrop habitat unit and within the modified habitat unit considered to be of a low ecological sensitivity. As a result the impact on the floral ecology within the plant and office complex infrastructure footprint areas is considered to be low, as this habitat does not provide suitable habitat for floral Species of conservation concern (SCC), nor is the habitat integrity considered to be significant. • The plant and office complex is located outside of any freshwater resources, and not in close proximity to any freshwater resources, thus no impacts regarding the placement of these infrastructures is expected on the freshwater ecology of the area. • The up-cast and downcast shafts are located outside the 1:100 year flood line and wetland areas.

8. Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity.

All impacts and risks as identified are contained within Section 7.5 (Impacts and risks identified). As further provided is an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. The potential impacts and risks of the proposed activity were identified through consultation with the applicant regarding the proposed activities to be undertaken.

Site visits were also conducted by specialists to understand the nature of the proposed activities off-set against the baseline environment of the area. Internal workshops were held in order to determine the risks associated with the proposed project and to identify the knowledge gaps, information insufficiency as well as to identify the specialist studies that would be required to investigate these knowledge gaps and information insufficiencies.

The following specialist studies were conducted for the Leslie 2 project:

- Soil, Land use and Land Capability Impact Assessment;
- Fauna and Flora Impact Assessment;
- Wetland Impact Assessment;
- Aquatic Impact Assessment;
- Hydrological Assessment;
- Geohydrological Assessment and Waste Characterisation;
- Geotechnical investigation in support of Waste Characterisation;
- Air Quality Impact Assessment (AIA);
- Environmental Noise Assessment;
- Blasting and Vibration Impact Assessment;
- Visual Impact Assessment (VIA);
- Heritage Impact Assessment (HIA);
- Palaeontological Impact Assessment (PIA);
- Traffic Impact Assessment (TIA);
- Social-Economic Assessment (SIA); and
- Land Trade-off Study and Macro-economic Assessment.

These specialist studies were initiated to assess the respective biophysical aspects, provide a baseline description of the environment as well as identify any risks and impacts on the biophysical aspects associated with the proposed project. Refer also to Section 7.6 (*Methodology used in determining and ranking potential environmental impacts and risks*) for the methodology applied in assessing and ranking the impacts and risks on the preferred site and associated preferred alternatives.

The results of the assessments are provided below, with the detailed Risk Assessment Report attached hereto as Annexure J.

9. Assessment of each identified potentially significant impact and risk

Refer to the full risk assessment and mitigation measures table provided in Section 7.5 (Part A) above.

10. Summary of specialist reports

Table 75: Recommendations made by specialists

List of specialist studies	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (Mark with an X where applicable)	Reference to applicable section of report where specialist recommendations have been included
Soil, Land use and Land Capability	All recommendations and mitigation / management measures contained in specialist reports contained in Annexure H have been included in Section 7.5 (Part A) of this report.	X	Section 7.5 (Part A)
Flora and Fauna		X	Section 7.5 (Part A)
Hydrological		X	Section 7.5 (Part A)
Aquatic and Wetland		X	Section 7.5 (Part A)
Geohydrology (including Waste Characterisation) & Geotechnical		X	Section 7.5 (Part A)
Air quality		X	Section 7.5 (Part A)
Noise		X	Section 7.5 (Part A)
Visual		X	Section 7.5 (Part A)
Traffic		X	Section 7.5 (Part A)
Heritage		X	Section 7.5 (Part A)
Palaeontology		X	Section 7.5 (Part A)
Blasting and Vibration		X	Section 7.5 (Part A)
Socio-economic		X	Section 7.5 (Part A)

List of specialist studies	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report (Mark with an X where applicable)	Reference to applicable section of report where specialist recommendations have been included
Economic		**X**	Section 7.5 (Part A)

The above-mentioned specialist reports are attached hereto in Annexure H.

11. Environmental Impact Statement

11.1 Summary of the key findings of the environmental impact assessment

A detailed description of the methodology utilised to determining the environmental impacts and their respective probability, magnitude and severity is provided in Section 7.6 above. As part of the EIA process, a number of alternatives applicable to the proposed project were identified (refer to Annexure F for the detailed quantitative Alternatives Assessment Report) and therefore (as per the requirements of the EIA Regulations GN. R982, dated 04 December 2014) the risks associated with the proposed activity, as well as the identified alternatives, were assessed (refer also to the Part 5 of the Risk Assessment Report attached hereto as Annexure J).

Significant environmental impacts

During the risk assessment process (refer to Annexure J) it was found that the proposed project would result in a number of impacts with a “High” significance rating, and these impacts include impacts on geology and palaeontology, ecology, visual and socio-economic aspects.

Refer also to Section 11.3 below for a summary of the negative and positive environmental impacts, after mitigation.

Concerns raised by IAP’s

Because of the fact that Shangoni has no interest in this activity other than the fair remuneration for the work done by it and the fact that payment for the work done by Shangoni is not subject to a positive outcome of the application, no circumstances exist that may compromise the objectivity of the EAP (as required per the definition of “independence”). Due attention and consideration have been placed to consider the inputs from I&AP’s within this EIAR / EMPr, and the comments/concerns received from I&AP’s are highly regarded for the value and merit in compiling of this EIAR / EMPr. The public participation process conducted for the project has been described in the Public Participation Reports attached hereto as Annexure G and the comments received from all I&APs and stakeholders have also been included in sections above.

11.2 Final Site Map

The final site layout plan is presented in Figure 4 and the final site layout plan in relation to sensitive environmental features in presented in Figure 87. Refer also to Annexure A.

11.3 Summary of the positive and negative implications and risks of the proposed activity and identified alternatives

Table 76: Summary of negative and positive environmental impacts, after mitigation.

Geology	
A permanent impact on the localised geology of the areas associated with the proposed extension area will result from the mining and removal of coal.	High
Soil, land use and land capability	
The main impact from a land capability perspective is anticipated to be limited to the construction and operation of the surface infrastructure, which will render parts of the mining rights application area inaccessible for prevailing land uses, particularly agricultural activities including cultivation and livestock grazing. In addition, the aboveground conveyor will create a barrier restricting livestock access to grazing pastures and/or water resources.	Low
Susceptibility to erosion will be largely increased once the vegetation is cleared and the soils become exposed to wind and storm water during construction activities. Soil erosion will also persist on unvegetated (bare) areas such as haul roads during the operational phase.	Medium
The soil contamination impact is largely dependent on the nature, volume and/or concentration of the contaminant of concern, and all of the identified soils are considered to be equally predisposed to contamination, as contamination sources are unpredictable and typically occur as incidental spills or leaks, and/or or decant of contaminated mine waste water. In addition, accumulative coal dust settling on the soil surface may cause significant soil contamination through leaching.	Medium
The identified soils are inherently less prone to dust emission due to their characteristically duplex and clayey nature; however, they will be more susceptible to dust emission under dry and windy conditions once the vegetation is cleared during the construction phase.	Low
Heavy equipment traffic is anticipated to cause significant soil compaction. The severity of this impact is anticipated to be particularly highest in the vicinity of the proposed hauling and access roads.	Medium
The soil contamination impact is largely dependent on the nature, volume and/or concentration of the contaminant of concern, and all of the identified soils are considered to be equally predisposed to contamination, as contamination sources are unpredictable and typically occur as incidental spills or leaks, and/or or decant of contaminated mine waste water. In addition, accumulative coal dust settling on the soil surface may cause significant soil contamination through leaching.	Medium
Subsidence could potentially occur due to structural distortion of the support pillars and/or overlying strata of the underground mine roof.	Low
Rehabilitation and Closure: Heavy equipment traffic is anticipated to cause significant soil compaction. The severity of this impact is anticipated to be particularly highest in the vicinity of the proposed hauling and access roads.	Medium
Flora and Fauna	

The impact of vegetation clearing for the Plant and Office Complex Alternative PL02 is considered to be lower (medium impact)[74] as this area is already considered modified, with a low possibility of floral SCC occurring within the modified grassland habitat unit. Should this alternative be used, and proper mitigation takes place, the impact rating after mitigation can be further reduced, possibly to low level impacts for this Alternative; however, the impact for the infrastructure development as a whole is considered to be high prior to mitigation, and medium post mitigation as a result of the Shaft Complex, Overland Conveyor and Access Road located within floral communities considered to be of moderately high and intermediate ecological sensitivities.	Medium
The loss of floral SCC as a result of the establishment of infrastructure for the Plant and Office Complex Alternative PL02 is considered to be lower (medium impact)[75] as this area is already considered modified, with a low possibility of floral SCC occurring within the modified grassland habitat unit. Should this alternative be used, proper mitigation implemented, and care taken to prevent edge effects from impacting on the surrounding areas of higher ecological importance, the impact rating after mitigation can be further reduced, possibly to low level impacts for this Alternative. The loss of floral SCC as a result of infrastructure development as a whole is considered to be high prior to mitigation, and medium post mitigation as a result of the Shaft Complex, Overland Conveyor and Access Road located within floral habitat units which provide suitable habitat for floral SCC.	Medium
Alien species proliferation for the Plant and Office Complex Alternative PL02 is considered to be lower (medium impact)[76] as this area is already considered modified, with few species representative of the Soweto Highveld Grassland Vegetation type occurring within the modified grassland habitat unit., however care should be taken to prevent the spread of alien species to the surrounding areas considered to be of increased ecological importance and sensitivity. Should this alternative be used and proper mitigation implemented the impact rating after mitigation can be further reduced, possibly to low level impacts for this Alternative. As the Shaft Complex, Overland Conveyor and Access Road are located within floral habitat units of increased sensitivity the loss of indigenous floral species as a result of alien proliferation for the development as a whole is considered to be high prior to mitigation, however if effective mitigation measures are implemented, the impact can be reduced to a medium level impact..	Medium

[74] The impact rating is representative should Alternative PL02 of the Plant and Office Complex be utilised for mining operations. Should Alternative 1 be implemented, it must be noted that the impact rating will be considerably higher, particularly the after-mitigation impact rating. Clearing within the Wetland, Rocky Outcrop and Open Grassland Habitat Units for the Shaft Complex, Access Road

[75] The impact rating is representative should Alternative PL02 of the Plant and Office Complex be utilised for mining operations. Should Alternative PL01 be implemented, it must be noted that the impact rating will be considerably higher, particularly the after-mitigation impact rating. Construction and operational activities of the Shaft Complex, Access Road and Overland Conveyor within the Wetland, Rocky Outcrop and Open Grassland Habitat Units will result in the permanent removal of habitat considered to be of increased ecological importance and sensitivity. There is also a significant risk that construction and operation of infrastructure areas will affect natural vegetation adjacent to cleared mine infrastructure footprint areas, which may affect floral SCC which have not previously been rescued and relocated during site clearing (if the rescue and relocation of NT and VU species are approved by GDARD).

[76] The impact rating is representative should Alternative 2 of the Plant and Office Complex be utilised for mining operations. Should Alternative 1 be implemented, it must be noted that the impact rating will be higher. Alien and invasive species might establish in areas where ground disturbance has occurred, as these species can establish themselves more readily than indigenous vegetation. This will result in the displacement of indigenous vegetation, change in species composition, and an overall loss in floral biodiversity.

Placement of infrastructure is likely to have a detrimental impact on floral habitat as habitat fragmentation within sensitive areas will occur, especially within the wetland and rocky outcrop habitat units associated with the Overland Conveyor and Access Road. Floral habitat fragmentation within the MRA has been increasing as a result of historic and on-going disturbances such as crop cultivation, grazing and infrastructure development.	Medium
The impact of vegetation clearing for the Plant and Office Complex Alternative PL02 is considered to be lower (medium impact)[77] as this area is already considered modified, with a moderate possibility of faunal SCC occurring within the modified grassland habitat unit. Should this alternative be used, and effective mitigation takes place, the impact rating after mitigation can be further reduced, possibly to low severity impacts for this Alternative; however the impact for the infrastructure development as a whole is considered to be high prior to mitigation, and medium post mitigation as a result of the Shaft Complex, Overland Conveyor and Access Road located within faunal habitat considered to be of high and intermediate ecological sensitivities.	High
The loss of faunal SCC as a result of the establishment of infrastructure for the Plant and Office Complex Alternative PL02 is considered to be the same as Alternative PL01 as the area is already considered modified, but faunal SCC have adapted to utilise these modified areas.[78] Should this alternative be used, effective mitigation implemented, and care taken to prevent edge effects from impacting on the surrounding areas of higher ecological importance, the impact rating after mitigation can be further reduced, possibly to low severity impacts for this Alternative. The loss of faunal SCC as a result of infrastructure development as a whole is considered to be high prior to mitigation, and high post mitigation as a result of the Shaft Complex, Overland Conveyor and Access Road located within faunal habitat units which provide suitable habitat for faunal SCC.	High
Alien species proliferation for the Plant and Office Complex Alternative 2 is considered to be lower (medium impact) as this area is already considered modified, as the habitat is over grazed by cattle and floral species diversity have been impacted upon negatively, however care should be taken to prevent the spread of alien species to the surrounding areas considered to be of increased ecological importance and sensitivity. Should this alternative be used and effective mitigation	High

[77] The impact rating is applicable should Alternative PL02 of the Plant and Office Complex be utilised for mining operations. Should Alternative PL01 be implemented, it must be noted that the impact rating will be the same as Alternative PL02, particularly the post-mitigation impact rating. Clearing within the Wetland, Modified Grassland and Open Grassland Habitat Units for the Shaft Complex, Access Road and Overland Conveyor, will result in the permanent removal of habitat considered to be of increased ecological importance and sensitivity. These habitat units also provide suitable habitat for faunal SCC such as *Eupodotis caerulescens* and *Phoenicopterus roseus*, as encountered during the site assessment as well as other potential species such as *Sagrittarius serpentarius, Anthropoides paradiseus* and *Polemaetus bellicosus*.

[78] The impact rating is applicable should Alternative PL02 of the Plant and Office Complex be utilised for mining operations. Should Alternative PL01 be implemented, it must be noted that the impact rating will be the same as Alternative PL02, particularly the after-mitigation impact rating. Construction and operational activities of the Shaft Complex, Access Road and Overland Conveyor within the Wetland, Rocky Outcrop Modified Grassland and Open Grassland Habitat Units, will result in the permanent removal of habitat considered to be of increased ecological importance and sensitivity for faunal SCC that will utilise the area for feeding and breeding purposes. There is also a significant risk that construction and operation of infrastructure areas will affect the game breeding project as it will most likely increase the stress levels of the animals and lower breeding rate will occur. Avifaunal SCC have utilise the short grassland micro habitat that is created by cattle farming, and also utilise crop field during the winter breeding months.

implemented the impact rating after mitigation can be further reduced, possibly to low severity impacts for this Alternative.	
Placement of infrastructure is likely to have a detrimental impact on faunal habitat as habitat fragmentation within sensitive areas will occur, especially within the wetland and open grassland habitat units. Faunal habitat fragmentation within the MRA has been increasing as a result of historic and on-going disturbances such as crop cultivation, grazing and infrastructure development.	High
Dust may be generated during the conveying of coal on the conveyor. This may result in a negative impact on the floral diversity and SCC on floral habitat in the immediate vicinity of the conveyor belt, by affecting the photosynthetic capability of flora.	Low
Dust and noise may be generated during the conveying of coal on the conveyor belt. This may result in a negative impact on the faunal diversity and SCC. Faunal habitat in the immediate vicinity of the conveyor belt may be negatively affected, by affecting the photosynthetic capability of flora species that will provide habitat for faunal SCC. Noise and dust generated during the operational activities may also negatively affect the breeding potential of game species especially (Cape Buffalo) as stress levels have the potential to increase and lower the breeding rate of the animals.	High
Removal of infrastructure and rehabilitation may result in a loss of floral habitat, diversity and floral SCC, if not performed according to a detailed rehabilitation plan.	Medium
Ineffective rehabilitation of disturbed areas may result in alien and invasive species proliferation, which might spread to surrounding undisturbed areas.	Medium
Surface water	
Grading, vegetation clearing and soil stripping may lead to siltation of water resources causing deterioration of water quality affecting the use of surface water as a natural resource. Surface water quality: There may be a decrease in surface water quality when any surface water comes into contact with dust, eroded soil, carbonaceous materials or other pollutants generated during the construction phase of the Leslie 2 project. The sediment load within surface water runoff may increase if not prevented or mitigated, or the chemistry of surface water may be altered.	Low
Spillages of hazardous materials used during the construction of the plant, conveyor, pollution control dams, shaft and workshops may impact on the surrounding clean water environment. Surface water quality: Deterioration of water quality due to chemical contamination affecting the use of surface water as a natural resource.	Low
Upstream clean surface runoff may be exposed to contaminants and bare surfaces within the construction sites. Surface water quality: Deterioration of water quality due to exposure to possible contaminants and bare surfaces that may result in a decrease in surface water quality towards the natural clean water resources near the operation.	Low
Dumping of waste or any foreign material into drainage lines and wetlands may impact on surface water resources and aquatic biodiversity and ecosystems.	Medium

Surface water quality: The above-mentioned impact may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	
Maintenance activities resulting in spillage of oil, fuel, grease at construction sites. Surface water quality: Spillages of substances that contains hydrocarbons may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Low
Excess surface water runoff may cause affected water containment facilities such as sumps, oil traps, oil separators and drip trays to overflow. Surface water quality: Overflow of affected water containment facilities during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Low
Washing of concrete delivering trucks and cement equipment on site as well as cement/ concrete mixing outside of demarcated areas and the incorrect disposal of excess cement and concrete may impact on the surrounding clean water environment. Surface water quality: Incorrect cement/ concrete handling practises during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Medium
Accidental spillages of fuel on site and incorrect storage practises may impact on the surrounding clean surface water environment. Surface water quality: Incorrect fuel storage, handling and accidental spillages as a result during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Medium
Coal mining operations may lead to interruption of surface and sub-surface flows, lead to the concentration of surface flow, change in flow pathways, flow impoundment, increased surface runoff due to hardened surfaces and an increase in erosion potential. Surface water quality: There may be a decrease in surface water quality when any surface water comes into contact with dust, eroded soil, carbonaceous materials or other pollutants generated during the operational phase of the Leslie 2 project. The sediment load within surface water runoff may increase if not prevented or mitigated, or the chemistry of surface water may be altered. Surface water quantity: Coal mining operations may isolate certain areas resulting in a reduction in the clean water catchment yield contributing runoff to clean water drainage lines during rainfall events.	Low
Failure of pipes transporting dewatered water from underground workings, overflow from pollution control dams, sumps / oil traps, accidental discharges of affected water and coal spillages underneath the conveyor may impact on the surrounding clean water environment. Surface water quality:	Low

Overflows and spillages from affected water facilities may lead to the deterioration in water quality affecting the use of surface water as a natural resource.	
Dumping of waste or any foreign material into drainage lines and wetlands may impact on surface water resources and aquatic biodiversity and ecosystems. Surface water quality: The abovementioned impact may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Medium
Upstream clean surface runoff may be exposed to contaminants and bare surfaces within the shaft and plant areas. Surface water quality: Deterioration of water quality due to exposure to possible contaminants and bare surfaces that may result in a decrease in surface water quality towards the natural clean water resources in the vicinity of the operation.	Low
Ineffective containment of dirty wash water towards the receiving clean water environment. Surface water quality: Discharge of affected water from the vehicle wash bays may contain hazardous substances that may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Low
Maintenance activities resulting in spillage of oil, fuel, grease during mining operations. Surface water quality: Spillages of substances that contains hydrocarbons may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems	Low
Accidental spillages of fuel on site and incorrect storage practises may impact on the surrounding clean surface water environment. Surface water quality: Incorrect fuel storage, handling and accidental spillages as a result during operations may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Medium
Spillages of hazardous materials used during the operation of the plant, conveyor, shaft and workshops may impact on the surrounding clean water environment. Surface water quality: Deterioration of water quality due to chemical contamination affecting the use of surface water as a natural resource.	Low
Impact on the groundwater only occurs through leachate formation from surface. Impact thus only occurs because of rainfall recharge or when water is introduced in some form where leachate can form that seeps to the groundwater regime. The artificial recharge and mounding concept does not come into play with dry sources and therefore the intensity and rate of transport of contamination is far less significant than at wet sources. The geochemical assessment of overburden that will likely be encountered and utilised to construct the storm water berm at the adit and the hard coal stockpile pads is relatively inert and do potentially contain sufficient buffer minerals to neutralise any acid that may form if any sulphide remnants are present. However, continuous monitoring of groundwater quality through purpose drilled	Low

groundwater monitoring boreholes would be necessary to ensure early detection of negative impacts. It is probable that the overburden berm will contain some carbonaceous and coal remnants. Although it is expected that the berm will contain sufficient neutralising minerals to buffer any acidification should it form, the interaction of surface/rain water with the overburden berm, could lead to recharge of groundwater with sulphate-rich water beneath the sources. Any plume that may develop will be limited in terms of concentrations and extent and will be localised to immediate vicinity of the adit.	
Groundwater	
Site clearing and removal of topsoil, may lead to ponding of surface water in the cleared areas during the wet season and could potentially lead to increased infiltration to aquifers. Groundwater quality impacts during the construction phase are expected to be insignificant if the proposed management measures are implemented. The stripping and stockpiling of topsoil and subsoil from the pit and infrastructure surface areas is considered negligible since no chemical interaction is envisaged that could have an adverse impact on groundwater quality. The stripping of topsoil may result in a very slight increase in groundwater recharge, which is a slight positive effect on the groundwater environment. The duration of the activity is however so limited that the effect will not be measureable. The construction of the above-mentioned infrastructure will cause a very small reduction in recharge to the aquifer due to the compaction of the surface area. This impact is countered by the fact that vegetation clearing may result in ponding and slight increases in recharge. Runoff water will contribute to the catchment yield.	Low
Blasting activities may impact negatively on the groundwater quality if significant amounts of explosives are spilled or incompletely detonated. The chemical residues in the form of NH4 and NO3 may potentially leach to the groundwater table. With the construction of the initial box-cut, dewatering of the aquifer will begin to occur, but only within the immediate vicinity of the box-cut. The aquifer structure will be destroyed wherever the box-cut intersects the aquifer. Carbonaceous overburden material found within the mine lease area has the potential to generate acidic leachate, which means that any construction undertaken with carbonaceous material may be a potential source of poor quality leachate. No significant groundwater impacts are however expected during the construction phase. Run-off from haul-roads will be diverted and contained in the dirty water system.	Low
During the operational phase the mining will be active that will require dewatering of the deep aquifer(s). This will result in a cone of depression and a decline in water levels with a subsequent loss in resource for users. The presence of dolerite sills may render certain boreholes isolated from effects of dewatering, but, this would need to be confirmed with monitoring. If impact is confirmed by monitoring, impacts to the community's and farmer's water supply must be mitigated by the applicant providing an alternative reliable, clean water supply. The localised dewatering of the deep aquifer cannot be prevented. Since mining will be underground, it can be expected that the mining will be below the static groundwater levels. It is expected that the deeper aquifer will be drawn down to the bottom of No. 2 Seam. No boreholes	Medium

are drilled down to this depth with most boreholes exploiting groundwater from the shallower aquifer mostly less than 60 mbs. Groundwater users that extract groundwater from the shallow weathered aquifer are not expected to be significantly impacted on in terms of water levels or quality but this should be confirmed with ongoing and long-term monitoring. If impact is confirmed by monitoring, impacts to the community's and farmers' water supply must be mitigated by the applicant providing an alternative reliable, clean water supply. If dewatering is to take place from dewatering boreholes, the weathered aquifer could be sealed off, thereby protecting it from the effects of drawdown. Water level impacts are expected to be restricted to within the deeper fractured rock aquifer, which is currently not being utilised by the surrounding groundwater users. The effect of bord-&-pillar on shallow aquifer recharge is expected to be minimal due to the depth of mining and the fact that stooping is not planned for the mining operation. The recharge to the deep, secondary aquifer is expected to be less than 1% especially due to the depth and the overlaying dolerite sills. The underground mine was designed for zero subsidence. With the 50% extraction ratio bord-&-pillar mining planned subsidence or cracking is not expected; this will also limit drawdown within the shallow aquifer. Reasons for the localisation of the groundwater level impacts are: • The depth at which the planned mining will take place. • The prevention of subsidence and subsequent fracture formation. • The overall low aquifer transmissivity.	
Groundwater abstraction will result in a conical (theoretical) cone of depression that will extend from the source to the zone of extent. The result of the cone of depression is a lowering of groundwater levels that is included in the zone of extent. This extent of the influence zone will ultimately depend on factors such as abstraction rate within the borehole and the hydraulic properties of the aquifer. This study and various other studies conducted in the vicinity on the Karoo aquifer indicate that the hydraulic conductivity/transmissivity of the aquifer is low. This together with the yield requirement of 40 Kl per day, will result in localised cone of depression. However, specialist studies must nevertheless be conducted to determine the sustainable yield of the boreholes and the cone of depression so as not impact on adjacent users	Low
Coal surfaces exposed to the atmosphere within underground workings can potentially generate acid mine drainage. Following full recovery, the contaminants will start to migrate away from the mine site. No vertical migration of contaminants is expected to occur and therefore the contamination plume will not move towards the top weathered aquifer even after 100 years of model simulation. Given the depth of receptor boreholes, no contamination from the underground workings will reach nearby private boreholes even in the long-term. If future abstraction boreholes are drilled to this depth (>150 mbs), the water will be of poor unsuitable quality.	Low
Decant is not expected for the Leslie 2 project since no roof collapse with associated cracking/fracturing of roof strata or subsidence is expected because of the proposed bord-&-pillar mining. The mine plan was designed in such a manner as to prevent the destabilisation of the roof.	Low

With the 51 to 53% extraction ratio bord-&-pillar mining planned for Leslie 2, no subsidence or cracking is expected. Decant only occurs when the mining activities cause such an increase in recharge that the aquifer(s) downgradient from the mine cannot accommodate the increased volumes of water generated because of the mine. The effective recharge to the deep aquifer at Leslie 2 is not expected to increase and horizontal groundwater flow is expected to resume through the receiving aquifer(s) once the water levels have recovered. If the effects of only the project area are considered, no decant at the shaft will take place. However, when the cumulative effect of the nearby mines and mine hydraulic connectivity are considered decant at the shaft could be possible. With the implementation of such precautionary mitigation methods in place, the environmental impacts of any potential decants (if they occur) can be reduced to negligible.	
When coal, rock or mineral ore is removed from an underground mine, the overlying earth can sink, i.e. subsidence. The extent of mine subsidence depends on the mining method, local geology, depth of mining and amount of material extracted. Mine subsidence can affect built features, like homes or roads, and environmental features like surface freshwater resources and aquifers.	Low
Aquatic environment	
The following potential design / construction phase impacts were identified: • Placement of conveyors within non-perennial drainage lines, may alter freshwater habitats, lead to a loss of aquatic biodiversity and result in loss of stream connectivity. • Placement of conveyors within freshwater habitat may lead to increased risk of erosion and sedimentation of freshwater habitats as well as increasing the mobility of pollutants, which have the potential to impact of water quality of the aquatic resources present and a loss of aquatic biodiversity, with special mention of loss of natural migration routes for fish and loss of refugia for the aquatic communities present. • Potentially inadequate design of infrastructure may result in changes to instream habitat. • Potentially inadequate design of infrastructure may lead to changes to system hydrology and may alter aquatic habitats and lead to a loss in biodiversity as a result of moisture stress and instream flow. • Potentially inadequate separation of clean and dirty water areas and the prevention of the release of sediment rich water may alter the aquatic habitat within the receiving environment. • Potential inadequate design of a storm water management plan surrounding the structures and parking areas, leading to a loss of streamflow regulation capabilities in the area, altered water quality and hydrology, erosion and sedimentation of the surrounding freshwater environment.	Low
Use of surface runoff and groundwater sources for the supply of production water for the mining project may alter surface water recharge and the flow in the receiving systems; Use groundwater sources for the supply of production water for the mining project may result in alterations to groundwater tables and result in the development of an increasing cone of depression over time. Use of the freshwater resources for water supply may lead to changes to system hydrology and may alter aquatic habitats and lead to a loss in biodiversity as a result of moisture stress; and a loss of baseflow in the rivers downstream of the zone of influence.	Medium
The following potential construction phase impacts were identified:	Medium

• Site clearing, the removal of vegetation and disturbance of soils, leading to loss of storm water attenuation and increased erosion. Long term, may result in alien vegetation encroachment; thereby reducing surface water recharge and resulting in a loss of biodiversity. • Earthworks and other mining construction activities in the vicinity of wetland and riparian areas may lead to a loss in aquatic biodiversity. • Major earthworks and construction activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites and carbonaceous material. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting; • Disturbance of soils during the construction phase could lead to erosion and sedimentation of the aquatic resources present, thus resulting in loss of instream flow. • Placement of infrastructure within non-perennial drainage lines with special mention of the mine residue stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity. • Altered drainage patterns due to increased impermeable surfaces and installation of culverts/pipes for stream crossings. This would alter the flow and wetting patterns leading to changed vegetation communities. • Potential risk of spillage/leakages from waste management infrastructure associated with the proposed structures (e.g. sewage infrastructure) leading to contamination of the receiving freshwater environment. • Inadequately constructed clean and dirty water systems may impact on water quality. • Construction of clean and dirty water separation structures for pollution control purposes may lead to altered flow levels. • Potential poor housekeeping and management may lead to impacts on water quality. • Potential inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	
During the construction phase, stripping/vegetation clearing and potential stockpiling adjacent to freshwater resources and the runoff thereof, could lead to sedimentation of the system, leading to altered water quality and smothering of vegetation. Construction of stockpiles causes altered topography/geomorphology, which leads to altered runoff patterns and formation of preferential flow paths. Runoff from stockpiles and the RoM, could during the operational phase result in additional water inputs into freshwater resources and could cause potential contamination of the surface and groundwater.	Medium
Development of the underground mine workings may result in the formation of a cone of depression in the shallow aquifer. The cone of depression has been determined by the geohydrologist (Scholtz, 2016) likely to be of up to 1m in depth and extending within 900m of the underground mine workings. Impacts to the riparian zones of the local streams are deemed likely in terms of moisture stress and a loss in base flow are deemed likely due to loss of stream recharge from the shallow aquifer. Decant impacts resulting from the development of the underground workings are likely to impact the deep groundwater aquifers present if suitable mitigation measures are not implemented.	Medium

However, should adequate mitigation measures and appropriate seals be implemented, impacts may be significantly reduced; Mine residue stockpiles resulting from the development of the underground mine workings may result in altered runoff patterns, generation and seepage of pollutants resulting in impaired water quality.	
The following potential operational phase impacts were identified: • Development of the underground mine workings may result in the formation of a cone of depression in the shallow aquifer. The cone of depression has been determined by the geohydrologist (Scholtz, 2016) likely to be of up to 1m in depth and extending within 900m of the underground mine workings. Impacts to the riparian zones of the local streams are deemed likely in terms of moisture stress and a loss in base flow are deemed likely due to loss of stream recharge from the shallow aquifer. • Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution. Loss of MAR from dirty water areas may impact on the instream flow of the surface water systems. • Loss of water through clean and dirty water separation may alter instream flow of the surface water systems. • Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area, with special mention of the formation of an ever increasing cone of depression over the life of the proposed mining project as a result of mining activities and water abstraction, may lead to altered instream flow. • Intercepting run-off around mining activities and infrastructure could reduce the amount of time that water would take to reach the Steenkoolspruit and the Blesbokspruit and their associated tributaries and may lead to “flash flood” events on varying scales. • Capture of run-off and capture of rainfall (inundation) in the ‘dirty’/impacted areas would lower instream flow in the receiving environment. • Clean and dirty water systems not being maintained and operated to the required specifications to prevent contamination of clean water areas may impact on water quality. • Potential poor housekeeping and management during operational phase may lead to impacts on water quality. • Major earthworks and operational activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting. • Ongoing disturbance of soils during general operational activities may alter the aquatic habitat and result in a loss in aquatic biodiversity. • Inadequate separation of clean and dirty water areas may alter the aquatic habitat and result in a loss of biodiversity during the operational phase. • Mining related activities leading to increased disturbance of soils and drainage lines may alter the aquatic habitat. • Spills and other unplanned events during operational phase may impact on water quality. • Any activities which lead to the reduction of flow in the system with special mention of the use of surface and groundwater sources for production water may alter the aquatic habitat.	Medium

• It is considered likely that the operational activities will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat. • Loss of instream flow due to abstraction for water for production may lead to a loss in aquatic biodiversity. • Seepage from the mine residue stockpiles may lead to a loss in aquatic biodiversity. • Alien vegetation encroachment will impact on and alter the aquatic habitat. • Potential discharge from the mine process water system with special mention of RWD and any PCD's may lead to a loss in aquatic biodiversity. • Sewage discharge from mine offices and camps may lead to a loss in aquatic biodiversity. • Acidification as a result of pyrite oxidation and the release of metals due to tillage and blasting may lead to a loss in aquatic biodiversity.	
The following potential rehabilitation / closure phase impacts were identified: • impact on the flow even after operational phase. • Loss of water to inadequately rehabilitated areas may still have an impact on the flow post operational phase. • Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post operational phase. • Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as mine residue stockpiles and latent dirty water areas such as filled underground mine working areas may impact on water quality. • Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality. • Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase. • Potential poor housekeeping and management during decommissioning phase may lead to further impacts on water quality. • Spills and other unplanned events during decommissioning phase may impact on water quality. • Disturbance of soils as part of demolition activities may alter the aquatic habitat. • Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat. • Alien vegetation encroachment will impact on and alter the aquatic habitat.	Low

The following potential post-closure impacts were identified: • Loss of MAR from latent dirty water areas may still impact on the flow even after decommissioning phase. • Loss of water to inadequately rehabilitated areas may still have an impact on the flow post decommissioning phase. • Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post decommissioning phase. • Ongoing erosion and sedimentation of the aquatic resources, which will result in a loss of instream flow due to inadequate rehabilitation of affected areas. • Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity. • Inadequate closure and rehabilitation leading to ongoing pollution and seepage from contaminating sources such as mine residue stockpiles and latent dirty water areas may impact on water quality, with special mention of contaminated dirty water decant generated from underground mine workings. • Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality. • inadequate separation of clean and dirty water areas may alter the aquatic habitat and result in a loss of aquatic biodiversity. • Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present. • Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat. • Potential post closure impacts on water quality may lead to a loss in aquatic biodiversity. • Alien vegetation encroachment will impact on and alter the aquatic habitat.	Low
Sensitive landscapes (Wetlands)	
• Site clearing, the removal of vegetation and disturbance of soils for the construction of infrastructure, may enable the recruitment of alien and invasive vegetation, which decreases the available freshwater habitat, increases sedimentation and impacts on the ecological structure of the freshwater environment. • Altered drainage patterns due to increased impermeable surfaces and installation of culverts/pipes for stream crossings. This would alter the flow and wetting patterns leading to changed wetland vegetation communities. • Potential inadequate design of a storm water management plan surrounding the structures and parking areas, leading to altered water quality and hydrology, erosion and sedimentation of the surrounding freshwater environment. • Potential risk of spillage/leakages from waste management infrastructure associated with the proposed structures (e.g. sewage infrastructure) leading to contamination of the receiving freshwater environment. • Decommissioning activities may lead to further wetland habitat transformation and increased alien plant species proliferation is areas are not revegetated and compacted areas ripped.	Medium

• Loss of connectivity of freshwater resources as a result of road and conveyor crossings through the freshwater habitat, resulting in altered hydrological patterns and fragmented habitats; • Water flowing within the freshwater resources could possibly be diverted due to construction of roads/conveyors within the freshwater resource. • Site clearing, the removal of vegetation and disturbance of soils, may enable the recruitment of alien and invasive vegetation, which decreases the available freshwater habitat and impacts on the ecological structure of the freshwater environment. • Decommissioning activities may lead to further wetland habitat transformation and increased alien plant species proliferation if inadequate site rehabilitation does not take place (i.e. Ripping and re-profiling of compacted soils and revegetation with suitable wetland species). Also, concentration of flow erosion and sedimentation of the system is possible where roads within existing wetland resources are being decommissioned.	Medium
• Potential poor planning leading to the placement of stockpiles within freshwater habitat. • During the construction phase, stripping/vegetation clearing and potential stockpiling adjacent to freshwater resources and the runoff thereof, could lead to sedimentation of the system, leading to altered water quality and smothering of wetland vegetation. • Construction of stockpiles causes altered topography / geomorphology, which leads to altered runoff patterns and formation of preferential flow paths. • Runoff from stockpiles, could during the operational phase result in additional water inputs into freshwater resources and could cause potential contamination of the surface and groundwater.	Low
• Potential impact on surface and groundwater quality due to impaired water quality due to the discharge of pollutants from crushing and screening plant. • Increased dust from processing plant, could settle within the freshwater resources, increasing the amount of sediment within the system.	Low
• The development of the underground workings may result in a possible reduction of groundwater level although the significance on the fractured zone aquifer and perched aquifers which are the larger drivers of the wetlands in the area is significantly reduced in relation to the deeper aquifer and associated hydraulic head which in turn has the potential to lead to the dewatering of the shallow aquifer. The geohydrological assessment has determined that the area to be affected will be within 900m of the underground workings (Scholtz, 2016). This has the potential to lead to changes in the wetland hydroperiod and this the characteristics of the wetland resources in this affected area. • Development of the underground mining could lead to eutrophication of the receiving environment and result in lowering the water quality of the surrounding freshwater system • Even though the possibility of decant is unlikely, as suggested within the geohydrological report (Scholtz, 2016) during the decommissioning of the adit/shafts, the possibility still exists. In the case of possible decant, water will accumulate within the adit/shafts and eventually decant into nearby freshwater resources, thus resulting in salt rich and potentially low pH dirty water reaching the receiving environment. • Subsidence after decommissioning of the underground mining areas are also unlikely to occur, as determined by the geohydrologist (Scholtz, 2016). However, the possibility still exists. Possible subsidence could potentially impact on the hydrology of the freshwater resources within the MRA, but also impact on the catchments hydrology.	Medium
• Potential inadequate design leading to a poorly functioning dirty water system.	Low

• The presence of clean and dirty separation infrastructure within close vicinity to the freshwater system could cause a loss of catchment yield due to storm water containment. • Seepage and spillage of PDC during operational phase, which could have an increased risk of pollution of surface water. • A further increased risk of pollution of groundwater due to dirty discharges (by accidental instances or storm events), potentially leading to the formation of a contaminated groundwater plume, which may migrate downgradient of the PCD, thus possibly affecting the freshwater system.	
Air quality	
Flora: Exposure of vegetation to particulates leads phytotoxic responses, depending on the volume and chemical composition of the particles. Particulate deposition disrupts plant physiology and biochemistry and may cause physical damage by abrasive action during turbulent deposition. Particulate deposition may therefore affect the health of the remaining natural habitats (Open Grassland, Rocky Outcrop, Wetland, Modified Grassland).	Medium
Fauna: Nuisance and stress as a result of significant dust may result in reduced breeding rates in game species (e.g. Buffalo) and livestock. Birds have a higher breathing rate and spend more time in open air and may therefore be sensitive to high concentration of particulates in the atmosphere.	Medium
Agriculture: Particulate deposition disrupts plant physiology and biochemistry and may cause physical damage by abrasive action during turbulent deposition. Reduced photosynthesis results in reduced growth and productivity of crops. In agriculture the impact is felt by either the quantity of the output or yield being reduced or if the quality of the product lowered, this results in reduced nutritional quality and market value of agricultural crops.	Medium
Human receptors: Health impacts on susceptible groups include the elderly, infants, persons with chronic cardiopulmonary disease, -pneumonia, -influenza and -asthma.	Low
Human receptors: Nuisance impact of dust on surrounding residences.	Low
Noise	
During the construction phase, the activities will involve significant noise and vibration generating mechanisms that can have a significant impact on the surrounding communities and the animal life.	Medium
On completion of the construction and implementation of the Surface infrastructure, the day to day running of the mine will commence. The mining and plant activities will involve significant noise generating mechanisms that can have a significant impact on the surrounding communities and the animal life.	Medium
Vibration and Air Blast	
Air blast impact on houses. Impact is negligible.	Low
Fly rock impact on houses. Impact is negligible	Low
Impact of fumes – houses. Impact is negligible	Low

Impact on buffalo camp located on Portion 21 of the farm Winterhoek 214 IR.	Low
Visual aspects	
Removal of vegetation leading to increased visual contrast, loss of Visual Absorption Capacity of the landscape and visual intrusion on sensitive receptors.	Medium
Erosion and loss of topsoil leading to increased visual contrast, loss of Visual Absorption Capacity of the landscape and visual intrusion on sensitive receptors.	Medium
Alteration of natural features as a result of infrastructure placement and positioning, including potential loss or alterations of wetlands in the vicinity of the overland conveyor and rocky areas, leading to loss of visual quality and visual exposure. Natural features act as visual resources and disturbance of such landscape features will also have an impact on landscape character and sense of place of the region.	High
Excavation and blasting during construction of mining infrastructure will lead to visual intrusion and visual exposure of sensitive receptors.	Medium
Topographical alteration as a result of construction activities leading to a change in the natural environment which will lead to increased level of visual intrusion and a potential impact on sense of place of the region.	High
Mine infrastructure including buildings being visible over long distances and creating strong contrast with the surrounding landscape.	High
Continual stockpiling of material, including the resource and increasing heights of stockpiles during operational activities.	Medium
Conveying of coal from the shaft complex to the plant complex is likely to lead to visual impacts on adjacent receptors.	Medium
Generation of dust leading to visual intrusion, visual exposure of receptors and impacts on the overall landscape character.	Medium
Additional vehicular traffic and potential railway activities impacting on the rural character of the region and leading to visual exposure of receptors further from the MRA to coal mining activities.	Medium
Night time lighting due to operations impacting on receptors accustomed to a low district brightness during night time.	Medium
Removal of infrastructure and general decommissioning and closure activities leading to visual intrusion on sensitive receptors.	Medium
Ineffective rehabilitation leading to landscape scarring, permanent visual contrast and a permanent alteration of the landscape character and sense of place within the region.	Medium
Archaeology and heritage	
Historical Remains: Farmstead Complex 01 (FC01) will not be affected by the Leslie 2 Project.	Low
Historical Remains – Farmstead Complex 02: FC02.1 and FC02.5 are located approximately 180m to the west of the conveyor route. These two structures are part of a complex of structures which constitute FC02 which will not be directly impacted by the conveyer route	Low
Graveyard (GY) 03: GY03 is located approximately 85m to the east of the proposed conveyor route. Construction activities may impact on Graveyard 03, if mitigation measures are not implemented appropriately	Low
Graveyards That remain unaffected: No impacts. GY01, GY02, GY04, GY05, GY06 and G01 will remain unaffected by the Leslie 2 Project	Low

Palaeontology	
Surface infrastructure construction: The probability of a negative impact upon the palaeontological heritage of the surface 1-2 m of the bedrock and regolith strata is assessed as being nil.	Low
The probability of a negative impact upon the palaeontological heritage of the coal-bearing Vryheid Formation strata underlying the regional scale dolerite sill is assessed as being probable. However, this categorisation does not apply to the coal itself, but rather to any siliciclastic sediment partings they may contain. The severity of the possible negative impacts upon the palaeontological heritage caused by the underground mining activities was assessed as being high.	High
Traffic	
Traffic will occur over the life of mine or as long as operations occur Minor traffic generated and congestion levels have been modelled and are acceptable Traffic already on the R29. Traffic only generated over life of mine and will cease to be generated upon closing the mine R29 already exists and not a considerable volume of traffic added by the mine	Medium
Socio-economic aspects	
Mining activity is a source of potential pollutant to underground water resources.	Refer to geohydrological assessment ratings
The project will have an impact on current farming activity which will be rendered uneconomical.	High
The creation of dust during mining activities such as transport, blasting, drilling etc. will have an impact on the quality and growth of crops as well as the quality of grazing. This has the ability to affect farmers yield and growth of livestock.	High
Mining will result in a number of nuisance factors which will affect local and residents and have the potential to disrupt social activity. These include blasting, noise and dust. Drilling; blasting and construction activities will create noise pollution which may affect schools, churches and private residents. Noise pollution can be disturbing and inconvenient to the community.	Medium
As a result of more people moving into the area, the constraints on the health system are likely to worsen. Health services in the area are insufficient. The closest health facility is in the town of Devon. Health issues also arise from social conditions. The influx of prospective workers, particularly of men, can cause social ills. The number of men in the mining area is already significantly higher than the number of women. HIV/Aids are likely to increase with the introduction of a transient population. As a result of mining activities, the air quality in the area can deteriorate. It was reported that lung diseases are common the area. These problems were associated with the close proximity of mining activity to residential areas.	High
Persons currently employed by the farm may potentially lose their jobs as a result of mining activity.	Medium
Mining activity will attract potential job-seekers in the area. This will cause a disruption to the current social structure of the communities.	High
The proposed mine will generate local employment opportunities and skills development opportunities.	Positive

Employment will contribute to household wealth. Households will spend more money which will stimulate the local economy. This stimulus will generate more wealth and opportunity for the local community during the construction phase. Training and upskilling not only increase a person's chance of accessing employment opportunities, but also can raise the income of the person.	
GDP Impact (National): GDP is a good indicator of economic growth and welfare as it represents, among other, criteria, remuneration of employees and gross operating surplus (profits) as components of value added at all the levels of the economy. The direct impact generated during Year 2 is estimated at R110.27 million with the total GDP at R252.05 million in 2015 prices. GDP Impact (Provincial): The direct impact generated during Year 2 is estimated at R88 million with the total GDP at R141 million in 2016 prices.	Positive
Capital formation (National): The direct capital will be around R210.21 million supplemented by the indirect component of R117.32 million, the induced element of R249.38 million providing a total of R576.90 million. It is interesting to note that the original investment of R233 million is increased by a factor of 2.47 to R577 million. Capital formation (Provincial): The direct capital will be around R178 million supplemented by the indirect component of R56 million and the induced element of R55 million providing a total of R289. It is interesting to note that the original investment of R178 million is increased by a factor of 1.62 to R289 million.	Positive
Employment created (National): The direct employment of 250 is supplemented by 107 indirect and 214 induced opportunities providing a total of 571 opportunities. This is a 2.28 growth factor in terms of the direct jobs to the total opportunities created. Employment created (Provincial): The direct employment of 217 is supplemented by 103 indirect and 127 induced opportunities providing a total of 437 opportunities. This is a 201 growth factor in terms of the direct employment opportunities to the total opportunities created.	Positive
Impact on households (National): The total payments to households are estimated at R180.83 per annum with R29.47 million to low-income households, 16.3% to the low-income households. Impact on households (Provincial): The total payments to households is estimated at R65.33 million per annum with R16.87 million to low-income	Positive

National and Provincial effectiveness criteria: A comparison of the coal mines GDP/Capital ratio with the average for the total South African economy indicates that for every R1 million of capital invested in the coal mine, it generates an overall GDP ratio of 0.51 compared to the average for the national economy of 0.45 and 0.51 for the provincial economy. This suggests that the coal mine utilises capital more effectively than other sectors in the national economy. When a similar comparison of the Labour/Capital ratio is made, the coal mine will generate more employment opportunities, i.e. 1.01 jobs created for every R1 million invested in this project, in comparison with the national average of 0.88 jobs created. Employment created compares well with the provincial ratio of 1.21. In terms of the income portion that is distributed to the low-income households, it is well above the national average at 16.2% and very comparable with the provincial basis of 24.2%.	Positive
It is calculated that the amount of R214 million will be paid annually to the Fiscus expressed in 2016 prices. The issue then arises what can be done with an additional R214 per annum paid into the Fiscus? As many as 332 additional educators and 11 medical doctors can be appointed, while simultaneously servicing 122 additional hospital beds and 125 low-cost houses	Positive
Sectoral Impact: As per the provincial sectorial GDP Impact figures provided in Annexure H14, 71.69% of the GDP impact is in the mining sector, with the balance spread between the different sectors. The second and third largest impact is in Community Services with 9.99% and Trade with 6.76%.	Positive
Overall the mining option is economically the preferable option as it will provide economic growth now, as needed provincial and country wide. The following is noteworthy: • Poverty alleviation will be supported with 396 net additional direct jobs plus low-income households' receiving an additional R82.87 million annually expressed in 2016 prices. The total employment created in the two provinces is estimated to be around 958 and additional GDP R433.50 million.	Positive
Mine Closure: During and subsequent to the cessation of mining activities, a loss of jobs may occur which may not only impact on the employees but on the socio-economic status of the local community and economy.	Medium

12. Proposed impact management objectives and the impact management outcomes for inclusion into the EMPr

Based on the assessment and where applicable the recommendations form specialist reports, the table below summarises the impact management objectives and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.

Table 77: Impact management objectives and the impact management outcomes

Environmental aspect	Objective	Summary of impact management outcome
Geology	To minimise the destruction of the geological strata and to prevent the unnecessary loss of geology	Monitoring of mineral resources and reserves.
Soil, land use and land capability	Preserve sufficient soil volumes to enable pre-mining land capability post-rehabilitation.	Site inspections, rehabilitation and monitoring programmes; Erosion management, rehabilitation and monitoring programmes; soil (and topsoil) management, rehabilitation and monitoring programmes
	Maintain natural soil morphology (horizon sequence) and structural characteristics	
	Preserve healthy (non-toxic) growth medium for future land use	
	Maintain a protective vegetation cover on soil stockpiles	
	Maintain functional soil structure to sustain post-mining land capability	
Flora and Fauna	Limit vegetation clearance within ecological sensitive areas to what is absolutely required, and prevent removal and destruction of floral SCC.	Implementation of a declared weed and invader plant species management programme and Biodiversity Management Plan; Site inspections and monitoring programmes. implementation of and training programmes. implementation of specialist recommendations.
	Prevent the disturbance of natural floral ecology beyond the infrastructure footprint area.	
	indiscriminate driving within natural areas outside of the development footprint	
	Maintain migratory corridors hand habitat connectivity particularly the wetland habitat unit	
Flora and Fauna	Prevent the disturbance of faunal ecology especially avifaunal species beyond the infrastructure footprint area and limit the	Dust suppression methods, air quality management plan; monitoring, rehabilitation.

Environmental aspect	Objective	Summary of impact management outcome
	negative impact on the game breeding project within the MRA.	
	Limit dust and noise generation during the operational phase of the conveyor	
	Ensure effective rehabilitation of disturbed areas.	
Surface water and aquatic environment	To prevent surface water quality deterioration and a reduction in surface water quantity towards the receiving clean water environment.	Storm water management plan; monitoring programmes; site inspections; spill management; incident reporting; management of water balance; preventive maintenance plan(s); rehabilitation.
	To prevent degradation of aquatic biodiversity and ecosystems.	
	Prevent affected storm water discharge into the receiving clean water environment.	
Groundwater	To minimise the extent of disturbance of the aquifer.	Monitoring programmes, site inspections; spill management; incident reporting system; preventive maintenance plan(s); rehabilitation; groundwater model.
	To limit degeneration of groundwater quality.	
Wetlands	Prevent the loss of freshwater habitat and ecological structure, changes to ecological and social-cultural services provision and alteration of the hydrological functioning and sediment balance of the freshwater system, beyond the infrastructure footprint area	Monitoring programmes; rehabilitation; site inspections, design, groundwater model, storm water management.
	Prevent the loss of freshwater system connectivity, hydrological functioning and loss of habitat.	
	Prevent the degradation of surface and groundwater quality of the freshwater system, and limit loss of habitat and ecological structure	
	Prevent the impact on the sediment balance and hydrological functioning of the freshwater system, and changes to the ecological	

Environmental aspect	Objective	Summary of impact management outcome
	functioning and socio-cultural services provision of the freshwater system. Prevent negative impact on the hydrological functioning, water quality and sediment balance of the surrounding freshwater system	
	Prevent possible degradation of surface and groundwater of the surrounding freshwater environment.	
Air quality	Prevent the deterioration of air quality	Monitoring programmes; dust suppression activities; maintenance activities; emergency preparedness and response; incident reporting system.
	Reporting on NAEIS	
Noise; vibration and air blast	Limit the generation of noise through the various mine and plant activities to prevent the causing of any possible disturbance or discomfort of wildlife species or communities as a result.	Monitoring programmes; maintenance activities, implementation of blasting procedures.
	Manage blasting activities in order to limit any impacts that may arise from such activity.	
Sites of archaeological and cultural importance	Conserve Farmstead complex (FC01)	Obtaining of appropriate authorisations and permits where required; site inspections; protection of heritage resources; training programmes.
	Conserve Farmstead complex (FC02)	
	To conserve GY03 as well as other graveyards in the project area	
	To conserve all unaffected graveyards in the project area	
Palaeontology	Prevent the destruction of and loss of sites of palaeontological importance.	Obtaining of appropriate authorisations and permits where required; site inspections, training programmes.
Visual	To keep development footprint area as small as possible in order to present unnecessary loss of vegetation	Erosion control measures; site inspections, training programmes, monitoring, procedures, training programmes, dust management and air quality management plan
	To prevent erosion of soils and subsequent loss of valuable topsoil	
	To prevent loss of sensitive habitat feature act as visual resources within the study area and contribute to landscape character within the MRA	
	To minimise the visual impact from excavations and blasting	

Environmental aspect	Objective	Summary of impact management outcome
	To minimise construction activities and impacts from a project layout that will lead to high levels of topographical alteration	
	To limit visual impacts as a result of mine surface infrastructure such as buildings	
	To limit visual impacts as a result of stockpiling of material	
	To limit impacts on the visual environment from coal conveying activities	
	To limit the presence of dust throughout the mining operations	
Visual	To limit visual impacts from additional vehicles on local and district road and to limit additional railway activity to what is essential	Implementation of correct night time lighting, rehabilitation.
	To limit visual impacts from night time lighting	
	To limit visual impacts as a result of mine surface infrastructure decommissioning	
	To ensure that effective rehabilitation takes place in such a way as to prevent permanent visual impacts remaining post-closure	
Traffic	Prevent / manage any impacts on traffic	Appropriate design and construction
Socio-economic aspects	To prevent contamination of water resources	Implementation of SLP, implementation of measures for all other environmental aspects (above), implementation of measures to train employees to ensure future employment opportunities.
	Compensation to affected parties for loss of arable land.	
	Limit the degree of pollution and its social and economic implications on those affected.	
	To mitigate against the health implications during the construction and operation of the mine	
	Limit socio-economic impacts	
	To prevent social ills that are associated with inward migration of potential jobseekers.	
	To maximise economic opportunities for local employment and development.	

13. Final proposed alternatives

Refer to Annexure F for the alternatives assessment. In addition, refer to Section 7.1 (Part A) above.

14. Aspects for inclusion as conditions of Authorisation

Section 26 of the EIA Regulations GNR. 982, dated 04 December 2014 specifies the requirements and content of an environmental authorisation. The content requirements of the environmental authorisation is described in Table 78 below, and where applicable, a reference to the section as to where the requirement has been addressed as part of the EIR/ EMPr has been included.

Table 78: Content of environmental authorisation as per Section 26 of the EIA Regulation GNR.982, dated 04 December 2015.

Ref. No.			Requirement as per Section 26	Reference to EIR/EMPr (where applicable)
a			the name, address and contact details of the person to whom the environmental authorisation is issued	Refer to Section 1 of Part A for details.
b			a description of the activity that is authorised;	Section 4 of Part A for details.
c			a description of the location of the activity, including	
	(i)		the 21 digit Surveyor General code of each cadastral land parcel,	Section 2 of Part A for details.
	(ii)		where available, the physical address or farm name,	Section 2 of Part A for details.
	(iii)		where the required information in sub-regulation (i) and (ii) is not available, the coordinates of the boundary of the property or properties,	-
	(iv)		a plan which locates the proposed activity or activities authorised at an appropriate scale, or, if it is-	Refer to Figure 4 for the plan.
		(aa)	a linear activity, a description and coordinates of the approved corridor of the activity or activities; or	Refer to Figures 4, 5 and 6 as well as figures contained in Annexure 3.
		(bb)	on land where the property has not been defined, the coordinates of the area within which the activity is to be undertaken;	-
d			the conditions subject to which the activity may be undertaken, including conditions determining-	-

Ref. No.		Requirement as per Section 26	Reference to EIR/EMPr (where applicable)
	(i)	the period within which commencement must occur, which period may not exceed 10 years and may not be extended beyond such 10 year period, unless the process to amend the environmental authorisation contemplated in regulation 32 is followed;	As determined by the competent authority.
	(ii)	the period for which the environmental authorisation is granted and the date on which the activity is deemed to have been concluded, where the environmental authorisation does not include operational aspects;	As determined by the competent authority.
	(iii)	a distinction between the portions of the environmental authorisation that deal with operational and non- operational aspects respectively and the respective periods for which the distinct portions of the environmental authorisation is granted, where the environmental authorisation contains operational and non- operational aspects;	As determined by the competent authority.
	(iv)	requirements for the avoidance, management, mitigation, monitoring and reporting of the impacts of the activity on the environment throughout the life of the activity. additional to those contained in the approved EMPr, and where applicable the closure plan; and	As determined by the competent authority.
e		the frequency of auditing of compliance with the conditions of the environmental authorisation and of compliance with the EMPr, and where applicable the closure plan, in order to determine whether such EMPr and closure plan continuously meet mitigation requirements and addresses environmental impacts, taking into account processes for such auditing prescribed in terms of these Regulations: provided that the frequency of the auditing of compliance with the conditions of the environmental authorisation and of compliance with the EMPr may not exceed intervals of five years;	Refer to Section 1.8 and Section 1.11 of Part B for details and / or as determined by the competent authority.
f		the frequency of submission of an environmental audit report to the competent authority, including the timeframe within which a final environmental audit report must be submitted to the competent authority;	Refer to Section 1.11 of Part B details and / or as determined by the competent authority.
g		the frequency of updating the EMPr, and where applicable the closure plan, and the manner in which the updated EMPr and closure plan will be approved, taking into account processes for such amendments prescribed in terms of these Regulations;	As determined by the competent authority.
h		a requirement that the environmental authorisation, EMPr, any independent assessments of financial provision for rehabilitation and environmental liability, closure plans, where	-

Ref. No.		Requirement as per Section 26	Reference to EIR/EMPr (where applicable)
		applicable, audit reports including the environmental audit report contemplated by regulation 34, and all compliance monitoring reports be made available for inspection and copying-	
	(i)	at the site of the authorised activity;	-
	(ii)	to anyone on request; and	-
	(iii)	where the holder of the environmental authorisation has a website, on such publicly accessible website; and	-
i		any relevant conditions which the competent authority deems appropriate.	As determined by the competent authority.

Furthermore, should the Environmental authorisation be granted, the following condition should be included and / or taken into account:

- The project should remain in full compliance with the requirements of the EMPr and with all regulatory requirements.
- The EMPr should be implemented by qualified environmental personnel who have the competency and credibility to interpret the requirements of the EMPr. Such persons must be issued with a written mandate by the applicant. to provide guidance and instructions to employees and contractors.
- Stakeholder engagement must be maintained during the Construction, Operational and Closure / Rehabilitation Phases of the project, with the emphasis on the continuing provision of information.

15. Description of any assumptions, uncertainties and gaps in knowledge

In terms of Section 3(p) of Appendix 3 to the EIA Regulations GN 982, the Environmental Impact Assessment Practitioner (EAP) must provide a description of any assumptions, uncertainties and gaps in knowledge upon which the impact assessment has been based. The table below provides the assumptions and limitations applicable to the various specialist assessments.

Table 79: Specialist assumptions and limitations

Specialist	Assumptions and limitations
Soil, Land use and Land capability	• Sampling by definition means that not all areas are assessed, and therefore some aspects of soil and land capability may have been overlooked in this assessment. However, it is the opinion of the professional specialist that this assessment was carried out with sufficient sampling and in sufficient detail to enable the applicant, the Environmental Assessment Practitioner and the

Specialist	Assumptions and limitations
	regulating authorities to make an informed decision regarding the proposed activities; • Land Capability was classified according to current soil restrictions, with respect to prevailing climatic conditions on site. However, it is virtually impossible to achieve 100% purity in soil mapping. The delineated soil map units could include other soil type(s), as the boundaries between the mapped soils are not absolute, but rather form a continuum and gradually change from one type to another. Therefore, soil mapping and the findings of this assessment were extrapolated from individual observation points; and • Soil fertility status was not considered a limitation, since inherent nutrient deficiencies and/or toxicities would be rectified by appropriate liming and/or fertilization prior to cultivation.
Flora and fauna	• The field assessment was undertaken in the beginning of October, and although this indicates the start of the flowering season, the severe drought conditions and delayed onset of rain has resulted in a delay in the flowering times of most floral species. As such the full assemblage of floral species could not be accurately determined and very few floral SCC were observed, mainly due to the majority of floral SCC listed for the Quarter Degree Square (QDS) 2628BD are considered to be geophytic species and as such are likely to have been dormant during the site assessment. • It is therefore recommended by the ecologist that a thorough walk down of the infrastructure laydown areas be conducted prior to construction activities commencing (preferably during January) to identify floral SCC, listed as 'Declining' that might be associated with these areas, and that a rescue and relocation plan be implemented for all affected individuals, should they be present. • For floral species included in the SANBI and Gauteng Red List and indicated to fall within the Near Threatened or Vulnerable RDL categories (and listed by GDARD to have an A3 Priority grouping) with a high probability of being located within the proposed infrastructure footprint areas, it is recommended that if infrastructure layout cannot be placed in such a way as to avoid these areas, walk downs of these areas be conducted during the flowering period of these species. Should it be confirmed that these are indeed present, the Gauteng Department of Agriculture and Rural Development (GDARD) should be approached in order to determine whether relocation of these species may be considered.
Hydrology	• Whilst every endeavour has been made by Shangoni to ensure that information provided is correct and relevant, this technical report is, of necessity, based on information that could reasonably have been sourced within the time period allocated to the assessment, and is, furthermore, of necessity, dependent on information provided by management and/or its representatives during the course of the project.

Specialist	Assumptions and limitations
	• It is assumed that the applicant provided all information to Shangoni that is relevant to the scope of work included in this technical report and that no important information has been withheld. • The relevant information received from the applicant during the course of this project will be deemed true and correct. If such information reflected in any documentation relevant to this project is discovered to be misleading, Shangoni does not take any responsibility for the implications of such misrepresentations made by the applicant. • Any reference to legislation in this technical report should not be perceived as a substitute for the provisions of such legislation. In the event of any inconsistency between this document and such legislation, the latter would prevail. • Shangoni is under no obligation to the applicant and others to conduct work not specified in the scope of work as agreed in the relevant proposal. • Flood peak calculations assume rainfall intensity is uniform throughout the duration of the storm. • Calculations are done for complete catchment areas and should be distributed where there is more than one drainage point within the same built up catchment. • Storm water control recommendations are based on industry experience and best practice. Final designs for construction should be authorised by an approved engineer. • Contour and elevation data as provided during the analysis are assumed to be accurate and representative of the site and catchment areas. • Upstream catchment activities are interpreted according to common practices and no detailed insight is available on possible storm water measures beyond the site. The assessment does not guarantee the integrity of downstream infrastructure in the event of release or discharge from site. • The measures proposed as part of the storm water management section of the report do not impose preference as this is an operational document to assist in the complete management of clean and dirty surface water in the vicinity of the operation. • The measures proposed in the storm water management plan section of the report do not specifically cover considerations relevant to storm water management for the purpose of safety, like mine flooding and loss of life, the primary focus being environmental management and the identification of potential environmental concerns. • Recommendations represented in this report apply to the site conditions and features as they existed at the time of Shangoni's investigations, and those reasonable foreseeable. The recommendations do not necessarily apply to conditions and features that may arise after the date of this storm water management plan, for which Shangoni had no prior knowledge nor had the opportunity to evaluate. Refer also to Section 6.1 in Annexure H3.

Specialist	Assumptions and limitations
Geohydrology	• Numerical models have become a popular tool to solve problems. However, groundwater systems are complicated beyond our capability to practically evaluate them in detail. *A model, no matter how sophisticated, will never describe the investigated groundwater system without deviation of model simulations from the actual physical processes that occur in the study area* (Spitz and Moreno, 1996). All numerical modelling simulations require assumptions to be made during the translation of any geohydrological system into a numerical model. These assumptions, which reflect data gaps in the conceptual model regarding the aquifer distribution and the aquifer parameters, can result in uncertainty in the model output and predictions. For the practical purposes, considerable simplifications had to be made with regards to the current model and it is the opinion of the author that the groundwater models produced are of a sufficient confidence level to meet the modelling objectives for this project. However, the models should be routinely validated and refined as soon as additional time-dependant data becomes available during the operational phase of the project, especially to plan appropriately for the post-closure phase of the mine.
Geotechnical	• None
Aquatic and Wetland	• It is the opinion of the ecologist that results obtained in this aquatic assessment are not an accurate representation of the ecological importance and sensitivity of the systems within the MRAs as a result of the prevailing drought conditions at the time of the assessment. Despite these limitations however, it is the opinion of the ecologist that these systems are not regarded as extremely sensitive and have already been subjected to various impacts associated with agricultural return flows, livestock grazing and trampling, erosion, sedimentation and incision. • The freshwater resource assessment is confined to the MRA and does not include the neighbouring and adjacent properties; these were, however, considered as part of the desktop assessment; • Significant transformation of the vegetation communities and soil profiles arising from historical and current agricultural practices within the MRA, was apparent. As a result, identification of the outer boundary of the temporary zone of some freshwater resources proved difficult in some areas. Therefore, the freshwater resource delineations as presented in this report are regarded as a best estimate of the boundaries based on the site conditions present, as observed during the site assessment. Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the freshwater resource boundaries will need to be surveyed and pegged according to surveying principles; • Freshwater resources create transitional areas where an ecotone is formed as vegetation species change from terrestrial to wetland species. Within this

Specialist	Assumptions and limitations
	transition zone, some variation of opinion on the freshwater resource boundary may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results; • With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. It is, however, expected that the MRA has been accurately assessed and considered, based on the field observations undertaken; • A single field assessment for the freshwater ecology was undertaken during October 2016 to determine the ecological status of the MRA and the surrounding area. Unseasonal dry conditions during the time of the assessment may have limited the diversity of species which would normally be recorded and used for wetland delineation purposes, during a similar timeframe in wetter years. Studies within the immediate surrounding area has previously been conducted within various seasons throughout 2015, and was utilised to augment and supplement the data for the wetland ecological assessment where possible; • Similarly, unseasonal dry conditions have resulted in a lack of sufficient flow and loss of refuge and may be considered key factors limiting the diversity of the aquatic communities observed during the freshwater ecological assessment. It is highly recommended that prior to construction, a quarterly biomonitoring programme be implemented in order to establish baseline seasonal variations of the freshwater resources present.
Air quality	• Where available, design specifications and operating conditions were provided by Anglo Operations (Pty) Ltd.; • The life of mine of the proposed Leslie 2 Project is 14 years. The emissions estimated for the operational phase of this project were based on and simulated for an “average year”; • Where source specific particle size data for PM2.5 was not available, it was conservatively assumed to be equal to the PM10 fraction; • The ground level concentrations as a result of emissions from vehicle tailpipes, generators, spontaneous combustion and methane emissions from the underground mining of coal were not estimated and simulated in this air quality impact assessment. However, these sources, if not managed, may be significant in long term degradation of ambient air quality in the area and have been included in the risk assessment (see section 4.4 of this report); • There are currently no emission factors available for the particulate emissions generated by the movement of a trains on railways. These particulate emissions are however expected to be marginal; • There are no emission factors for bord and pillar mining. In the absence of a specific emission factor, and as a conservative measure, the equation for material handling and transfer was used to estimate emissions for this activity;

Specialist	Assumptions and limitations
	• No moisture contents were available for the materials: coal, topsoil, soft material and hard material. Moisture contents for coal, obtained from AP42 range from 4.0 to 22.0, with a geometric mean = 10.4% and moisture contents for overburden, obtained from AP42 range from 2.2 to 16.8, with a geometric mean = 7.9. Emissions for material handling and transfer activities were estimated based on the following conservative- and escalated assumptions for material moisture contents: ➢ Conservative assumptions: o Coal moisture content of 10.4%; and o Topsoil-, soft material, and hard material moisture content of 7.9%. ➢ Escalated assumptions: o Coal moisture content of 3%; and o Topsoil-, soft material, and hard material moisture content of 3%. • No data was available on the silt content of the soft material used in the construction of the Soft material shaft protection berm. The geometric mean silt content (6.9%) for overburden was thus applied in the estimation of emissions from the bulldozing activity; • Anglo Operations (Pty) Ltd. commited to paving the access road and on-site haul road for the Leslie 2 project. Emission generated from traffic on the access road and onsite haul road were therefore estimated based on emission factors for paved roads; • No silt loading data was available for the access road and the R29 road. Emissions from the paved roads were estimated based on conservative- and escalated assumptions for the silt loading of the access road and the R29 road. The conservative assumption of 1.7 g/m^2 is based on an average between 0.4 g/m^2 (normal) and 3 g/m^2 (worst) for roads with an average daily traffic <5000. These silt loading values were taken from the source document: Midwest Research Institute and Parsons Brinckerhoff, Alternative Methods for Determining Emissions for Re-Entrained Road Dust On Transportation Projects, Final Report, December 2008. The escalated assumptions of 9.3 g/m^2 was based on an average of the mean silt loadings of the following industries: Iron and steel production (9.7g/m^2), Concrete batching (12 g/m^2), municipal solid waste landfill (7.4 g/m^2) and quarry (8.2 g/m^2). These silt loading values were taken from the source document: Western Regional Air Partnership (WRAP) (September 2006), WRAP Fugitive Dust Handbook, Countess Environmental, Western Governors' Association, Denver, Colorado 80202; • Since water sprays are envisioned at the transfer point from the plant feed conveyor to the crushing and screening plant, emission factors for the primary crushing of coal were based on high moisture ores (>4% moisture content). No emission factors for high moisture ores were available for screening. As a conservative measure, emission factors for screening were therefore based on low moisture content ores (<4% moisture content);

Specialist	Assumptions and limitations
	• A control efficiency of 90% was attributed to enclosure of the entire crushing and screening plant; • For transport alternatives TA1 and TA3, 70% of the freight was applied to the section of the R29 road going east and 30% of the freight was applied to the section of the R29 road going west.
Noise	• None
Blasting and Vibration	• The proposed surface infrastructure includes a box-cut, stockpile area, plant area, integrated mine residue dump, workshops, change house, administration facilities and associated infrastructure. The project is a greenfields project with no drilling and blasting operations currently active. The anticipated levels of influence estimated in this report are calculated using standard accepted methodology according to international and local regulations. Assumption is made that the predictions are a good estimate with significant safety factors to ensure that expected levels are based on worst case scenarios. These will have to be confirmed with actual measurements once the operation is active. The limitation is that no data is available from this operation for a confirmation of the predicted values as it is a greenfield site with no current blasting activities.
Visual	• No specific national legal requirements for VIAs currently exist in South Africa. However, the assessment of visual impacts are required by implication when the provisions of relevant acts governing environmental management are considered and when certain characteristics of either the receiving environment or the proposed project indicate that visibility and aesthetics are likely to be significant issues and that visual input is required (Oberholzer, 2005); • Due to a lack of visual specialist guidelines within the Mpumalanga or Gauteng Provinces, the “Guidelines for Involving Visual and Aesthetic Specialists in the EIA Process” (Oberholzer, 2005), prepared for the Western Cape Department of Environmental Affairs & Development Planning was used; • All information relating to the proposed project as referred to in this report, inclusive of the proposed infrastructure layout, infrastructure height, mining techniques and sequences, etc., is assumed to be the latest available information. No detailed information about building styles, colours and finishes and lighting types and positioning, etc. were available prior to completion of the assessment, and assumptions, relating to industry standards, have been made regarding these elements, taking industry standard and best practice guidelines into consideration; • Abstract or qualitative aspects of the environment and the intangible value of elements of visual and aesthetic significance are difficult to measure or quantify and as such depend to some degree on subjective judgments. It therefore is necessary to differentiate between aspects that involve a degree of subjective opinion and those that are more objective and quantifiable, as

Specialist	Assumptions and limitations
	outlined in the diagram below (The Landscape Institute and Institute of Environmental Management and Assessment (LI IEMA, 2002); and • The viewsheds resulting from the DEM and as illustrated in this report, indicate the areas from which the proposed project is likely to be visible and does not take local vegetation cover and man-made structures into account. Potential sensitive receptor sites, indicated to fall within the viewsheds have therefore been groundtruthed during the field assessment.
Traffic	• The trip generation for the construction phase is based on the expected staffing numbers and assumptions are made as to the number of trucks that will operate during this phase. • An assumption is made that 10% of those employed will be managers, site foreman and office / admin staff. This is equivalent to 25 persons. Assuming each of these employees use private vehicles, this equates to 25 vehicle trips in the peak hours. The remaining 225 employees are assumed to make use of public transport in the form of taxis. Assuming each taxi trip carries 10 employees, this is equivalent to 23 trips in the peak hours. • An assumption of ten delivery trucks in the peak hours is assumed. • Assumptions are made that the directional split of staff will be similar to the split for office staff in the South African Trip Data Manual. • Office Staff = 36 – All office staff are assumed to have their own private vehicles and drive to work and back. This is a conservative assumption and therefore 36 two (2)-way trips are expected to be made by office staff in the peak hours. • An assumption is made that fifteen (15%) of these trips will be made during the peak hours and this works out to 56 two way trips in the peak hours.
Archaeology (heritage)	• It is possible that this Phase I HIA study may have missed heritage resources in the project area as heritage sites may occur in maize fields or in tall grass or thick clumps of vegetation while others may be located below the surface of the earth and may only be exposed once development commences.
Palaeontology	• The information provided within this report was derived from a detailed site investigation conducted on foot and by vehicle (where appropriate). No fossil materials were observed during the conduct of that survey. However, it was impossible, within the time constraints possible, to inspect all portions of the three project infrastructure areas. It is possible, but unlikely that fossiliferous outcrops may have not been observed. • Additionally, the geological occurrence of fossils within fossiliferous geological units is sporadic and cannot be interpreted with precision or certainty. In order to assess the potential impacts of the project upon the palaeontological heritage of the area assumptions were made concerning both the scope of impact that will result from the construction of the identified mine surface infrastructure elements.

Specialist	Assumptions and limitations
Socio-economic	• It is assumed that information obtained during the interviews provide an honest account of the community and community relationship to the mine. It must be noted, however, that meetings are not statistically representative. • It must be assumed that all the interview reports are based on reflections and personal opinions. provided by those present and may or may not necessarily be a reflection of future conditions. Where possible comments that could be verified were, using other sources. Opinions of the participants have influence over the report. • The study was done with the information available to the specialist at the time of executing the study, within the available time frames and budget. The sources consulted are not exhaustive, and additional information which might strengthen arguments, contradict information in this report and/or identify additional information might exist. However, the specialist did endeavour to take an evidence-based approach in the compilation of this report and did not intentionally exclude information relevant to the assessment.
Economic	• For the financial analysis the calculations are done in constant prices. This is necessary as part of the establishment of the economic viability by first determining the financial viability. • By economic analysis is meant the project is re-evaluated at prices which reflect the relative scarcity of inputs and outputs. The economic analysis follows the analysis of the source and application of productive funds, which is done at market prices. In the economic analysis, prices actually represent opportunity costs and reflect the actual economic value of inputs and outputs. The opportunity cost is the value of the best alternative application of an input or an output of the project. • The market price of land, for example, does not necessarily reflect the opportunity cost of the land. Thus, when a price has to be determined for a piece of agricultural land used for maize farming but on which an airport is planned, the opportunity cost of the land is the discounted net output from the maize. • In some other cases the concept of shadow prices are used to estimate opportunity costs. The whole concept is discussed in a later section • The domestic prices used are based on the current Eskom prices. According to an Eskom press release dated the 5th of June 2015 the average price paid by Eskom is R230.90 per ton, the lowest R168.48 and the most expensive is R428.84 per ton. ***These are Net Prices as Eskom accepts responsibility for the transport cost of the coal***. • A quality component is also applicable in the setting of the price and the age of the mine. The other issues at stake are the position of the mine in relation to the specific Eskom needs and the current age of the mines supplying a specific area. It appears as if the current price negotiation in terms of the Medupi Power Station is heading to a price of around R400 to R450 per ton.

Specialist	Assumptions and limitations
	No reliable data source on price negotiations for the new Kusile power station could be obtained. However, the cash forecast in the scoping report uses R375 per ton. After consideration of all the available information it was decided to use the following three prices as representative of the South African Coal Eskom price: ➢ Pessimistic price – R350 per ton; ➢ Base Price – R375 per ton; and ➢ Optimistic Price R400 per ton • The cost applied in the CBA was provided by the AOL
Financial provision and Closure Plan	• The following assumptions have been made as part of closure planning: ➢ No allowances have been made for money received from sale of equipment, recyclable materials, structures, vehicles or the hiring out of infrastructure in terms of premature closure costs. ➢ Pre-fab structures and any other mobile or temporary infrastructure will be removed from site by removal contractors • The following bio-physical assumptions have been made: ➢ Life of Mine is 14 years (16 years including construction). ➢ Surface disturbance will be minimised due to underground mining.

The impact assessments have assumed that all specialist assessments are essentially correct.

The potable water requirements for the mine for use by employees is approximately 40 Kl/d (~0.55 l/s). The current study and other studies conducted by the author and various others within the area indicate that the Vryheid Formation sandstones/shales are generally not good yielding aquifers and that exploitable quantities are generally only held in fractures. Although the matrix may store significant quantities of water, it can only be tapped if fractures are intersected during drilling. These fractures are generally encountered between 15 and 60 mbs. At depths greater than 60 m the presence of fractures generally decreases with meaningful groundwater yields being extremely rare.

Therefore, if geophysical methods are used to target these fractures the potable requirement of 40 Kl/d could be obtained water supply boreholes.

- Boreholes must be pump tested to determine aquifer properties and sustainable yields. This must be determined by a professional geohydrologist and must not be exceeded..
- Geophysical methods must be used to site boreholes which should be pump tested to determine hydraulic properties and depression cones.
- Boreholes must be sited and drilled so as not to impact on privately owned boreholes

16. Reasoned opinion as to whether the proposed activity should or should not be authorised.

16.1 Reasons why the activity should be authorised or not

In accordance with Section 3(q) of Appendix 3 to the EIA Regulations GN R982, the Environmental Impact Assessment Practitioner (EAP) must provide an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation must be stated.

An impact assessment has been undertaken using qualified specialists, which has incorporated extensive consultation with and participation of interested and affected parties. Applying the hierarchical approach to impact management, alternatives were firstly considered to avoid negative impacts, but where avoidance was not possible, to better mitigate and manage negative impacts. Where impacts were found to be potentially significant, various mitigation measures to manage and monitor the impacts of the project have been proposed. As a final option, offset strategies were considered.

In terms of collectively considering ecological, social and economic impacts it is important to remember that while there might be some trade-offs between the considerations, in South Africa all development must in terms of Section 24 of the Constitution be ecologically sustainable, while economic and social development must be justifiable. There are therefore specific "trade-off" rules that apply. Environmental integrity may never be compromised and the social and economic development must take a certain form and meet certain specific objectives in order for it to be considered justifiable.[79]

The EAP is of opinion that economic benefit will be derived from the proposed project at both local and national level. This is not only applicable to monetary aspects, as the project will allow for the continued employment and job security of the current employees of the mine. This being said, as described above in Part 11.1, a number of “High” negative impacts will transpire during the life span of the project. Impacts of primary concern relate to ecological, visual, and socio-economic as some of the impacts may be irreversible and could lead to irreplaceable loss. Impacts of notable concern, although not obtaining a severity rating of “High” after mitigation, are impacts that may occur on surface- and groundwater, air quality, noise, and wetlands.

Although a number of significant impacts may result from the proposed project, a number of these significant impacts are reversible and may not lead to irreplaceable loss, if the recommended mitigation measures are effectively implemented.

[79] Guideline on need and desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (GN 891 of 20 October 2014);

The following reasoned opinions on whether the project should be authorised or not, were provided by the project specialists:

Table 80: Specialist reasoned opinions

Specialist	Reasoned opinion
Soil, Land use and Land Capability	Based on the findings of this assessment, it is of the specialist's opinion that the proposed development activities can be considered favourably in consideration of the projected economic incentives, provided that the recommended management and mitigation measures of this assessment report are considered and implemented to the satisfaction of the regulating authorities.
Fauna and Flora	Based on the findings of the ecological assessment, it is the opinion of the ecologists that the proposed project be considered favorably. However, all mitigation measures and recommendations presented in this report should be adhered to as to ensure the ecology within the proposed disturbance areas as well as surrounding zone of influence is protected or adequately rehabilitated in order to minimize the deviations from the Present Ecological State.
Hydrology	Based on the findings of this study, it is the opinion of the author that the proposed Leslie 2 project may proceed on condition that all mitigation measures as outlined and discussed in this report be adhered to.
Geohydrology	Based on the findings of the geohydrological assessment, it is the opinion of the author that the proposed project, Leslie 2 Underground Mine, may proceed on condition that all mitigation measures as outlined and discussed in this report be adhered to.
Aquatic and Wetland	Based on the findings of the freshwater ecological assessment, it is the opinion of the ecologists that the proposed mining project be considered favorably. However, all mitigation measures and recommendations presented in this report should be adhered to so as to ensure the ecology within the proposed disturbance areas as well as surrounding zone of influence is protected or adequately rehabilitated in order to minimize the deviations from the Present Ecological State.
Air quality	Based on the information and knowledge available and the findings of the air quality impact assessment, it can be reasoned that by mitigating the atmospheric emissions the impact could be lessened to a manageable low to moderate air quality impact. It is the authors opinion that the proposed Leslie 2 Project may continue if the applicant commits to implementing the mitigation measures recommended in section 5 of the specialist report. These mitigation measures should be improved on, should dustfall- or any ambient air quality monitoring results, during the construction- and operational phase, show exceedences of dustfall or air quality standards.
Noise	A reasoned opinion would be that the impact on the environment, fauna and flora would be significant and permanent. Provided that the farming community and the animals remains on the farms and are not relocated, the opinion would be that a project of this magnitude should not be allowed to continue.

Specialist	Reasoned opinion
Blasting and Vibration	There is no reason to believe that this operation cannot continue if attention is given to the recommendations made.
Visual	It is the opinion of the specialists that this study provides the relevant information required in order to ensure that the best long-term use of the resources on the MRA will be made in support of the principle of sustainable development. The project is regarded as having several high significance impacts on the visual environment, particularly due to the location of the plant and office complex in close vicinity to the busy N17 roadway. Therefore, in order to ensure acceptability of the project from a visual perspective, strict adherence to cogent, well-developed mitigation measures, with particular attention to screening possibilities and efficient ongoing rehabilitation, are to be implemented throughout all phases of the proposed project.
Traffic	This study therefore supports the proposed Leslie Coal mine development from a traffic engineering perspective. This study also recommends that the EIA be supported, as the proposed coal mine has been evaluated to have a medium environmental impact rating.
Archaeology	There is no reason from a heritage point of view why Anglo's proposed Leslie 2 Project with all possible alternatives (haul road, new road to the offices, plant locations and conveyor alignment) cannot proceed after the appropriate mitigation measures outlined for historical remains and for graveyards have been implemented.
Palaeontology	This study has not identified any palaeontological reason to prejudice the development of the Leslie 2 Project as an underground coal mining operation subject to the proposed damage mitigation procedures being enacted.
Socio-economic	There are no fatal flaws to each of the alternatives that were studies as part of this report. However, this study strongly advises against opencast mining methods as the implications on land use after decommissioning will have significant long term implications. Overall, the major trade off in the study was that of agricultural activity vs mining. Mining presents a short-term boost to the local economy which is much needed in South Africa, particularly in rural environments where economic opportunities are limited. However, mining activity is historically disruptive. It will threaten the social stability found in the community, threaten the sensitive environment and it presents a trade-off energy (power) and food security through agriculture. Agricultural activity is far more long term, with sustainable long term economic growth. What it lacks is the high labour intensity and a lesser impact on the local economy. Mitigation measures are costly and require time and efficient and sensitive communication structures. However, given the long viability of the local economy post-closure, it is imperative that the mine is sensitive and aware of its impact on the social, economic and biophysical environment and legacy post closure.
Economic	From an economic point of view the the area will benefit from the project, however, the current farming activities will be negatively impacted upon. The

Specialist	Reasoned opinion
	cattle farming operation of Dr Muller should be able to continue with limited impact possibly due to coal dust from the shaft stockpile and conveyor belt, the buffalo rearing enterprise of Mr Kruger as well as the cattle feedlots will have to be relocated. The continuous noise from the conveyor belt as well as the possibility of dust related problems will in our opinion have a negative impact on the two activities.

Based on the above and the results of the impact assessment, the EAP is of the opinion that the proposed project be allowed to commence, with the condition that the management objectives and management measures as presented in the EIAR/EMPr (including socio-economic related measures in terms of affected parties on the farm portions where infrastructure will be placed), be implemented to effectively manage, prevent, control and / or stop environmental- and socio-economic impacts from occurring.

16.2 Conditions that must be included in the authorisation

16.2.1 Specific conditions to be included into the compilation and approval of the EMPr

Should the DMR grant authorisation for this project, it should be subject to the following conditions:

- The project should remain in full compliance with the requirements of the EMPr and with all regulatory requirements.
- The EMPr should be implemented by qualified environmental personnel who have the competence and credibility to interpret the requirements of the EMPr. Such persons must be issued with a written mandate by Anglo Operations (Pty) Ltd. to provide guidance and instructions to employees and contractors.
- Stakeholder engagement must be maintained during the operational and closure/rehabilitation phases of the project, with the emphasis on the continuing provision of information.

17. Period for which the authorisation is required

The Leslie 2 mining operation is expected to have a lifespan of approximately 16 years (inclusive of the construction period). Therefore, the period for which environmental authorisation is required is at least 16 years (from the date of approval provided by the DMR), keeping in mind that decommissioning will also take place after the 16 year period (construction- and operational phases).

18. Undertaking (confirmation)

The undertaking by the EAP is provided in Section 2 of Part B (Environmental Management Programme) below. This undertaking confirms: the correctness of the information provided in the reports, the inclusion of comments and inputs from stakeholders and I&APs, the inclusion of inputs and recommendations from the specialist reports where relevant and the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

19. Financial Provision

The quantum has been calculated as **R 5,358,611 (including P&G, contingency and VAT)** for the closure of the proposed mining activities at Leslie 2. A breakdown of the costing is contained in Table 81. The physical component of closure contributes R 1,311,539 towards the closure liability, consisting of demolition of the crushing and screening plant and administration structures, as well as fencing off the area. Biophysical costing, consisting of sealing of the shafts/adits/inclines, rehabilitation of access roads and processing waste deposits as well as general surface rehabilitation and post closure maintenance, contributes R 2,494,563 to the closure quantum. Refer to Figure 89 for a comparison of the physical and biophysical closure costs.

Table 81: Summary of the closure cost calculation for Leslie 2

No	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication Factor	Weighting Factor 1	Amount (ZAR)
			Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	Dismantling of screening and crushing plant and related structures (Including overland conveyors and power lines)	m^3	3,219.80	12.98	1	1.1	45,972
2(A)	Demolition of steel buildings and structures	m^2	494.69	180.9	1	1.1	98,438
2(B)	Demolition of reinforced concrete buildings and structures	m^2	89.766	266.6	1	1.1	26,325
3	Rehabilitation of access roads	m^2	21,600	32.37	1	1.1	769,111
5	Demolition of housing and/or administration facilities	m^2	400	361.81	1	1.1	159,196
7	Sealing of shafts, adits and inclines	m^3	18,128	45.00	1	1.1	897,311
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	0.5	457,405.19	1	1.1	251,573
10	General surface rehabilitation	ha	5	100,164.50	1	1.1	550,905
12	Fencing	m	7,810	114.26	1	1.1	981,608

No	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication Factor	Weighting Factor 1	Amount (ZAR)
			Step 4.5	Step 4.3	Step 4.3	Step 4.4	
14	2 to 3 Years of Maintenance and Aftercare	ha	1	23,329.87	1	1.1	25,663
Sub-Total 1							**3,806,102**
1	Preliminary and General	10.5% of Sub-Total 1		**Weighting factor 2 (Step 4.4)**		1.05	399,641
2	Administration and supervision costs	6.0% of Sub-total 1					228,366
3	Engineering drawings and specifications	2.0% of Sub-total 1					76,122
4	Engineering and procurement of specialist work	2.5% of Sub-total 1					95,153
5	Development of a closure plan	2.5% of Sub-total 1					95,153
6	Final groundwater modelling						
Sub-Total 2 (Sub-total 1 plus sum of management and administrative items, 1 to 6 above)							**4,700,536**
7	Contingency 0% of Sub-total 1						-
Sub-Total 3							**4,700,536**
VAT (14%)							658,075
Grand Toal (Sub-Total 3 plus VAT)							**5,358,611**

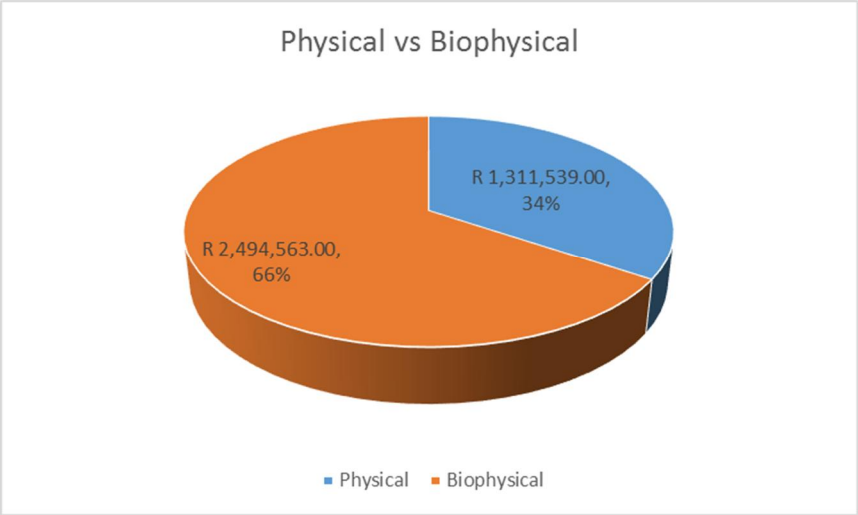

Figure 89: Physical vs biophysical costing

19.1 Explain how the aforesaid amount was derived.

19.1.1 Process followed

The personnel within the Department of Mineral Resources (DMR) Regional Offices are required to review and approve the quantum, that is, the monetary value of the financial provision that has been computed by the holder of a prospecting right, mining right or mining permit during the annual review as being sufficient to cover the environmental liability at that time and at closure of the mine. This guideline document entitled "Guideline document for the evaluation of financial provision made by the mining industry" has been developed to address this need, and is for use by the DMR personnel in the Regional Offices.

The guideline for the calculation of closure cost issued by DMR in 2005 was used to support the calculation of the closure cost quanta.

19.1.2 Tariffs

The tariffs used in the guideline document have been increased to support inflation increases since 2005. Tariffs were increase by 6% per annum based on the inflation levels as documented by the Reserve Bank of South Africa. Refer to Annexure K.

19.2 Confirm that this amount can be provided for from operating expenditure

Refer to Annexure K.

20. Deviations from the approved scoping report and plan of study

20.1 Deviations from the methodology used in determining the significance of potential environmental impacts and risks.

The methodology applied in determining and ranking potential environmental impacts and the significance of potential impacts is described in detail in Section 7.6 of Part A above. Furthermore, this methodology was described in the Final Scoping Report for this project, which was accepted on 16 October 2016. Therefore, no deviation from the methodology as provided in the Scoping Report, has occurred.

20.2 Motivation for the deviation.

Refer to Section 20.1 of Part A, above. No deviation from the methodology used in determining the significance of potential environmental impacts and risks, as provided in the approved Environmental Scoping Report, has occurred.

21. Other information required by the competent Authority

21.1 Compliance with the provisions of section 24(4)(a) and (b) read with section 24(3)(a) and (7) of the National Environmental Management Act (Act 107 of 1998). The EIA report must include the:-

21.1.1 Impact on the socio-economic conditions of any directly affected person.

Table 82: Impacts on socio-economic conditions

Results of investigation, assessment and evaluation of impact on any directly affected person	Reference to where mitigation is reflected
The proposed mine will generate local employment opportunities and skills development opportunities. Employment will contribute to household wealth. Households will spend more money which will stimulate the local economy. This stimulus will generate more wealth and opportunity for the local community during the construction phase. For the middle to high income groups, which are largely the farming community surrounding the town of Devon and Leandra, the implications of the mine are more commercial in nature. The proposed project has created uncertainty about the future viability of farming which has created anxiety amongst farmers. Whilst the mining infrastructure is small, the implications of mining activity as raised by farmers are numerous and include the impact of dust on crop yield, noise, traffic, pollution of underground water and implications for livestock. Social concerns relate to the change in sense of place, the change to social relations as a result of migration towards the area and the burden on infrastructure. Ultimately, both groups, whilst their focus varies, raise important socio-economic impacts that with effective mitigation, can be somewhat controlled. The Land Trade-off Study and Macro Economic Assessment, conducted by Mosaka Economic Consultants (Annexure H14), states that the local agricultural activities will be impacted on if the mine is constructed and operated; however, the Mpumalanga and Gauteng Provinces will benefit considerably when the mine is operational. The following is noteworthy:	Section 7.5 (Part A) and Annexures H13 and H14.

• Poverty alleviation will be supported with 396 net additional direct jobs plus low-income households' receiving an additional R82.87 million annually. • The total employment created in the two provinces is estimated to be around 958 and additional Gross Domestic Product (GDP) of R433.50 million. Should the mining right and environmental authorisation / waste management licence for the project not be granted, the socio-economic opportunities mentioned above may not realise.	

21.1.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.

Table 83: Impacts on national heritage resources

Results of investigation, assessment and evaluation of impact on any national estate	Reference to where mitigation is reflected
The proposed Leslie 2 Project may impact on those heritage resources which are located closest to the footprint of the proposed Leslie 2 Project, namely: • GY03 which are located approximately 85m to the east of the conveyor route. • FC02.1 and FC02.5 are located approximately 180m to the west of the conveyor route. These two structures are part of a complex of structures which constitute FC02.	Section 7.5 (Part A) and Annexure H11.

22. Other matters required in terms of section 24(4)(a) and (b) of the Act.

Section 24(4)(b) of the NEMA (1998) states that the following:

"24(4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment -

(b) must include, with respect to every application for an environmental authorisation and where applicable-

(i) investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;"

An Alternative Assessment Report has been compiled and is attached hereto as Annexure F. The Alternative Assessment Report has been compiled to include the following:

- Brief description of the proposed project.
- A description of the proposed activities to be undertaken.
- A description of the proposed alternatives.
- An assessment of the positive and negative implications of each of the alternatives.

- A description of the method to be followed during the EIA and EMPr Phase, in terms of quantitate assessing the alternatives.

Furthermore, a Risk Assessment Report (attached hereto as Annexure J) has been compiled in support of this EIAR / EMPr document and provides information regarding the potential environmental impacts associated with the proposed activities as well as an assessment of the significance of the potential environmental impacts. Information and an assessment of potential environmental impacts associated with the identified alternatives has also been provided in the Risk Assessment Report.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1. Draft environmental management programme.

1.1 Details of the EAP.

The requirements for the provision of the detail and expertise of the EAP are included in Part A, Section 1.1.

1.2 Description of the Aspects of the Activity.

The requirement to describe the aspects of the activity that are covered by the draft environmental management programme is included in Part A, Section 7.

1.3 Composite Map.

Refer to Figure 87 above as well as Annexure A for a map that superimposes the proposed activity, its associated structures and infrastructures on the environmental sensitivities of the preferred sites, also indicating any areas that should be avoided, including buffers.

1.4 Description of Impact management objectives including management statements.

1.4.1 Determination of closure objectives

In order to guide identification of key biophysical and socio-economic drivers, and aligned to the mine's current EMPR commitments, the following general closure objectives have been formulated:

- To rehabilitate mining-related disturbed areas to a land capability that will support and sustain a predetermined mix of post closure land uses;
- To reinstate a self-sustaining system over the rehabilitated mined and infrastructure areas, requiring minimum maintenance to facilitate a walk away situation;
- To ensure that the plans and actions put in place will meet specific closure-related performance objectives;
- To prevent acid mine drainage;
- To limit decant from the open water bodies, as well as the amount of contaminated water seeping from the underground works;
- To in-fill and slope area to be free draining;

- To remove all surface infrastructure that cannot be beneficially re-used and return the associate disturbed land to the planned final land use;
- To limit adverse effect on local catchment yield.

Physical stability

- To remove and/or stabilise surface infrastructure and unavoidable mining residue which are present on the mine to facilitate the implementation of the planned land use, by:
- Closing, dismantling, removing and disposing of all surface infrastructure that has no beneficial post closure use; and
- Ripping, shaping, and vegetating of access and/or haul roads with no beneficial post-closure use and integrating these into the surrounding surface topography.

Environmental quality

- To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the mine site as well as to sustain catchment yield as far as possible after closure, by:
- Ensuring that the rehabilitated mine site is free-draining with limited recharge to rehabilitated spoils and run-off is routed to local/natural drainage lines as far as possible;
- Cleaning up of the sources of possible surface water contamination still present on the mine site and along the conveyor route (fugitive coal spillages) to protect the downstream receiving environment;
- Removing off-site hazardous material and disposing of it at the closest hazardous waste disposal facility. As removal is an on-going process, no hazardous waste build-up on-site should occur; and
- Limiting dust generation on the rehabilitated mine site that could cause nuisance and/or health effects to surrounding landowners/communities.

Health and safety

- To limit the possible health and safety threats to humans and animals using the rehabilitated mine site as it becomes available, by:
- Demonstrating by means of suitable sampling and analysis that the threshold levels of salts, metals and other potential contaminants over the rehabilitated sites allocated in terms of the land use planning for human habitation are acceptable;
- Removing, for safe disposal, all potential process-related contaminants to ensure that no hazardous waste is present on the respective sites once these have been rehabilitated; and
- Demonstrating through a review of monitoring data that no possible surface and/or groundwater contaminant sources remain on the rehabilitated mine site that could compromise the planned land use and/or pose health and safety threats.

Land capability/land-use

- To re-instate suitable land capabilities over the various portions of the mine site to facilitate the progressive implementation the planned land use/s, by:
- Upfront zoning of the overall mine site and obtaining agreement with stakeholders on this;
- Ensuring that the rehabilitated portions of the mine site are safe and stable in the long-term;
- Cleaning-up and rehabilitating of contaminated soil areas, if applicable; and
- Limiting the possible loss of topsoil by committing the available topsoil to suitable concurrent rehabilitation practices.

Landscape viability

- To create a landscape that is self-sustaining and over time will converge to the desired ecosystem structure, function and composition, by:
- Establishing rehabilitated slopes and drainage lines that will preserve vital resources such as growth medium and nutrients as far as possible;
- Ensuring that drainage lines created on the rehabilitated surfaces will not scour and be sources of head cuts;
- Ensuring that pre-mining drainage lines that formed an integral part of wetland systems are recreated towards reinstating the functionality of these systems;
- Placing suitable growth medium of sufficient depths to sustain croplands (cultivation), pastures and/or indigenous vegetation growth in line with identified end land uses; and
- Ensuring that the growth medium has the required organic content and the potential to sustain microbial activity to ensure infiltration, limit runoff and improved soil stability.

Aesthetic quality

- To leave behind a rehabilitated mine site that, in general, is not only neat and tidy giving an acceptable overall aesthetic appearance, but which in terms of this attribute is also aligned to the respective land use/s, by:
- Tidying-up the rehabilitated mine sites by removing demolition waste, rubble, etc.;
- Shaping and levelling rehabilitated areas to create landforms that emulate the surroundings and would facilitate surface drainage;
- Ensuring that the rehabilitated mine site is free draining and disturbed areas are suitably vegetated where feasible;
- Shaping of haul roads and hard stand (compacted) areas to roughly emulate the surrounding surface topography; and
- Vegetating the above rehabilitated areas, as required, to be aesthetically pleasing.

Biodiversity

- To encourage, where appropriate, the re-establishment of indigenous vegetation on the rehabilitated mine sites such that the ecological integrity of the surrounding terrestrial and aquatic environments are enhanced, by:

- Stabilising disturbed areas to prevent erosion in the short- to medium-term until a suitable vegetation cover has established;
- Establishing viable self-sustaining vegetation communities that will encourage the re-introduction of local fauna, as far as possible; and
- Identifying those aspects/obstacles, once site rehabilitation has been completed, which could inhibit and/or deter animal life from returning to the rehabilitated mine site and removing/correcting where possible.

Social

- To ensure that measures and/or contributions made by the mine towards the long-term socio-economic benefit of both employees and local communities are sustainable, by:
- Ensuring alignment to the Anglo Social Way Management System Standards (April, 2009) which indicate that Anglo will 'pro-actively seek to deliver a lasting net socio-economic benefit to host communities over the project lifestyle and beyond through the operation of our core business in addition to social investment;
- Communicating and negotiating with local communities, farmers and related civil structures on the closure of the mine and the possible land use/s options available for re-instatement post-closure;
- Identifying services/utilities to local farmers and/or the local village that are dependent on the mine that would need to be addressed prior to decommissioning; and
- Transferring appropriate skills to employees and inhabitants of the local community to enable them to sustain alternative post-mining livelihoods.

1.4.2 The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity.

The potential impacts that may result from the Leslie 2 activities have been presented in the Risk Assessment Report (attached hereto as Annexure J). The impacts were identified through the input from various specialists and their resultant specialist reports (attached hereto in Annexure H). The impacts were identified, described, assessed and their significance ranked. Mitigation measures were then put forward to prevent these impacts from occurring, and where they could not be prevented, mitigation measures were put forward to minimise, remedy and / or avoid the impacts.

1.4.3 Potential risk of Acid Mine Drainage

Pyrite (FeS_2) is generally the major sulphide phase within the Vryheid coal seams; it is the most abundant detrital heavy mineral (Poujol, 1999).

Acid mine drainage (AMD) occurs when sulphide minerals, such as pyrite, are exposed to air and water and undergo oxidation. This occurs primarily in coal (and gold) mines. After air contact in the presence of sulphide (mostly pyrite) this water is often acidic, because of sulphide oxidation that forms sulphuric

acid, and cannot be used for any regular uses such as irrigation and requires treatment before discharge. The production of AMD depends on the rate of pyrite/sulphide oxidation, the presence of acidophilic bacteria and the influence of carbonate minerals in the host rock. Moreover, upon infiltration by rainwater, mine spoil heaps leach highly acidic acid mine drainage that mobilizes toxic metal species and contaminates groundwaters. AMD has a pH of about 2 and a total dissolved solids (TDS) in the order of 4000- 5000 mg/l. Acidification has several negative consequences and most notably includes the solubilisation of a variety of trace metals and metalloids in toxic concentrations. Sulphate is also present at unacceptably high concentrations. As AMD has the potential to impact significantly on surface and groundwater quality, it is necessary to quantify the potential that waste rock has to generate AMD. This is typically done through geochemical characterisation assays.

Acidic water has been found associated with many mine wastes including underground flows, mine decant, wastes and ore stockpiles. During the oxidation process of sulphide ores, the sulphidic component (S_2^-) in pyrite is oxidised to sulphate (SO_4^{2-}); acidity (H^+) is generated in the process and ferrous iron (Fe^{2+}) ions are released. The following reaction steps show the general accepted sequence of pyrite oxidation (Stumm and Morgan, 1996):

1 Acidity (H^+), Fe^{2+} and SO_4 are released into the water when the mineral FeS_2 is exposed to water and oxygen:

$$FeS_2(s)+3.5O_2+H_2O \rightarrow Fe^{2+} + 2SO_4^{-2} + 2H^+$$

2 The highly soluble Fe^{2+} species oxidise to relatively insoluble Fe^{3+} in the presence of oxygen – the reaction is slow but is increased by microbial activity:

$$Fe^{2+}+0.25O_2+H^+ \rightarrow Fe^{3+} + 0.5H_2O$$

3 Fe^{3+} is then hydrolysed by water (at pH >3) to form the insoluble precipitate ferrihydrate $Fe(OH)_3(s)$ (also known as yellow-boy) and more acidity:

$$Fe^{3+}+3H_2O \rightarrow FeOH_3(s) + 3H^+$$

4. In addition to reacting directly with oxygen, FeS_2 may also be oxidised by dissolved Fe^{3+} to produce additional Fe^{2+} and acidity:

$$FeS_2(s)+14Fe^{3+} \rightarrow 15Fe^{2+} + 2SO_4^{2-} +16H^+$$

Reaction 4 uses up all available Fe^{3+} and the reaction may cease unless more Fe^{3+} is made available (Appelo and Postma, 1999). Reaction 2, the re-oxidation of Fe^{2+}, can sustain the pyrite oxidation cycle (Nordstrom and Alpers, 1999). The rate determining step is the oxidation of Fe^{2+} to Fe^{3+} (reaction 2), usually catalysed by autotrophic bacteria.

5. The overall reaction as given by Nordstrom and Alpers (1999) is:

$$FeS_2(s)+3.75O2 + 3.5H2O \rightarrow Fe(OH)_2(s) + 2SO_4^{2-} +4H^+$$

Acidity (H^+), Fe and SO_4^{2-} are the end products of the above reactions. Reaction (1) is an abiotic process occurring at a pH >4.5 due to spontaneous oxidation of the pyrite. Process (2) is the transformation of Fe^{2+} to Fe^{3+}. This is an abiotic process when pH is >4.5, but slows down and becomes biotic at pH <4.5. At a pH below 2.5 the biotic process is most prominent. Reaction (3) produces ferric hydroxide (yellow boy), and further lowers the acidity by releasing protons (H^+). The Fe^{3+} oxidises the pyrite in reaction 4 even when oxygen in absent.

Process (2) is the rate limiting process in this mechanism. This process requires oxygen, therefore, the prevention of oxygen ingress and the creation of reducing conditions within the workings is crucial to slow down the oxidation of pyrite and the resulting low pH conditions. However, if the reaction has proceeded past reaction 2 to where Fe3+ is produced oxygen is no longer required for the reaction to continue. Fe3+ will continue to oxidise the pyrite releasing Fe, SO4 and acidity until all the pyrite, or other sulphidic mineral, has been oxidised.

The contaminant generation potential is pronounced where the source minerals of contaminants are in direct contact with water and oxygen underground. Within slimes/tailings materials these reactive minerals are exposed to water and oxygen. Sulphides are the main minerals which react and contribute to the formation of AMD. Mining sections that are not in contact with groundwater flow paths i.e. flooded or stagnant sections are unlikely to contribute to AMD formation. AMD formation may be enhanced and continue at high rates if there are active flow paths through sections. Where water is flowing through moist sections, ideal conditions for sulphide mineral oxidation exist.

Many sulphide ores have a mixture of sulphide minerals such as pyrrhotite (FeS), arsenopyrite (FeAsS), chalcopyrite ($CuFeS_2$), galena (PbS), cobaltite (CoAsS), gersdorffite (NiAsS) and millerite (NiS). If pyrite is dominant it initiates acid formation resulting in leaching of metal sulphides and oxides. The result of AMD is therefore a mixture of very acidic pH, high SO_4 and soluble and precipitated Fe including toxic heavy or trace metals, metalloids and/or radionuclides in solution (Nordstrom and Alpers, 1999). Sulphidic waste rock dumps and tailings dams are proposed to be the major sources of AMD. This is due to their sheer volume, porosity and surface to volume ratios increased by mining and blasting.

In general, mine residue deposits are considered the major sources of AMD due to their great surface area and surface to volume ratio of the material. AMD development in these wastes is influenced by the properties of the waste material and complex weathering reactions (Lottermoser, 2003). Surface mine wastes usually contain perched aquifers with subsequent saturated and unsaturated zones well above the underlying bedrock. The dynamics within these waste piles generally result in the formation of AMD if sulphidic minerals are present. The flow of water is influenced by the physical properties of the waste material. Precipitation together with oxygen percolates through the unsaturated zone filling small pores and covering particle surfaces. Where large rock fragments are present, a significant volume of interstitial pores are created. In the saturated zone, water movement is channelled through

voids, channels and conduits. Consequently, the hydraulic properties are influenced by the dump structure and size of fragments (Lottermoser, 2003).

Wetting and drying cycles control the drainage of waters from these sulphidic mining wastes. A simplified model by which drainage is described by the initial wetting through meteoric water followed by run-off, drainage and evaporation that result in the formation of secondary minerals, is shown in Figure 90. Intense wetting of these minerals will result in dissolution releasing acidity and metals into solution.

Perkins *et al*. (1997) described the wetting-drying cycle and the subsequent leaching of waste to consist of four sequential stages:

1. Sulphide oxidation and destruction followed by the formation of secondary minerals.
2. Precipitation percolating into the dump and seasonal run-off resulting in the weathering of minerals.
3. Drainage of water from the dump towards underlying aquifers especially if uncapped or unlined, the lining has been breached or if it is permeable at its base.
4. Evaporation of pore water again resulting in the formation of secondary minerals.

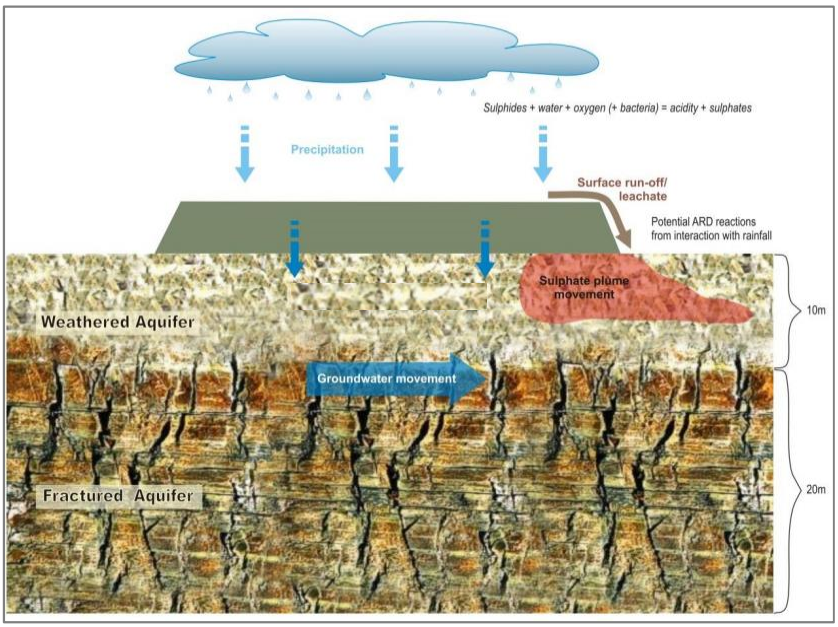

Figure 90:Simplified dynamics of AMD formation in mine residue deposits (modified from Perkins et. al., 1997)

Underground mining takes place when the coal seams are too deep to be able to afford to remove the overburden. Typically, this occurs when the coal seam is >40 m deep. The deposit is mined by extracting square “rooms” about 10 m wide and leaving behind pillars to hold up the roof. The pillars also represent a large surface area, and sulphur compounds in the coal can be slowly oxidized and hydrated by water as the compartment/s fill up with water, and so give rise to AMD. Fortunately mines

in the Highveld coalfields are below the local groundwater level, and once the mines are abandoned and fill up with water, air cannot reach the coal and acid production stops.

The generation, release, mobility and attenuation of AMS are complex processes governed by a combination of physical, chemical and biological factors. Whether it ultimately enters the environment depends largely on the characteristics of the sources, pathways and receptors involved. A generalised conceptual model of sources, pathways and receiving environments is shown in Figure 91. The sources include the mine and process wastes and mine and process facilities that contain reactive sulphide and potentially neutralising minerals involved in mitigation of acidity. The characteristics and relative abundance of these sulphide minerals, which play a critical role in determining the nature of the discharge being generated, may vary as a function of commodity and ore deposit type, type of mining and waste disposal strategy. The pathways and transport mechanisms are related to climate and seasonal effects and its hydraulic characteristics. The receptors (i.e., the receiving environment) may also alter the nature of the mine drainage. Examples of receiving environments include groundwater, surface water and wetlands. Al of these receiving environments can alter the original characteristics of the mine discharge through a combination of physical mixing, chemical and biological reaction.

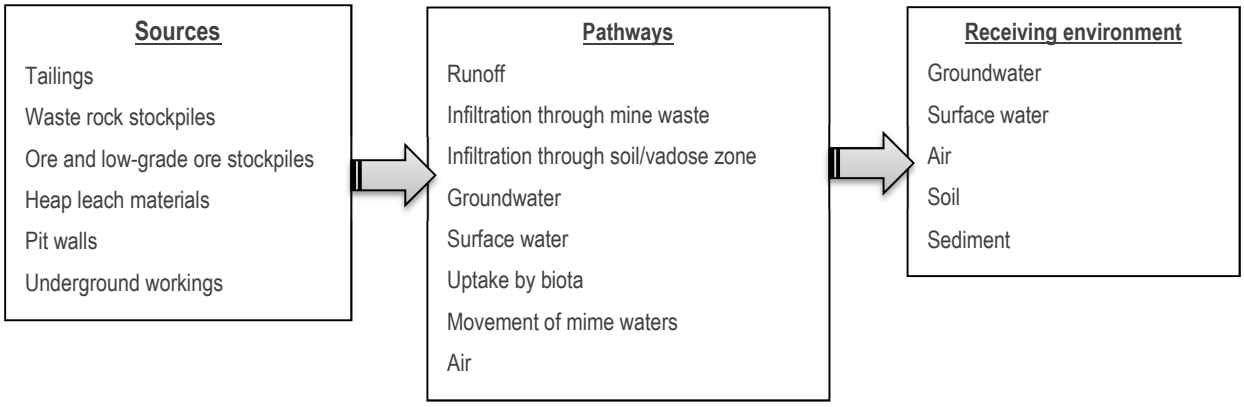

Figure 91: Generalised conceptual model of sources, pathways and receiving environment at a mine or processing site

AMD when generated is very difficult and costly to remediate and once the process has succeeded past reaction 2 and has precipitated Fe^{3+}, oxygen is no longer the rate limiting step since Fe^{3+} can chemically oxidise FeS_2 in the absence of oxygen - the AMD reaction sequence will therefore continue until all the FeS_2 has been oxidised. It is therefore important to mitigate and have effective management measures in place to control or prevent AMD generation at the source.

1.4.4 Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Refer to Section 1.4.3 above.

1.4.5 Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Refer to Section 1.4.3 above as well as Section 7.5 (Part A)

1.4.6 Measures that will be put in place to remedy any residual or cumulative impacts that may result from acid mine drainage

Refer to Section 1.4.3 above and Part B; Section 7.5 (Part A) of this EIAR / EMPr. Refer also to Annexure J for the Risk Assessment Report.

1.4.7 Volumes and rate of water use required for the mining, trenching or bulk sampling operation

Refer to Annexure H3 and Section 4 (Part A) of this EIAR / EMPr.

1.4.8 Has a water use licence been applied for

A water use licence has not yet been applied for.

1.4.9 Impacts to be mitigated in their respective phases.

Refer to the full risk assessment and mitigation measures table provided in Section 7.5 (Part A) above.

1.5 Impact Management Outcomes.

Refer to the full risk assessment and mitigation measures table provided in Section 7.5 (Part A) above.

1.6 Impact Management Actions

Refer to the full risk assessment and mitigation measures table provided in Section 7.5 (Part A) above.

1.7 Financial Provision

1.7.1 Describe the closure objectives and the extent to which they have been aligned with the baseline environment described under Regulation 22(2)(d) as described in Section 7.4.1

Table 84: The alignment of Closure objectives to the baseline environment[80]

Closure Objective	Alignment with baseline environment
To rehabilitate mining-related disturbed areas to a land capability that will support and sustain a predetermined mix of post closure land uses.	During the rehabilitation phase, the identified soils within the project area should be sequentially replaced to mimic the current (pre-mining) conditions which will enable re-establishment of the conditions,. Ultimately, the overarching aim for land use related closure is that the Leslie 2 site will contribute to a sustainable situation once mining has ceased in the region.To achieve this land uses that will be viable in the long run must where possible be progressively realised throughout the remaining operational life of the mine. The Land Use Plan (LUP) and associated development strategies must therefore be reviewed over time to align to changes in the receiving biophysical environment, as well as policy changes at national level, planning requirements at local levels, shifts in mine planning and closure focus by the applicant and changing socio-economic conditions in the area. Furthermore, the establishment of a regional land use planning strategy supported by the local and district municpalities as well as all major mines should be persued, to ensure that all role players strive towards an aligned long-term use vision for the region.
To reinstate a self-sustaining system over the rehabilitated mined and infrastructure areas, requiring minimum maintenance to facilitate a walk away situation.	
To ensure that the plans and actions put in place will meet specific closure-related performance objectives.	
To prevent acid mine drainage.	
To in-fill and slope area to be free draining	
To remove all surface infrastructure that cannot be beneficially re-used and return the associate disturbed land to the planned final land use.	
To limit adverse effect on local catchment yield.	

1.7.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowners and interested and affected parties.

This EIAR / EMPr has been made available to the public for review for a period thirty (30) days. The public are also encouraged to comment on sections of this report (with specific reference to the closure objectives as presented in Section 1.7.1 above), any aspect of the proposed project and raise any concerns and / or issues they may have. Any comments, concerns and / or issues will be addressed and responded to and will be taken into consideration in finalising this EIAR / EMPr.

1.7.3 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure.

A rehabilitated plan has been compiled and is included in Annexure K.

1.7.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The rehabilitation plan has been compiled taking the closure objectives into account. The annual rehabilitation plan is included in Annexure K along with the Decommissioning- and Closure Plan.

1.7.5 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

Refer to Section 19 (Part A) of this EIAR / EMPr and Annexure K.

1.7.6 Confirm that the financial provision will be provided as determined.

The financial provision as determined above will be provided.

1.8 Mechanisms for monitoring compliance with and performance assessments against the environmental management programme.

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

- Monitoring of Impact Management Actions.
- Monitoring and reporting frequency.
- Responsible persons.
- Time period for implementing impact management actions.
- Mechanism for monitoring compliance.

Table 85: Monitoring programmes and compliance thereto

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES[81]	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Mining and related activities	Surface water may become impacted upon as result of mining and related activities.	Implement a surface water monitoring programme	The Environmental Manager is to ensure that surface water monitoring and GN704 Audits are taking place. The resultant monitoring reports and audit reports need to be submitted to the DWS and kept on record.	Surface water quality monitoring to be conducted on a monthly basis. The reports will be submitted to the DWS on a quarterly basis, unless stated otherwise in a WUL.
		GN704 Audits are to be conducted to evaluate compliance thereto.		Gn704 Audits to be conducted bi-ennially and submitted to DWS.

[81] Refer to detailed impacts included in relevant sections of this EIAR / EMPr.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES[81]	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Mining and related activities	Groundwater may become impacted upon as result of mining and related activities. Furthermore, impacts on surrounding groundwater users may occur as a result of abstraction activities undertaken.	Implementing a groundwater monitoring programme to determine if there are any impacts on groundwater quantity and quality.	The Environmental Manager is to ensure that groundwater monitoring is taking place. The resultant groundwater monitoring reports need to be submitted to the DWS and kept on record.	Groundwater quality and level monitoring to be conducted on at least a quarterly basis. The reports will be submitted to the DWS on a quarterly basis, unless stated otherwise in WUL.
Activities that may result in the generation of waste.	Waste will be generated at on-site.	A waste monitoring programme is to be developed and implemented as per Regulation GNR 634 of 23 August 2013 under the NEM:WA (2008). Sub-regulation 10 of GNR 634 requires the following: 1) Waste generators must keep accurate and up to date records of the management of the waste they generate, which records must reflect-	The Environmental Manager is to ensure that all departments at the mine are keeping accurate and up to date records of the waste generated. The Environmental Manager will ensure that all waste reports are combined and kept on record.	Internal audits will be conducted on compliance with waste-related legislation.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES[81]	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		a) the classification of the wastes. b) the quantity of each waste generated, expressed in tons or cubic metres per month. c) the quantities of each waste that has either been re-used, recycled, recovered, treated or disposed of. d) by whom the waste was managed. 2) The records contemplated above must be- a) retained for a period of at least five (5) years. made available to the Department upon request.		
Mining and related activities.	Potential environmental impacts resulting from the non-compliance with legislation.	Environmental legal compliance audits are to be conducted to ensure compliance against all applicable environmental legislation and policies.	The Environmental Manager is to ensure that the Environmental Legal Compliance audit is conducted by an independent and suitably qualified individual.	The Environmental Legal Compliance audit is to be conducted on a biennial basis (unless otherwise instructed by the DMR), kept on record and submitted to the DMR.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES[81]	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		Environmental Audits on the EMPr compliance (as per the EIA Regulations, 2014 (or amendments thereto) are to be conducted.	The Environmental Manager is to ensure that the Environmental audits are conducted by an independent and suitably qualified individual.	The Environmental audit is to be conducted on a biennial basis (unless otherwise instructed by the DMR), kept on record and submitted to the DMR.
Mining and related activities	Dust may be generated as a result of mining and related activities conducted.	A dust fallout and air quality monitoring plan will be implemented throughout the Life of Mine in order to determine potential impacts and sources of dust.	The Environmental Manager is to ensure that the dust fallout and air quality monitoring is conducted by a suitably qualified individual.	The dust fallout and air quality monitoring reports are to be submitted to the DMR on at least a bi-annual basis (unless otherwise instructed).
	Mining and related activities, use of vehicles on roads, crushing etc. generate noise.	Regular environmental noise measurements should be conducted to ensure that the affected communities are not exposed to adverse noise levels during the day and night.	The Environmental Manager is to ensure that noise and blast monitoring is conducted by a suitably qualified individual.	Frequency of monitoring could be quarterly during construction, moving the frequency to bi-annually during normal operations
	Blasting activities may impact on structures and I&APs in the surrounding area.	A monitoring programme for recording blasting operations is recommended. This process will be mainly for the development of the box-cut. The following elements should be part of such a monitoring program:		Blast monitoring to be conducted monthly during the box-cut development.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES[81]	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		• Ground vibration and air blast results • Blast Information summary • Meteorological information at time of the blast • Video Recording of the blast • Fly rock observations		
Mining and related activities	Mining and related activities, use of vehicles on roads, crushing and placement of infrastructure may impact on the visual character of the area, soil etc..	It is recommended that a visual monitoring programme, to ensure that mitigation measures regarding visual impacts are implemented and maintained, be designed for implementation throughout all development phases.	The Environmental Manager is to ensure that visual monitoring is conducted by a suitably qualified individual	Vegetation must be monitored annually
		In addition, an annual soil contamination assessment can be carried out to monitor soil quality down-gradient of the potentially contaminating facilities	The Environmental Manager is to ensure that soil contamination monitoring is conducted by a suitably qualified individual	At least bi-annually, unless otherwise instructed by the DMR or other competent authority.
Decommissioning and rehabilitation activities.	Impacts such as soil erosion, deterioration of vegetation and dust may result in the event that the	The rehabilitation monitoring programme (including floral monitoring programme) will be implemented to ensure that the	The Environmental Manager will ensure that the rehabilitation monitoring programme is being implemented, the monitoring	Monitoring of the rehabilitation success will take place for at least 5 years and will include corrective follow-up action.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES[81]	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
	rehabilitation techniques were incorrectly implemented	rehabilitation techniques that were implemented are sufficient and that no significant impact (soil erosion, dust, weed and invasive plant species establishment) are occurring on the rehabilitated areas.	techniques were implemented correctly and that no impacts occurring on the rehabilitated areas.	The rehabilitation monitoring reports will be submitted to the DMR on an annual basis during the Operational and Decommissioning and Post-closure phases, unless otherwise stated by the Department.

1.9 Indicate the frequency of the submission of the performance assessment report.

Unless otherwise instructed by the Competent Authority (in this case, the DMR) or as a condition to the authorisation / EMPr approval, environmental compliance audits on the EMPr will be undertaken on a biennial basis (every second year), and the resultant audit reports will be submitted to the DMR. The auditing process, as well as report format will comply with the requirements as contained in the EIA Regulations, GN R982, dated December 2014.

1.10 Environmental Awareness Plan.

1.10.1 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

Formal training will be provided to all employees regarding the hazards of the duties to be performed to both their health as well as the surrounding environment. It is the responsibility of the Mine Manager and the Health and safety officer to ensure that adequate training is provided to all employees. It is also the responsibility of the relevant Heads of Departments to identify the need for further training. As part of the mandatory training provided to all employees and contractors, environmental awareness training will be provided, as described in Section 1.10.2 below.

1.10.2 Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.

The following Environmental Awareness Training will be implemented by the applicant in order to inform employees and contractors of the environmental risk that may result from their work, or the risk of their interaction with the sensitive environment. The training will be conducted as part of the induction process for all new employees (including contractors) that will perform work in terms of the proposed activities. Proof of all training provided must be kept on-site.

The Environmental Awareness Training will, as a minimum cover the following topics:

- Air Quality
    - Activities that may result or mitigate impact on air quality; speeding on roads, covering of haul trucks etc.
    - Negative impacts on the receiving environment if mitigation measures are not implemented.
- Surface and groundwater
    - Risks to surface and groundwater, e.g. fuel and chemical handling and further risks of erosion or damage to riparian vegetation.
    - How incidents should be reported, and emergency requirements.
    - The importance of storm water control, maintenance of pollution control infrastructure.

  - The importance to reuse water and to prevent spillages.
- Cultural Heritage
  - To respect all cultures and believes.
  - To remain within working areas and not to enter or interfere with any cultural heritage.
  - How to report any sightings as identified during operation activities (e.g. fossils).
- Fauna
  - Overview of the fauna found on site and the uniqueness thereof.
  - Mitigation measures that all contractors and employees need to abide by.
  - No contractor or personnel allowed to catch or kill any species, and how any sightings should be reported if further actions are required (e.g. to catch and release).
- Flora
  - Overview of the flora diversity on site, and the rare and endangered nature thereof.
  - Measures taken by the mine to protect species.
  - No contractor or personnel allowed to remove, harvest or destroy any flora species unless clearly instructed based on the construction and operational plans.
- Waste management
  - The correct segregation of general and hazardous waste.
  - Do's and don'ts with respect to waste disposal.
  - Measures to avoid waste generation and to participate in waste minimisation/reduction strategies.
- Traffic
  - Abide by traffic rules, no speeding allowed.
  - To stay on designated roads (and not to drive on areas that are not fit and designed for this purpose).
  - To be aware of the fauna species and to be on the lookout and avoid collisions.
- Natural Resource Consumption
  - Minimise unnecessary use of energy by making use of energy saving devices, switching off non-essential appliances etc.
  - Optimise utilisation of mining and plant equipment, travelling routes etc.
- Emergency Preparedness and Response
  - Designated smoking areas.
  - How to report any emergency or incident.
  - How to respond when emergency alarm goes off.
- General rules and conduct
  - Respect for the sensitive environment.
  - Do not litter.
  - HIV/AIDS awareness.
  - Respect for each other and for different cultures.
  - Safety and health requirements.

1.11 Specific information required by the Competent Authority.

The information, as presented in Table 86 below, will be required by the competent authority.

Table 86: Monitoring information required by the competent authority

Information	Frequency of submission
Quantum of Financial Provision	Annually
Annual Rehabilitation Plan	Annually
Environmental Audit Report on approved EIAR / EMPr and other environmental authorisations	Biennially (every second year) or as per auditing timeframe indicated in authorisation(s)
Legal Compliance Audit Report	Biennially (every second year)
Surface Water Monitoring Reports	Monthly
Groundwater Monitoring Reports	Quarterly
Fall-out Dust Monitoring Reports	Bi-annual
GN 704 Audit Report	Biennially (every second year)[82]
Rehabilitation Monitoring Report	Annually (during Decommissioning / Closure Phase)
Soil contamination assessment / monitoring	Bi-annual
Visual monitoring	Annually
Noise	Frequency of monitoring could be quarterly during construction, moving the frequency to bi-annually during normal operations
Blasting and Vibration	At least monthly during box-cut development

[82] Also to be submitted to DWS

2. Undertaking

The EAP (represented by WILDA ELIZABETH MEYER), herewith confirms

(a) the correctness of the information provided in the reports ☑
(b) the inclusion of comments and inputs from stakeholders and I&APs; ☑
(c) the inclusion of inputs and recommendations from the specialist reports where relevant; ☑ and
(d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed. ☑

_____

Signature of EAP representative

Date: 02 /02/2017

I CERTIFY that the Deponent acknowledged that she knows and understands the contents of this affidavit which was signed and sworn to before me at PRETORIA on this the ___ day of _____-_____ 2017, by the Deponent who admitted and declared that she understands the content of this declaration, the content thereof is true and correct, that she has no objection to taking the oath and that she considers the oath binding on her conscience, the Regulations contained in Government Notice No R1258 dated 21 July 1972, as amended, having been complied with.

Refer to hard copy

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Commissioner of Oaths

- END-