APPENDIX 9(A)

Impact Significance Assessments Conducted by Specialists

This Appendix provides the comprehensive Environmental Impact Assessments conducted by the different Specialists and/or EAP for the current and new activities at HERNIC.

Impact and Risk Significance Tables were compiled in accordance with the table format provided in the DMR table with a few adjustments for ease of a presentable and auditable Environmental Management Plan.

The Activity, Aspects Affected and Potential Impact are relayed in that order in the Table heading of each Impact and Risk Significance Table.

The Phase in which the impact is anticipated is dealt with in the different sections below:

- Construction Phase Section 9.1
- Operational Phase Section 9.2
- Decommissioning and Closure Phase Section 9.3
- Post Closure Phase Section 9.4

The Significance of the Impact was determined if not mitigated and is relayed as **BEFORE** management. The Mitigation Type is presented as Management Measure(s) where after the Significance of the Impact if mitigated was again determined and is relayed as Significance **AFTER** management.

9.1 CONSTRUCTION PHASE IMPACT AND RISK SIGNIFICANCE ASSESSMENT

The Construction Phase Impact and Risk Significance Assessment was done only for the new Activities at HERNIC, as this phase is not applicable to the current Activities at HERNIC. Impact and Risk Significance Tables for each Environmental Component considered are provided below in Tables 9.1(a) - (p).

9.2 OPERATIONAL PHASE IMPACT AND RISK SIGNIFICANCE ASSESSMENT

The Operational Phase Impact and Risk Significance Assessment was done for the current and new Activities at HERNIC. Impact and Risk Significance Tables for each Environmental Component considered are provided below in Table 9.2(a) – (p).

9.3 DECOMMISSIONING AND CLOSURE PHASE IMPACT AND RISK SIGNIFICANCE ASSESSMENT

The Decommissioning and Closure Phase Impact and Risk Significance Assessment was done for the current and new Activities at HERNIC. Impact and Risk Significance Tables for each Environmental Component considered are provided below in Table 9.3(a) – (p).

9.4 POST CLOSURE PHASE IMPACT AND RISK SIGNIFICANCE ASSESSMENT

The Post Closure Phase Impact and Risk Significance Assessment was done for the current and new Activities at HERNIC. Impact and Risk Significance Tables for each Environmental Component considered are provided below in Table 9.4(a) - (p).



Table 9.1(a): Socio- Cultural/Economic Construction Phase Impact and Risk Significance Table

ACTIVITY: New Proposed Activities - ASPECT: Economic Efficiency - IMPACT DESCRIPTION: Local job creation											
	Magnitude	Duration	Scale	Consequence	nce Probability SIGNIFICANCE +/- Com						
Impact BEFORE Management	Minor +	Short Term	Site	Low	Possible	Low	+	High			
Management Measures					Time Period f	or Implementation	Comp	liance with Standards			
Measure 1: Utilise local contractor			Short Term		None						
Impact AFTER Management	Minor+	Short Term	Site	Low	Definite	Medium	+	High			

ACTIVITY: New Proposed Activities - ASPECT: Social Demographic Processes - IMPACT DESCRIPTION: Project-induced in-migration											
	Magnitude	Duration	Scale	Consequence	Probability	Confidence					
Impact BEFORE Management	Minor-	Short Term	Site	Low	Possible	Low	+	Medium			
Management Measures					Time Period f	or Implementation	Comp	+/- Confidence + Medium Compliance with Standards None + Medium			
Measure 1: Avoid recruiting dire settlement.	Short Term			None							
Impact AFTER Management	Minor-	Short Term	Site	Low	Possible	Low	+	Medium			



Table 9.1(b): Heritage Construction Phase Impact and Risk Significance Table

No Significant Heritage Related Impacts identified/expected during the Construction Phase.



Table 9.1(c): Blasting and Vibration Construction Phase Impact and Risk Significance Table

No Significant Blasting and Vibration Related Impacts identified/expected during the Construction Phase.



Table 9.1(d): Traffic Aspects Construction Phase Impact and Risk Significance Table

No Significant Traffic Related Impacts identified/expected during the Construction Phase.



 Table 9.1(e): Topography Construction Phase Impact and Risk Significance Table

Activity: Tailings Storage Facility (TSF) - Aspect - Southern Expansion of the TSF - Change in Morphology (uneven surfaces) due to expansion activities										
	Magnitude	Duration	Scale	Consequence	Probability	+/-	Confidence			
Impact BEFORE Management	Minor	Short Term	Site	Low	Possible	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
					I lille I el lou loi li	inprementation	compnane	e with Standarus		
Measure 1: Limit expansion to footp	orint area				Constructio	on Phase	Design	Specifications		



Table 9.1(f): Soils and Land Capability Construction Phase Impact and Risk Significance Table

ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps - ASPECT: Reduction of Run-off to Natural Resource IMPACT CATEGORY: Soil Distribution, Soil Pollution - IMPACT DESCRIPTION: 1. Loss of Soil Distribution (depth/horizons) during excavation. 2. Soil Contamination due to seepage of 'dirty' water below canal											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	High			
Management Measures				Time Period for Implementation Compliance with Standards							
Measure 1: Excavate <i>in-situ</i> 'topsoil during development/expansion of appropriate facility) or re-process encountered/excavated in these are adjacent to the canals (entire length developed areas; Transport excess ex Undeveloped natural areas: Transp stockpiles; Establish a 'topsoil' bern length on the downslope side).Re-v stockpiles.	' or overburde canals. Develo waste' or 'nor eas; Establish n on the down ccavated 'dirty' ort excavated n from excavate egetate (locall	n 'waste' or non-wa ped infrastructure h-waste' overburder a 'topsoil' berm fro islope side); Do not soil (polluted) to 'di 'clean' soil (non-p ed soil material adj y indigenous grasse	During development/expansion process Chamber of Mines Guide								
Measure 2: 'Dirty' polluted areas: Co water. 'Clean' non-polluted areas: Co walls of the canal to achieve a relative	Construct cana nstruct an ear ely impermeab	ls from concrete to th canal; Compact th le compacted-'re-mo	seepage of 'dirty' soil base and side- il seal' layer.	During development/expansion process Chamber of Mines Guid			of Mines Guidelines				
Impact AFTER Management	Moderate	Medium Term	Medium	Possible (soil contamination)	Medium	-	High				



ACTIVITIES: Development of the Morula PCD, Expansion of Storm Water PCD No. 1, Development of Storm Water PCD No. 2, Development of Storm Water PCD No. 3, Development of Storm Water PCD No. 4, Expansion of the OB Plant Process Water Dam, Expansion of the Plant Process Water Dam, Expansion of the CRP Process Water Dam - ASPECTS: Clearance of Vegetation - IMPACT CATEGORY: Soil Distribution, Soil Pollution - IMPACT DESCRIPTION: 1. Loss of Soil Distribution (depth/horizons) during excavation. 2. Soil Contamination due to Seepage of 'dirty' water below dam and through walls											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	High			
Management Measures				Time Period for	riod for Implementation Compliance with Standards						
Measure 1: Strip <i>in-situ</i> 'topsoils' du stripped 'dirty' soil (polluted) to natural areas): Transport excess strip Re-vegetate (locally indigenous grass	ring developme 'dirty' 'topsoil oped 'clean' soi ses) the 'topsoil	ent/expansion. Pollu 'stockpiles.Non-Pol l (non-polluted) to 'c 'stockpiles.	: Transport excess eas (undeveloped soil' stockpiles.	During developmen	g development/expansion process Chamber of Mines Guidelines						
Measure 2: Compact vertic soil bas moulded' 'seal' layer; Build impound Place appropriate impermeable men base and walls. Construct an earth ' with its adjacent soil berm (entire le downslope (not upslope) side-walls 're-moulded' soil 'seal' layer. Amel indigenous grasses) the side-slopes of	se of dam to c ment walls fro brane liner se dirty' water in ngth on the do of the drains t iorate soils (s of dam walls wh	reate a relatively in m compacted-'re-me al overlying compac tercept drain downs wnslope side); Comp o achieve a relativel ample and fertilise here appropriate, as	ertic soil material; oulded' vertic soil ach dam, together ertic soil base and neable compacted- e-vegetate (locally e drain berms.	During developmen	t/expansion process	Chamber o	of Mines Guidelines				
Impact AFTER Management	Moderate	Medium Term	Medium	Possible (soil contamination)	Medium	-	High				



ACTIVITY: Expansion of the OB Plant Tailings Storage Facility (TSF) - ASPECTS: Clearance of Vegetation, Stabilisation of Facility Walls, Disposal to TSF - IMPACT CATEGORY: Soil Distribution, Soil Contamination - IMPACT DESCRIPTION: 1. Loss of Soil Distribution (depth/horizons) during excavation of TSF, and construction of paddocks/walls and 'clean' water diversion drains/berms. 2. Soil Contamination due to Seepage of 'dirty' water below TSF and through walls in the future or due to over-topping

	Magnitude	Duration	Scale	Consequence	e Probability SIGNIFICANCE		+/-	Confidence	
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	High	
Management Measures			-		Time Period for Implementation Compliance with Standard				
Measure 1: Strip <i>in-situ</i> vertic 'tops excess excavated 'clean' soil (non-po expansion and drain occurs in un excavated 'dirty' soil (polluted) to diversion drain surrounding the ups (entire length on the downslope sid side-wall of the drain to achieve a rel Re-vegetate (locally indigenous grass	soils' during ex lluted) to 'clear developed nat 'dirty' 'topsoil slope sections o e); Compact th atively imperm ses) the 'topsoil	pansion of TSF. Non ' 'topsoil' stockpiles ural areas). Pollute ' stockpiles. Constr of the TSF, together e vertic soil base an neable compacted-'rea ' stockpiles and the	During developmer	nt/expansion process	Chamber o	of Mines Guidelines			
Measure 2: Compact the vertic soil 're-moulded' soil 'seal' layer; Build material; Place appropriate impern moulded' vertic soil base and walls earth walls. Ameliorate (sample an paddock earth walls.	base of the TSF impoundment neable membr ; Construct su d fertilise), and	to create a relative walls from compac ane liner 'sea'l ove rrounding paddocks d Re-vegetate (loca	neable compacted- oulded' vertic soil ne compacted 're- ociated vertic soil mous grasses) the	During developmer	nt/expansion process	Chamber o	of Mines Guidelines		
Impact AFTER Management	Moderate	Long Term	Site	Medium	Unlikely (soil Low		-	High	



ACTIVITY: Development of a New Salvage Yard - ASPECTS: Clearance of Vegetation, Yard Footprint - IMPACT CATEGORY: Soil Contamination, Soil Compaction, Soil Distribution - IMPACT DESCRIPTION: 1. Loss of Soil Distribution (depth/horizons) during excavation of 'clean' water diversion drain/berm and 'dirty' water intercept drain/berm. 2. Soil Compaction due to intentional compaction of Yard Footprint and machinery traffic. 3. Soil Contamination due to Seepage of 'dirty' water below Yard Footprint and Run-off

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Definite	Medium	-	High
Management Measures			-	-	Time Period for	ce with Standards		
Measure 1: Scrape off the overburd occurs, and dispose of (in an appre- 'topsoil' to the required depth duri 'dirty' water intercept drains (refer t	den 'waste' or opriate facility ng the constru o Measures 3).	non-waste' overlyir) or re-process as action of the 'clean'	<i>situ</i> soils where it e. Excavate <i>in-situ</i> version drain and	During develo	opment process	Chamber o	of Mines Guidelines	
Measure 2: Compact the vertic soil compacted-'re-moulded' soil 'seal' la	base of the Yar yer	d Footprint to crea	vely impermeable	During develo	opment process	Chamber of Mines Guidelines		
Measure 3: Construct an earth 'cleat the Yard Footprint, together with it Construct an earth 'dirty' water inter adjacent soil berm (entire length downslope (not upslope) side-wall of compacted-'re-moulded' soil 'seal' lat berms.Construct a concrete pad in a area under which bins/skips are place materials/chemicals or oils.	n' water diver contractions adjacent soin recept drain dow on the downs of the 'dirty' w yer; Re-vegetat ppropriate sec ced on a concre	sion drain surround l berm (entire lengt wnslope of the Yard lope side); Compac rater drain to achiev te (locally indigenous tions of the Yard For ete pad for the future	pslope sections of downslope side); t, together with its tic soil base and vely impermeable the 'topsoil' drain Construct a roofed of used hazardous	During develo	opment process	Chamber o	of Mines Guidelines	
Impact AFTER Management	Moderate	Medium Term	Site	Medium	Possible (soil contamination) Medium -		High	

ACTIVITY: Expansion of the Tap Hole Fume Extraction System - ASPECTS: Gaseous Emissions, Particulate Matter Emissions, Scrubber Effluent - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination due to the settling of dust on the downwind soil surface, and infiltration of future Scrubber Effluent spillages													
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence													
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible Medium - High								
Management Measures					Time Period for	- Implementation	Complian	ce with Standards					
Measure 1: Spray water to limit bl drain for potential future scrubber el	own dust duri ffluent spillages	ng construction. Co	concrete pad and	During expansion process Chamber of Mines (of Mines Guidelines						
Impact AFTER Management Minor Short Term Local Low Unlikely Low - High													



Table 9.1(g): Geology Construction Phase Impact and Risk Significance Table

No Significant Geological Related Impacts identified/expected during the Construction Phase.



Table 9.1(h): Groundwater Construction Phase Impact and Risk Significance Table

No Significant Groundwater Related Impacts identified/expected during the Construction Phase.



Table 9.1(i): Surface Water Construction Phase Impact and Risk Significance Table

ACTIVITY: SW Canal System – ASPECT: Reduction of run-off to Natural Resource – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall in the canal system by ponding.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Short Term	Local	Low	Low Definite Medium - High						
Management Measures					Time Period	for Implementation		Compliance with Standards			
Measure 1: Pump out ponding w surface water run-off past the con	vated foundations s into the natura	and diver l environn	rt all other 1ent.	Constr	ruction Phase		None applicable.				
Impact AFTER Management	Short Term	Local	Low	Possible	Low	0	High				

ACTIVITY: Development of Storm Water PCD No. 2 – ASPECT: Storage of Run-off Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall in the extended area.										
	Magnitude	Duration	Scale	Consequence	Probabilit y	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Short Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period	l for Implementation	Compliance with Standards			
Measure 1: Pump out ponding w surface water run-off past the co	vater from excav	vated foundations ks into the natura	s and diver l environn	rt all other nent.	Cons	truction Phase		None applicable		
Measure 2: Optimise size of PCD				Pre-Co	nstruction Phase	Design of Small Dams & Water Balance				
Impact AFTER Management	npact AFTER Management Minor Short Term Local Low				Possible	Low	-	High		

ACTIVITY: Development of Storm Water PCD No. 3 – ASPECT: Storage of Run-off Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to conturing of direct rainfall in the extended area

capturing of direct raiman in the extended area.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Short Term	Local	Low	Definite	Medium	-	High			
Management Measures					Time Period for Implementation Compliance with Standards			Compliance with Standards			
Measure 1: Pump out ponding w surface water run-off past the content of the surface water run-off past the content of the surface water run-off past the content of the surface water run-off past the surface water ru	vater from excav	vated foundations s into the natural	and diver environn	rt all other 1ent.	Const	ruction Phase		None applicable.			
Measure 2: Optimise size of PCD	during design.				Pre-Cor	nstruction Phase	Design of Small Dams & Water Balance				
Impact AFTER Management	Minor	Short Term	Local	Medium	Unlikely	Low	-	High			



ACTIVITY: Development of the Morula PCD – ASPECT: Storage of Mine U/G & runoff Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall in the extended area.										
	Magnitude	Duration	Scale	Consequence	Probability	Confidence				
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Pump out ponding w surface water run-off past the con	ater from excanstruction worl	vated foundations s into the natura	and diver environn	rt all other 1ent.	Const	ruction Phase		None applicable.		
Measure 2: Optimise size of PCD				Pre-Cor	struction Phase	Design of Small Dams & Water Balance				
Impact AFTER Management	Local	Low	Possible	Low	-	High				

ACTIVITY: Expansion of the OB Plant Tailings Storage Facility (TSF)- ASPECT: New extended footprint - IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall in the expanded area.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Protect footprint line	er from damage	during construct	ion.		Construction Phase Engineer's Design Specificati			Engineer's Design Specifications		
Measure 2: Pump out ponding w	ater into the cl	ean water canal.			Constr	uction Phase	None applicable			
Measure 3: Optimise size of TSF			Pre-Cons	struction Phase	Design of Small Dams & Water Balance					
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Plant Process Water Dam and Silt Traps – ASPECT: Dam Liner – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct

rainfail in the PWD and Silt Traps.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High			
Management Measures					Time Period f	or Implementation		Compliance with Standards			
Measure 1: Pump out ponding w surface water run-off past the con	ater from excaves a struction work	vated foundations as into the natural	and diver environn	rt all other 1ent.	Construction Phase None applicable.			None applicable.			
Measure 2: Optimise size of PWI	during design.			Pre-Cons	truction Phase	Design of Small Dams & Water Balance					
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High			



ACTIVITY: Expansion of Storm Water PCD No. 1 – ASPECT: Storage of run-off Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall in the expanded area.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation	Compliance with Standards			
Measure 1: Pump out ponding w surface water run-off past the con	ater from excar nstruction worl	vated foundations s into the natural	and diver environm	rt all other 1ent.	Constr	Construction Phase None applicable.				
Measure 2: Optimise size of PCD			Pre-Construction Phase		Design of Small Dams & Water Balance					
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Upgrading of the OB Plant Process Water Dam/CRP Process Water Dam – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall in the expanded area.										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Pump out ponding w surface water run-off past the con	vated foundations s into the natura	and diver environm	rt all other 1ent.	Constr	uction Phase		None applicable.			
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Upgrading of the Plant Process Water Dam- ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall in the expanded area.										
	Magnitude	ude Duration Scale Consequence Probability SIGNIFICANCE +/-						Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	I	High		
Management Measures					Time Period for Implementation Compliance with Standards					
Measure 1: Pump out ponding w surface water run-off past the con	ater from exca nstruction worl	vated foundations s into the natura	s and diver l environn	rt all other 1ent.	Construction Phase None applicable.			None applicable.		
Measure 2: Optimise size of the			Pre-Cons	truction Phase	Design of Small Dams & Water Balance					
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High		



ACTIVITY: New Salvage Yard – ASPECT: Yard Footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall in the new area.										
	+/-	Confidence								
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures Time Period for Implementation Compliance										
Measure 1: Pump out ponding w surface water run-off past the con	ater from excan nstruction worl	vated foundations as into the natural	and diver environm	rt all other 1ent.	Constr	uction Phase		None applicable.		
Measure 2: Optimise size of salva			Pre-Cons	Pre-Construction Phase SANS 1200D Ea		NS 1200D Earthworks & Water Balance				
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Development of Storm Water PCD No. 4 – ASPECT: Storage of run-off Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall in the expanded area.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Pump out ponding w surface water run-off past the con	ater from excav	vated foundations as into the natural	and diver environm	rt all other 1ent.	Construction Phase None applicable.			None applicable.		
Measure 2: Optimise size of PCD			Pre-Cons	truction Phase	Design of Small Dams & Water Balance					
Impact AFTER Management	Local	Low	Possible	Low	-	High				



Table 9.1(j): Plant Life Construction Phase Impact and Risk Significance Table

ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt TrapsASPECT: Reduction of Run-off to Natural Resource-												
IMPACT DESCRIPTION: Possible impact on habitat for floral species sensitive to changes in surface water flow volumes causing a reduction in floral species diversity.												
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible Medium - High							
Management Measures Time Period for Implementation Compliance with Standard												
Management Measures					Time Period fo	r Implementation	Complianc	e with Standards				
Management Measures Measure 1: Ensure that any redu	iction in runoff	to natural reso	urces stays	within the permitted	Time Period fo	r Implementation	Compliance Ecological Re	e with Standards serve and Water Use				
Management MeasuresMeasure 1: Ensure that any reduparameters of the ecological reservence	iction in runoff r	to natural reso	urces stays	within the permitted	Time Period fo	or Implementation	Compliance Ecological Re	e with Standards serve and Water Use License				

ACTIVITY: Development of the various PCD, Stormwater and Process Water Dams – ASPECT: Clearance of Vegetation – IMPACT DESCRIPTION: Degradation of floral habitat, species diversity and possible sensitive floral species.												
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence												
Impact BEFORE Management	BEFORE Management Minor Long Term Local Medium Possible Medium - High											
Management Measures					Time Period fo	or Implementation	Complianc	e with Standards				
Measure 1: Avoid placement of habitat.	PCD, Process	Water and Storm	s in sensitive floral	Constru	ction Phase	Sensitivity map in Floral Report						
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High				

ACTIVITY: Development of a New Salvage Yard – ASPECT: Clearance of Vegetation – IMPACT DESCRIPTION: Degradation of floral habitat, species diversity and possible sensitive floral species. Probability SIGNIFICANCE Magnitude Scale Consequence Duration +/-Confidence Impact **BEFORE** Management -Minor Long Term Medium Possible Medium High Local **Management Measures Time Period for Implementation Compliance with Standards** Measure 1: Avoid placement of the new salvage yard in sensitive floral habitat. Sensitivity map in Floral Report **Construction Phase** Impact AFTER Management Unlikely High Minor Medium Term Local Low Low -



ACTIVITY: Expansion of the OB Plant Tailings Storage Facility (TSF) – ASPECT: Clearance of Vegetation – IMPACT DESCRIPTION: Degradation of floral habitat, species diversity and possible sensitive floral species											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible Medium - High						
Management Measures					Time Period for I	mplementation	Compliance w	vith Standards			
Measure 1: Avoid expansion of the	TSF into sensi	tive floral habitat.		Constructi	on Phase	Sensitivity map in Floral Report.					
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			



Table 9.1(k): Animal Life Construction Phase Impact and Risk Significance Table

ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps – ASPECT: Reduction of Run-off to Natural Resource- IMPACT DESCRIPTION: Possible impact on faunal species dependent on freshwater ecosystems.											
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation		Compliance with Standards			
Measure 1: Ensure that any red permitted parameters of the ecolog	off to natural reso	ources s	Construction Phase Ecological Reserve and Water Use			ogical Reserve and Water Use License					
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High			

ACTIVITY: Development of the various PCD, Stormwater and Process Water Dams – ASPECT: Clearance of Vegetation – IMPACT DESCRIPTION: Degradation of faunal habitat, species diversity and possible sensitive faunal species.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Avoid placement of faunal habitat.	Water and Stormy	water Da	Construction Phase		Sensitivity map in Faunal Report					
Impact AFTER Management	Medium Term	Local	Unlikely	Low	-	High				

ACTIVITY: Development of a New Salvage Yard – ASPECT: Clearance of Vegetation – IMPACT DESCRIPTION: Degradation of faunal habitat, species diversity and possible sensitive faunal species.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	lanagement Minor Long Term Local Medium Possible Medium - High										
Management Measures					Time Period f	or Implementation		Compliance with Standards			
Measure 1: Avoid placement of the new salvage yard in sensitive faunal habitat.Construction PhaseSensitivity map in Faunal Report											
Impact AFTER Management Minor Medium Term Local Low Unlikely Low - High											



ACTIVITY: Expansion of the OB Plant Tailings Storage Facility (TSF) – ASPECT: Clearance of Vegetation – IMPACT DESCRIPTION: Degradation of faunal habitat, species diversity and possible sensitive faunal species.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period f	or Implementation		Compliance with Standards			
Measure 1: Avoid expansion of the	TSF into sensit	tive faunal habitat.			Construction Phase			Sensitivity map in Faunal Report			
Impact AFTER Management	Minor	Medium Term	Unlikely	Low	-	High					



Table 9.1(l): Wetlands Construction Phase Impact and Risk Significance Table

ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps – ASPECT: Reduction in runoff and catchment yield, IMPACT DESCRIPTION: Impacts on freshwater habitat and ecological structure, service provision capability and hydrological function.											
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management Moderate Long Term Local Medium Possible Medium - High											
Management Measures					Time Period	for Implementation	(Compliance with Standards			
Measure 1: Ensure that any red permitted parameters of the ecolo dirty water area created.	off to natural reso through minimisat	ources s tion of tl	Const	ruction Phase	Ecolog	ical Reserve and Water Use License					
Impact AFTER Management Minor Long Term Local Medium Unlikely Low - High											

ACTIVITY: Development of the various PCD, Stormwater and Process Water Dams – ASPECT: Clearance of Vegetation – IMPACT DESCRIPTION: Increase in erosion which will increase sediment load, affecting freshwater habitat and ecological structure, service provision capability and hydrological function.												
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence												
Impact BEFORE Management Minor Long Term Local Medium Possible Medium - High												
Management Measures					Time Period	for Implementation	(Compliance with Standards				
Measure 1: Ensure that clearan clearance is performed in a phas management measures are implem	ce of vegetations and manner an mented.	on is kept to the ad that effective s	project tormwat	footprint, that er and erosion	Const	ruction Phase	S	tormwater Management Plan				
Impact AFTER Management Minor Medium Term Local Low Unlikely Low - High												

ACTIVITY: Development of a New Salvage Yard – ASPECT: Clearance of Vegetation – IMPACT DESCRIPTION: Increase in erosion which will increase sediment load, affecting freshwater habitat and ecological structure, service provision capability and hydrological function.											
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence											
Impact BEFORE Management Minor Long Term Local Medium Possible Medium - High											
Management Measures					Time Period	for Implementation	(Compliance with Standards			
Measure 1: Ensure that clearan clearance is performed in a phase management measures are implement	on is kept to the id that effective s	project tormwa	footprint, that ter and erosion	Const	ruction Phase	S	torm water Management Plan				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	- High				



ACTIVITY: Expansion of the OB I sediment load, affecting freshwa	ACTIVITY: Expansion of the OB Plant Tailings Storage Facility (TSF) – ASPECT: Clearance of Vegetation – IMPACT DESCRIPTION: Increase in erosion which will increase sediment load, affecting freshwater habitat and ecological structure, service provision capability and hydrological function.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Minor Long Term Local Medium Possible Medium - High											
Management Measures					Time Period	for Implementation	(Compliance with Standards			
Measure 1: Ensure that clearance clearance is performed in a phase management measures are implem	on is kept to the id that effective s	project tormwat	footprint, that ter and erosion	Const	ruction Phase	S	tormwater Management Plan				
Impact AFTER Management Minor Medium Term Local Low Unlikely Low - High											



Table 9.1(m): Aquatic Ecosystems Construction Phase Impact and Risk Significance Table

ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps - ASPECT – Reduction of Run-off to Natural Resource – IMPACT CATEGORY – Loss of biodiversity and catchment yield -IMPACT DESCRIPTION - Potential loss of catchment yield due to decreased clean water runoff surface area. Increased flood peaks as a result of formalisation and concentration of surface runoff. Potential for erosion of terrestrial areas as a result of the formation of preferential flow paths, leading to sedimentation of the aquatic resources. Reduction in volume of water entering the aquatic resources, leading to loss of recharge (and thus desiccation) of downstream system; Altered vegetation communities due to increased moisture stress.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period for Implementation Compliance with Standards					
Measure 1: Ensure that any repermitted parameters of the ecol	off to natural	resources	stays within the	Construction Phase Ecolog			logical Reserve and Water Use License	
Measure 2: Very strict control of water consumption must take place and detailer monitoring must take place and where all water usage must continuously be optimised.					Construction Phase			Water Use License
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High

ACTIVITY: Development of the various PCD, Stormwater and Process Water Dams – ASPECT - Clearance of Vegetation – IMPACT CATEGORY – Loss of biodiversity – IMPACT DESCRIPTION - Increased surface water runoff, leading to erosion, and sedimentation of riparian habitat. Altered topography/geomorphology, leading to altered runoff patterns and formation of preferential flow paths. Proliferation of alien vegetation as a result of disturbances.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Minor Long Term Local Medium Possible Medium - High											
Management Measures	Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Avoid placement of P drainage lines; flood lines, riparian	CD, Process W zones or their	ater and Stormw associated buffer	ater Dan zones.	ns within natural	Constru	uction Phase	Refer to	o sensitivity map in the Wetland Report			
Measure 2: Ensure that alien spec and controlled according to an alies	ies proliferatio n and invasive :	n along road verg species managem	es and fe ent strate	ences is managed egy.	Constru	uction Phase	NEMB Spe	A (Act 10 of 2004): Alien and Invasive ecies Regulations, GN R598 of 2014			
Measure 3: Erosion control and sto	orm water and	dirty water mana	gement.		Constru	uction Phase	Ecological Reserve and Water Use License				
Impact AFTER Management Minor Medium Term Local Low Unlikely Low - High											



ACTIVITY: Development of a New water runoff, leading to erosio preferential flow paths. Prolifera	ACTIVITY: Development of a New Salvage Yard – ASPECT - Clearance of Vegetation – IMPACT CATEGORY – Loss of biodiversity – IMPACT DESCRIPTION - Increased surface water runoff, leading to erosion, and sedimentation of riparian habitat. Altered topography/geomorphology, leading to altered runoff patterns and formation of preferential flow paths. Proliferation of alien vegetation as a result of disturbances.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	- High					
Management Measures Time Period for Implementation Compliance with Standards												
Measure 1: Avoid placement of the lines, riparian zones or their associ possible through planning and suit:	ne new salvage ated buffer zon able layouts.	yard within nat es; Minimise loss	ural drai of aquat	nage lines; flood ic features where	Constru	action Phase	Refer	to the sensitivity map in the Wetland Report				
Measure 2: Limit the footprint a essential in order to minimise the recharge of streams in the area.	area of the co e loss of clean	nstruction activi water runoff ar	ty to wh eas and	hat is absolutely the concomitant	Constru	action Phase	Ecolo	ogical Reserve and Water Use License				
Measure 3: All soils compacted development footprint areas shoul possible should be promoted with order to protect soils and vegetatic in the area is not very high and so h	construction act ad profiled. As ma ed construction a ould be kept to a s will not grow qu	tivities fa uch vege area dur minimu ickly.	Constru	uction Phase	NEMB Spo	A (Act 10 of 2004): Alien and Invasive ecies Regulations, GN R598 of 2014						
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High				



Table 9.1(n): Air Quality Construction Phase Impact and Risk Significance Table

No Significant Air Quality Related Impacts identified/expected during the Construction Phase.



Table 9.1(o): Noise Aspects Construction Phase Impact and Risk Significance Table

No Significant Noise Related Impacts identified/expected during the Construction Phase (Daytime).



Table 9.1(p): Visual Aspects Construction Phase Impact and Risk Significance Table

A: Infrastructure, elements or activities that generate dust or hosts activities that generate dust, visible from close, medium or long range views. A.2: Activities that generate dust from construction/decommissioning of site infrastructure and moving vehicles.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Minor Medium Term Site/Local Low Definite Medium - High											
Management Measures					Time Period for	- Implementation	Complian	ce with Standards			
Measure 1: Dust Suppression. Construction Phase Air Quality Specialist Report											
mpact AFTER Management Minor Medium Term Site/Local Low Possible Low - High											

A: Infrastructure, elements or activities that generate dust or hosts activities that generate dust, visible from close, medium or long range views. A.3: Activities that generate dust from moving vehicles on internal unpaved roads.												
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence												
Impact BEFORE Management Minor Medium Term Site/Local Low Definite Medium - High												
Management Measures					Time Period for	· Implementation	Complian	ce with Standards				
Measure 1: Dust Suppression.Construction PhaseAir Quality Specialist Report												
mpact AFTER Management Minor Medium Term Site/Local Low Possible Low - High												



Table 9.2(a): Socio- Cultural/Economic Operational Phase Impact and Risk Significance Table

ACTIVITY: HERNIC Operations - ASPECT: Social Cultural Processes - IMPACT DESCRIPTION: Local grievances due to historic project-induced in-migration											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High			
Management Measures				Time Period for Implementation Compliance with Standards							
Measure 1: Resolve resettlement departments.	t of De Kroon s	settlement in coop	th relevant government	Mediu	m Term	None					
Measure 2: Continue with policy	to demolish er	npty shacks.			Mediu	m Term	None				
Measure 3: Continue with quaresolve issues.	rterly meeting	s with affected p	arties to	register grievances and	Mediu	m Term	None				
Measure 4: Create liaison struct	ures with local	police.	Medium Term		None						
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: HERNIC Operations - ASPECT: Social Geographic Processes - IMPACT DESCRIPTION: Increase in nuisance factors (noise and dust)											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High			
Management Measures				Time Period for	Implementation	Complian	ce with Standards				
Measure 1: Implement managen	nent measures	of air quality repor	t.		Mediur	n Term	Air Qu	ality Legislation			
Measure 2: Continue with quaresolve issues.	Mediur	n Term		None							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: HERNIC Operations	- ASPECT: Soci	al Impact Institu	tional Pro	cesses - IMPACT DESCRI	PTION: Changes in p	erceptions related to	community s	afety	
	Magnitude	Duration	Scale	Consequence	Probability SIGNIFICANCE		+/-	Confidence	
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High	
Management Measures			Time Period for	Implementation	Complian	ce with Standards			
Measure 1: Implement managem	nent measures o	of water impact rej	ports and t	raffic report.	Mediur	n Term	Relevant Legislation		
Measure 2: Regular disclosure of	f management r	neasures and mon	itoring res	ults.	Medium Term			None	
Measure 3: Continue with quaresolve issues.									
Impact AFTER Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High	



ACTIVITY: HERNIC Operations	– ASPECT: Eco	nomic Efficiency	- IMPACT DE	ESCRIPTION: Increase	in local employment	and income		
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Medium Term	Regional	Medium +	Definite	Medium +	+	High
Management Measures				Time Period for Implementation Compliance with Standard				
Measure 1: As per the current resource development and the de	Social And Lab evelopment of l	our Plan focus on ocal entrepreneurs	Mediur	n Term	Social A	And Labour Plan		
Measure 2: Avoid recruitment fr	om the neighbo	ouring De Kroon in	Mediur	n Term	None			
Measure 3: Specify local procure its sub-contractors.	ement targets fo	or Madibeng LM th	at is feasible	for both HERNIC and	Mediur	n Term None		None
Measure 4: Develop a database local community alongside the m Labour Plan.	of goods and s arket analyses	services that could of potential vendo	be outsourced to the nned in the Social And	Medium Term		None		
Measure 5: Put a contractor maprocurement targets are met.	anagement pla	n in place to ensu	Medium Term None		None			
Impact AFTER Management	Major	Medium Term	Regional	Medium +	Definite	Medium +	+	High

ACTIVITY: HERNIC Operations – ASPECT: Economic Equity - IMPACT DESCRIPTION: Impact on poverty through employment											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Regional	Medium +	Definite	Medium +	+	High			
Management Measures					Time Period for	Implementation	Complian	ce with Standards			
Measure 1: Put a contractor main terms of unskilled labour are m	Measure 1: Put a contractor management plan in place to ensure that the local employment targets in terms of unskilled labour are met.						Social a	and Labour Plan			
Measure 2: Avoid the recruitmestellement.	Mediur	n Term		None							
Impact AFTER Management	Moderate	Medium Term	Regional	Medium +	Definite	Medium +	+	High			

ACTIVITY: HERNIC Operations – ASPECT: Economic Equity - IMPACT DESCRIPTION: Increase in tax revenues											
	SIGNIFICANCE	+/-	Confidence								
Impact BEFORE Management	Moderate	Medium Term	Definite	High +	+	High					
Management Measures					Time Period for	Implementation	Complian	ce with Standards			
Measure 1: None	None None			None							
Impact AFTER Management	Definite	High +	+	High							



ACTIVITY: HERNIC Operations – ASPECT: Economic Equity – IMPACT DESCRIPTION: Increase in social funds											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Moderate	Medium Term	Local	Medium+	Possible	e Medium+ + High					
Management Measures					Time Period for	Implementation	Complian	ce with Standards			
Measure 1: Implement as per the	Mediur	n Term	Social and Labour Plan								
Impact AFTER Management	Possible	Medium+	+	High							

ACTIVITY: HERNIC Operations – ASPECT: Economic Efficiency - IMPACT DESCRIPTION: Loss of income from alternative land-use										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - High										
Management Measures					Time Period for	Implementation	Complian	ce with Standards		
Measure 1: None	None None			None						
Impact AFTER Management	Possible	Medium	-	High						

ACTIVITY: HERNIC Operations – ASPECT: Economic Equity – IMPACT DESCRIPTION: Impact on adjacent property values										
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence									
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	Medium		
Management Measures					Time Period for	r Implementation	Complia	nce with Standards		
Measure 1: None					Shor	t Term		None		
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible Low -			Medium		

ACTIVITY: HERNIC Operations – ASPECT: Economic Efficiency – IMPACT DESCRIPTION: Negative externalities											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Minor	Long Term	Site	Medium	Possible	Medium	-	Medium			
Management Measures					Time Period for	Implementation	Complian	ce with Standards			
Measure 1: As per specialist r reports).	Long	Term	Yes (Air Qu S	uality, Water Quality Standards)							
Impact AFTER Management	Minor	Long Term	Site	Medium	Unlikely	Low	-	Medium			



ACTIVITY: HERNIC Operations – ASPECT: Economic Stability – IMPACT DESCRIPTION: Impact on local economic diversity											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Regional	Low	Definite	Medium	-	High			
Management Measures					Time Period fo	r Implementation	Complia	nce with Standards			
Measure 1: As per the current S activities in community developm	ocial And Labo nent programm	our Plan, focus on nes and business s	the support upport prog	t of non-mining related rammes.	Mediu	ım Term	Social	and Labour Plan			
Measure 2: Focus the local production.	Mediu	ım Term		None							
Impact AFTER Management	Minor	Medium Term	Regional	Low	Possible	Low	-	Medium			

Activity: HERNIC Operations – ASPECT: Economic Stability – IMPACT DESCRIPTION: Increase in local resource intensity											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures				Time Period for	r Implementation	Complia	nce with Standards				
Measure 1: Develop a resource	use plan with	the specific object	tive to mir	nimize HERNIC's energy	Modiu	m Torm		Nono			
and water use as far practical.	Meulu		None								
Impact AFTER Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			



Table 9.2(b): Heritage Operational Phase Impact and Risk Significance Table

ACTIVITY: HERNIC Operations - ASPECT: Site Activities - IMPACT DESCRIPTION: Impact on Graveyards										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Major	Medium Term	Site	Medium	Unlikely	Low	-	Medium		
Management Measures					Time Period f	or Implementation	Comp	liance with Standards		
Measure 1: Heritage Management Plan				Opera	Operational Phase None		None			
Impact AFTER Management	Major	Medium Term	Site	Medium	Unlikely	Low	-	Medium		



 Table 9.2(c): Blasting and Vibration Operational Phase Impact and Risk Significance Table

ACTIVITY: Morula Mining Underground Operation - ASPECT: Ground Vibration - IMPACT DESCRIPTION: Impact on Surface Infrastructure									
	Magnitude	Duration	Scale	Consequence	ConsequenceProbabilitySIGNIFICANCE+/-Confidence				
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Definite	Medium	-	High	
Management Measures		Time Period for Implementation		Compliance with Standards					
Measure 1: Limit the number of panels blasted simultaneously under the Tailings Facility.					Operational Phase		None		
Impact AFTER Management	Minor	Long Term	Site	Medium	Unlikely	Low	-	High	

ACTIVITY: Morula Mining Underground Operation - ASPECT: Ground Vibration - IMPACT DESCRIPTION: Impact on Private Houses									
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Control						Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High	
Management Measures		Time Period f	or Implementation	Compliance with Standards					
Measure 1: None					Operational Phase		None		
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High	



Table 9.2(d): Traffic Aspects Operational Phase Impact and Risk Significance Table

ACTIVITY: Transportation of Ferrochrome from the Mine – ASPECT: Increase in Tipping Trucks Trips – IMPACT DESCRIPTION: 54 trips per day, Traffic Congestion and Road Safety										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		
Management Measures		Time Period for Implementation		Compliance with Standards						
Measure 1: Transport the mine	Operational Phase		Roads Authority							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Transportation of Goods and Products (service delivery) to and from the Mine – ASPECT: Increase in Supplier Vehicles Trips – IMPACT DESCRIPTION: 8 Trips per day and Traffic Congestion										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Road Safety Awareness Campaigns						Operational Phase		-		
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	- High			

ACTIVITY: Transportation of Employees to and from the Mine - ASPECT: Increase in Bus Trips - IMPACT DESCRIPTION: 12 Trips per day and Traffic Congestion										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High		
Management Measures	Time Period for	Implementation	Compliance with Standards							
Measure 1: Road Safety Awarene	Operatio	onal Phase	-							
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High		


ACTIVITY: Increase in Pedestri	ACTIVITY: Increase in Pedestrian Activity while working on Site – ASPECT: Pedestrian Movement – IMPACT DESCRIPTION: ±979 Employees and Traffic Congestion											
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	ManagementMinorShort TermLocalLowPossibleLow-High											
Management Measures					Time Period for	mplementation	Complianc	e with Standards				
Measure 1: Road Safety Awarene	ess Campaigns				Operational Phase NEMA			NEMA				
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High				

ACTIVITY: Transportation of Employees to and from the Mine – ASPECT: Increase in Light Vehicles Trips – IMPACT DESCRIPTION: 274 Trips per day and Traffic Congestion											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	Medium			
Management Measures					Time Period for I	mplementation	Compliance	e with Standards			
Measure 1: Encourage use of lar	ge capacity veł	nicles		Operational Phase		NEMA					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	Medium			



Table 9.2(e): Topography Operational Phase Impact and Risk Significance Table

ACTIVITY: Morula Mining Shaft Complex – ASPECT: Storage/ Stockpiling of Emergency ROM and Topsoil - IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of ROM and soils											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures				Time Period for Implementation Compliance with Standards							
Measure 1: Minimise unnecessary s	oil stripping on s	ite			Operation	al Phase	-				
Measure 2: Conduct stockpiling in a	ccordance with s	specifications of so	oil scientist		Operational Phase Soil Scientist Specification			ist Specifications			
Measure 3: Stockpile ROM material	according to ope	rational requirem	ients		Operational Phase -		-				
Measure 4: Confine stockpiles to de	Operationa	al Phase		-							
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Morula Open Cast Operation – ASPECT: Steep Slopes / Uneven Surfaces - IMPACT DESCRIPTION: Presence of dangerous/ unstable excavations due to past

mining activities	mining activities											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High				
Management Measures			Time Period for I	Time Period for Implementation Compliance with Standard								
Measure 1: Reshape disturbed pit a	rea and flatten st	eep slopes	Operation	Operational Phase -		-						
Measure 2: Surface stones/boulders	s and remnants n	nust be buried			Operational Phase		-					
Measure 3: Even out all rough surfa	ces				Operational Phase		-					
Measure 4: Backfill deep voids/dep	Operation	al Phase		-								
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High				



ACTIVITY: Mine Waste Rock Dump – ASPECT: Storage/ Stockpiling of Mine Waste Rock- IMPACT DESCRIPTION: Creation of dangerous dump due to stockpiling of Mine Waste Rock											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - High											
Management Measures	mplementation	Complianc	e with Standards								
Measure 1: Operate dump according	g to operational a	activities/ custom	er requiren	nents	Operationa	al Phase		-			
Measure 2: Confine dump to design	Operational Phase -		-								
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			

ACTIVITY : Raw Material Stockpile Areas – ASPECT: Storage/Stockpiling of Raw Materials – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of raw materials											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: Operate stockpiles accord	ding to operatior	al feedstock requ	irements		Operational Phase -						
Measure 2: Confine stockpiles to des	Operation	al Phase		-							
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Open Pit (OB Plant Fines and Coarse Waste in Open Pit) – ASPECT: Disposal of OB Plant Fines and Coarse Waste in Open Pit – IMPACT DESCRIPTION: Presence of dangerous/ unstable excavations due to past mining activities. Creation of areas prone to surface subsidence due to backfilling of the open cast mining pit

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High	
Management Measures					Time Period for In	mplementation	Compliance with Standards		
Measure 1: Reshape disturbed pit a	Operation	al Phase	iase -						
Measure 2: Surface stones/boulders	s and remnants n	nust be buried			Operational Phase -		-		
Measure 3: Even out all rough surfa	ces				Operational Phase		-		
Measure 4: Backfill deep voids/dep	Operation	al Phase		-					
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High	



ACTIVITY : Ore Beneficiation Plant – ASPECT: Storage/Stockpiling of Mixed Material & HMS Waste Material – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of mixed materials and HMS Waste Materials											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - High											
Management Measures				Time Period for I	mplementation	Compliance	e with Standards				
Measure 1: Operate stockpiles acco	rding to operatio	nal feedstock req	uirements		Operationa	al Phase		-			
Measure 2: Confine stockpiles to de	Operationa	al Phase		-							
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			

ACTIVITY : Returns Material Stockpile Areas – ASPECT: Storage/Stockpiling of Returns Materials – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of returns materials											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: Operate stockpiles accor	ding to operatio	nal feedstock/ cu	stomer req	uirements	Operation	al Phase		-			
Measure 2: Confine stockpiles to des	Operationa	ıl Phase		-							
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			

ACTIVITY : Finished Product Plant – ASPECT: Storage/Stockpiling of Final Product – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of product material											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures					Time Period for I	mplementation	Complianc	e with Standards			
Measure 1: Operate stockpiles accord	ding to custome	r requirements			Operational Phase -						
Measure 2: Confine stockpiles to de	signated footprir	nt areas (bins)	Operationa	ıl Phase		-					
1											



ACTIVITY : Slag Stockpiling Areas – ASPECT: Storage/Stockpiling of Slag – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of slag material											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures				Time Period for I	Time Period for Implementation Compliance with Standards						
Measure 1: Confine stockpile to des	ignated footprint	tarea			Operation	al Phase		-			
Measure 2: Re-Process through CRF		Operation	al Phase		-						
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			

ACTIVITY : Primary Chrome Recovery Plant – ASPECT: Current Arising Slag Loading and Stockpiling of Product and Waste Material – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of product and waste materials											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures					Time Period for I	mplementation	Complianc	e with Standards			
Measure 1: Operate stockpiles accor	ding to operatio	nal feedstock/ cu	stomer req	uirements	Operation	al Phase		-			
Measure 2: Confine stockpiles to des	signated footprir	nt areas	Operation	al Phase		-					
Impact AFTER Management Minor Medium Term Site Low					Unlikely	Low	-	High			

ACTIVITY: Fine Slag Processing Plant – ASPECT: Storage/ Stockpiling of Product and Waste Material- IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of Product and Waste Material												
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence												
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - High												
Management Measures					Time Period for In	mplementation	Complianc	e with Standards				
Measure 1: Operate stockpiles account	rding to operatio	nal feedstock/ cu	stomer req	uirements	Operation	al Phase		-				
Measure 2: Confine stockpiles to designated footprint areas Operational Phase -												
Impact AFTER Management Minor Medium Term Site Low Unlikely Low High												



ACTIVITY : Product Rail Dispatch Area – ASPECT: Storage/Stockpiling of Product Material – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of product material											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - High											
Management Measures					Time Period for I	mplementation	Complianc	e with Standards			
Measure 1: Operate stockpiles acco	rding to custome	r requirements			Operation	al Phase		-			
Measure 2: Confine stockpiles to designated footprint areas Operational Phase -											
Impact AFTER ManagementMinorMedium TermSiteLowUnlikelyLow-High											

ACTIVITY: Platinum Group Minerals (PGM) Plant - ASPECT: Storage/ Stockpiling of Product Material - MPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of Product Material											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - High											
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: Operate stockpiles accor	ding to operatio	nal feedstock/ cu	stomer req	uirements	Operation	al Phase		-			
Measure 2: Confine stockpiles to designated footprint areas Operational Phase -											
Impact AFTER Management Minor Medium Term Site Low Unlikely Low - High											

ACTIVITY : Rehabilitated Quarry Area – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of dangerous/ uneven surfaces due to past quarrying activities											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Ensure that the rehability	tated quarry is n	ot reworked or al	tered		Operation	al Phase		-			
Measure 2: Routine soil erosion mo	nitoring and mai	ntenance must be	carried ou	t	Operation	al Phase		-			
Measure 3: Conduct vegetation cond fertilization, irrigation, removal of al	dition assessmen iens, etc.) as per	ts. Implement rec outcome of assess	ions (e.g.	Quarterly during O	perational Phase		-				
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	v - High				



ACTIVITY: Tailings Storage Facility (TSF) including the Southern Expansion of the TSF – ASPECT: Disposal to TSF - IMPACT DESCRIPTION: Creation of dangerous/ unstable dump due to disposal of waste material											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Moderate	Moderate Medium Term Site Medium Possible Medium - High									
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: Operate facility according to design specifications Operational Phase -											
Impact AFTER Management Minor Medium Term Site Low Unlikely Low High											

ACTIVITY: Re-Use (Screening, Stockpiling Internal Use and/or Selling) of Slag Sand at the Fine Slag Processing Plant – ASPECT: Storage/ Stockpiling of Product Material and Fine Slag Sand Material – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of product material and fine slag sand material												
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confid												
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - High												
Management Measures					Time Period for In	mplementation	Complianc	e with Standards				
Measure 1: Operate stockpiles acco	rding to operatio	nal feedstock/ cu	stomer req	uirements	Operationa	al Phase		-				
Measure 2: Confine stockpiles to de	signated footprir	nt areas	Operationa	ll Phase		-						
Impact AFTER Management	Minor	Unlikely	Low	-	High							

ACTIVITY: Re-Use (Screening, Stockpiling Internal Use and/or Selling) of Coarse Slag at the CRP – ASPECT: Storage/ Stockpiling of Coarse Slag – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of slag material												
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence												
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - High												
Management Measures					Time Period for I	mplementation	Complianc	e with Standards				
Measure 1: Operate stockpiles acco	rding to operatio	nal feedstock/ cu	stomer req	uirements	Operation	al Phase		-				
Measure 2: Confine stockpiles to designated footprint areas Operational Phase -												
Impact AFTER Management Minor Medium Term Site Low Unlikely Low High												



ACTIVITY: Re-Use of Waste Rock at the Mine Waste Rock Stockpile – ASPECT: Storage/ Stockpiling of Waste Rock – IMPACT DESCRIPTION: Creation of dangerous/ unstable piles/ dumps due to stockpiling of waste rock material												
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence												
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - High												
Management Measures					Time Period for I	mplementation	Compliance	e with Standards				
Measure 1: Operate stockpiles accord	rding to operatio	onal feedstock/ cu	stomer req	uirements	Operation	al Phase		-				
Measure 2: Confine stockpiles to designated footprint areas Operational Phase -												
Impact AFTER Management Minor Medium Term Site Low Unlikely Low - High												



Table 9.2(f): Soils and Land Capability Operational Phase Impact and Risk Significance Table

ACTIVITIES (AND ASPECTS): Security Fence and Access (Fences and Booms), Power Supply (Eskom Yard and Substations, Overhead Power Lines) - IMPACT CATEGORY: Soil Erosion - IMPACT DESCRIPTION: Soil Erosion due to possible poor vegetative (grass) basal cover											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management Minor Short Term Site Low Possible Low High											
Management Measures Time Period for Implementation Compliance with Standards											
Measures 1: Soil Erosion: Monitor the vicinity of the foundation hole spread out in eroded areas display along fence and power line routes; not fertilise the soils in these areas	r and maintain s; Mature seed ring poor grass Utilise steel (1 ; No grazing or	vegetative (grass ed grass may be cover; Do not sc 10t wooden) pole burning allowed	Biannually (soil ero monitoring: spring after- tl	osion and vegetative before- and autumn ne rains)	Chamber o	of Mines Guidelines					
Impact AFTER Management	Low	-	High								

ACTIVITIES (AND ASPECTS): Office Complexes (Building Material), Morula Mining Shaft Complex (Offices and Workshops, Change House Complex, Peoples Walkway, Redundant Explosives Magazine), Morula Mining Accommodation (Building Material), General Plant Infrastructure (Building Material, Clinic, Laboratory, Canteen, Change House/Laundry) - IMPACT CATEGORY: Soil Erosion, Soil Contamination - IMPACT DESCRIPTION: 1. Soil Erosion due to possible poor vegetative (lawn) basal cover of surrounds. 2. Soil Contamination of Underlying/Surrounding *in-situ* soils due to accidental spillages (oils or chemicals) on the soil surface and subsequent infiltration into the soils and run-off into the drainage systems (both unlikely).

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High	
Management Measures	-	-	-		Time Period for Implementation Compliance with Standa				
Measures 1: Soil Erosion: Monito surrounds; Fertilise lawn soils ann	or and maintain ually upon com	vegetative (lawn) mencement of the	Biannually (soil er monitoring: spring after- the rains commencement of quality-fer	osion and vegetative before- and autumn), Annually upon che rainy season (soil rtilise lawn)	ve nn Chamber of Mines Guidelines soil				
Measures 2: Soil Contamination immediately; Discuss further duri siltation and vegetation) of the 'din the 'clean' water diversion drains, water derived from elsewhere from	n: Monitor acc ng Induction T 'ty' water run-c /berms. The af n entering thes	cidental oil/chemi 'raining. Maintain off intercept drains prementioned will e areas.	Immediately/daily (staff), Quarterly (drai and m	(spills-various facility nage features-monitor aintain)	Chamber o	of Mines Guidelines			
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	-	High	



ACTIVITIES (AND ASPECTS): Access Roads, Internal Roads (Road Surface, Road Verge), Railway Lines (Railroad and Rail Vehicles) - IMPACT CATEGORY: Soil Erosion, Soil Contamination - IMPACT DESCRIPTION: 1. Soil Erosion due to possible poor vegetative (grass) basal cover of surrounding soils and soil berms, or 'waste' or 'non-waste' bare surfaces or berms. 2. Soil Contamination of Underlying/Surrounding <i>in-situ</i> soils due to accidental spillages (raw materials, chemicals, slag, 'wastes', vehicle oil/fuel leaks), exhaust fumes and blown dust; and subsequent infiltration into the soils and run-off into the drainage systems										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measures 1: Soil Erosion: Monitor and maintain vegetative (grass) basal cover in the surrounds; Sample/fertilize the 'topsoil' berms once every 3 -4 years in spring in order to maintain vegetative basal cover, thereby limiting soil erosion; No grazing or burning allowed. Maintain local drainage features (direct/contain 'dirty' water runoff and keep 'clean' water away); Maintain optimum functioning (remove siltation and vegetation) of the 'dirty' water run-off intercept drains/berms to the PCD's, as well as the 'clean' water diversion drains/berms. The aforementioned will limit 'dirty'Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains), Quarterly (drainage features-monitor and maintain)Chamber of Mines Guidelines										
Measures 2: Soil Contamination: Sweep roads/verges periodically. truck and rail vehicle bins to limit c	Immediately (spills), Daily (spray water), Quarterly (sweep roads/verges), Continuously (tarpaulin bin cover)			of Mines Guidelines						
Impact AFTER Management	Moderate	Short Term	Site	Low	Possible	Low	-	Medium		



ACTIVITIES (AND ASPECTS): Morula Mining Shaft Complex (Ore/Waste Rock Transfer House, Grout Plant), Pelletizing and Sintering Plants 1 & 2 (Structure/Complex), Furnaces 1,2, 3 and 4 (Structure/Complex), Platinum Group Minerals [PGM] Plant (Spiral Plant, Ball Milling), Redundant Historic Bag Plant (Building Material), Redundant Old Civil Workshop (Building Material) - IMPACT CATEGORY: Soil Contamination, 'Waste'/'Non-Waste' Erosion, Soil Quality - IMPACT DESCRIPTION: 1. Soil Contamination of Buried Underlying/Surrounding *in-situ* soils/'wastes'/'non-wastes' due to the infiltration/leaching of 'dirty' water and rain water through the generally thick historically accumulated 'waste'/'Non-Waste' Erosion of the soils and run-off into the drainage systems, as well as the contamination of downwind soils due to the settling of blown dust. 2. 'Waste'/'Non-Waste' Erosion of the Local/Surrounding bare (devoid of vegetation) surfaces due to the run-off of waste-water and rainfall. 3. Soil Quality reduction (reduced fertility, and increased compaction) of usually deeply buried soils (or frequently already removed during construction).

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Major	Long Term	Regional (Cadastral)	High	Definite	High	-	High	
Management Measures					Time Period f	or Implementation	Complian	ce with Standards	
Measures 1a: Soil Contamination accumulated 'waste'/'non-waste' is scrape up and remove daily gen (especially in spring before the ra- facility (TSF if potentially pollutin polluting), or re-process as applica Clean up spillages of hazardous in pads inside these structures; Maint of rainfall or run-off; Periodically S	n: Firstly, scrap materials layer erated/spilled 'v ainy season); Tr ng), and the 'no able; Tarpaulin o naterials/chemic ain the roofed ar pray water for du	e up and remo- that is spread o wastes'/'non-was ansport 'wastes' on-wastes' to the cover over haul t als or oils; Peric ea and concrete ust suppression v	Immediately (sc historical 'wast Continuously (scr 'waste'/'non-w Continuously (ta cover), Immediat Monthly, or imm (clean up, clean c (maintenance of u Daily or when ne	rrape up accumulated e'/'non-waste' layer), 'ape up generated daily vaste' fines material), arpaulin haul tuck bin ely (clean up spillages), nediately after a spill oncrete pads), Ongoing roofed areas and pads), ecessary (spray water)	Chamber o and	of Mines Guidelines Soil Scientist			
Measures 1b: Soil Contamination vegetation) of the earth 'clean' wat 'Infrastructure' areas, together wi side); as well as the earth 'dirty' wa relevant 'Infrastructure' areas. The 'Infrastructure' areas, as well as 'Infrastructure' areas respectively secondary drains, and berms) to en than allowing trapped water to int into the buried <i>in-situ</i> soils (underly	Monitor and m ter diversion dra th the drains ac ater intercept dra e aforementione s intercept 'dirt 7. Institute all p courage the run- filtrate/leach thr ying a number of	aintain optimum ain surrounding t djacent soil bern ain/berm surroun d will limit 'clea cy' water seepa possible measur off of 'dirty' water cough the 'waste' f these areas) and	ove siltation and ns of the relevant n the downslope pe sections of the rom entering the erived from the l concrete slabs, nto drains, rather rs, and thereafter	Quarterly (drain and	nage features-monitor maintain)	Chamber o	of Mines Guidelines		
Measures 2: 'Waste'/'Non-Waste' removed (during Construction pro the Operational phase of the project	Erosion: Note: a cess) in these ar t. Refer to Measu	all <i>in-situ</i> soils a reas. These 'active rres 1b above.	ouried, or already vegetated during		Chamber of Mines G				
Measures 3: Soil Quality: Soil Quality reduction (reduced fertility, and increased compaction) cannot be ameliorated during the Operational phase in these areas, since the Underlying <i>in-situ</i> soils are deeple buried by 'Infrastructure' and 'waste'/'non-waste' layers.					-		So	Soil Scientist	
Impact AFTER Management	Major	Long Term	Local	High	Definite	High	-	High	



ACTIVITIES (AND ASPECTS): Platinum Group Minerals [PGM] Plant (Pumping of PGM Feed Material, Thickening and Flotation Process) - IMPACT CATEGORY: Soil Contamination – IMPACT DESCRIPTION: 1. Soil Contamination of Buried Underlying/Surrounding <i>in-situ</i> soils, 'wastes', or 'non-wastes' due to possible leakage or spills of contaminated fluid/material, and subsequent infiltration into the soils and run-off into the drainage systems											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Moderate Medium Term Site Medium Possible Medium - Medium											
Management Measures	Management Measures Time Period for Implementation Compliance with Standards										
Measures 1: Soil Contamination: M concrete pad and drain for poter processes; Ongoing implementation	Aonitor, repair le itial future spill n of appropriate	eaks, and clean up a ages; Ongoing ma pollution reducing	Immediately (leal (monitor), Contin appropriate measure maintenance),Week and e	ks and spills), Daily uously (implement es, equipment/process ly (clean concrete pad drain)	Sc	il Scientist					
Impact AFTER Management	Impact AFTER Management Moderate Short Term Site Low Possible Low - Medium										

ACTIVITIES (AND ASPECTS): Pelletizing and Sintering Plants 1 & 2 (Gaseous Emissions, Particulate Matter Emissions), Furnaces 1, 2, 3 & 4 (Gaseous Emissions, Particulate Matter Emissions), Internal Transport and Contractors Yard and Wash Bay (Gaseous Emissions, Particulate Matter Emissions), Alloys Smelting Plant Air Quality Control (Gaseous Emissions), Expansion of the Tap Hole Fume Extraction System (Gaseous Emissions, Particulate Matter Emissions, Scrubber Effluent) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination due to the settling of dust on the downwind soil surface (i.e. SMELTER FALLOUT),[Unlikely infiltration of Scrubber Effluent spillages – not discussed]

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Regional	High	Definite	High	-	Medium
Management Measures				Time Period for	Implementation	Compliance with Standards		
Measures 1: Soil Contamination: C (already collected, and stored in de downwind (mostly) areas that are is potential identified issues; Monito Ongoing implementation of approp Ongoing maintenance of equipmen Clean up and dispose of accumulat over haul truck bins to limit dus electrical' areas only!![Maintain c spillages].	ontaminated Lar sep freeze) must impacted by Sme or emissions and priate pollution t and processes t ted 'waste' mater st; Spray water oncrete pad and	Id Assessment soil be analysed and in lter Fallout, as wel dust, both in the reducing measures that are designed t rial layers (particu to limit blown du d drain for poten	n-waste' samples order to identify solutions to any ownwind areas; rrently in place; issions and dust; Farpaulin covers 'non-heat'/'non- crubber effluent	Immediately (Co Assessment analy interpretation of Continuously (monito implement appro equipment/process m covers on haul true intervals on a daily 'safe' 'non-heat'/'non-	ontaminated Land ses of samples and if resultant data), or emissions and dust, opriate measures, naintenance, tarpaulin cks), Periodically at basis (spray water in electrical' areas only!!)	So	il Scientist	
Impact AFTER Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High



ACTIVITIES (AND ASPECTS): Fuel Supply (Diesel Fuel Tanks) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination of Buried Underlying/Surrounding <i>in-situ</i> soils due to accidental spillages (diesel) and subsequent infiltration into the soils and run-off into the drainage systems											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High		High			
Management Measures Time Period for Implementation Compliance with Standards											
Measures 1a: Soil Contamination tank/vehicle filling site (if not cu Report, monitor and clean up accid	n: Construct a s urrently present ental spillages in	loped concrete pa); Clean concrete 1mediately.	ump at the fuel mp periodically;	Immediately (spills), Weekly (clean concrete pad and sump)		Soil Scientist					
Measures 1b: Soil Contamination run-off and keep 'clean' water a vegetation) of the 'dirty' water run water diversion drains/berms. T derived from elsewhere from enter	: Maintain local away); Maintain n-off intercept d he aforemention ing this area.	drainage features optimum functio rains/berms to the ned will limit 'dirt	Quarterly (drainage main	features-monitor and ntain)	Soil Scientist						
Impact AFTER Management	Minor	Short Term	Site	Low	Possible	Low	-	High			

ACTIVITIES (AND ASPECTS): Morula Mining Shaft Complex (Conveyors) - IMPACT CATEGORY: Soil Contamination, Soil Erosion - IMPACT DESCRIPTION: 1. Soil Contamination of the Underlying/Surrounding *in-situ* soils/'waste'/'non-waste' due to rainfall infiltrating/leaching through the spilled material from the conveyor, as well as blown dust. 2. Soil Erosion of the Local/Surrounding bare (devoid of vegetation)surfaces due to the run-off of rainfall.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High
Management Measures		-		Time Period for	Implementation	Compliance with Standards		
Measures 1: Soil Contamination: S materials that are to be transpor conveyor, the aforementioned for d	weep up spilled ted by conveyor lust suppression	material periodica r before these ma	ter onto the raw leposited on the	Monthly (sweep u Continuously (sp suppr	p spilled materials), ray water for dust ession)	Chamber of Mines Guidelines and Soil Scientist		
Measures 2: Soil Erosion: Mo (direct/contain 'dirty' water runoff cover in the surrounding areas; M spread out on those sections of the grazing or burning allowed.	onitor soil ero: f and keep 'clean Mature seeded g le surrounding a	sion and Mainta ' water away).Main grass may be mow preas that display a	Quarterly (drainage main Biannually (monin vegetative cover - spr after- t	features-monitor and atain), tor soil erosion and ing before- and autumn he rains)	Chamber of Mines Guidelines			
Impact AFTER Management	Minor	Short Term	Site	Low	Possible	Low	-	High



ACTIVITIES (AND ASPECTS): Raw Materials Stockpile Area 1 and 2 (Storage of Raw Materials) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination of Buried Underlying/Surrounding <i>in-situ</i> soils (or 'wastes' and 'non-wastes') due to the infiltration/leaching of 'dirty' water and rain water through the raw materials into the soils and run-off into the drainage systems, as well as the contamination of downwind soils due to the settling of blown dust. <i>Note:</i> Soil compaction is not an issue since the underlying soils are deeply buried											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	Medium			
Management Measures			-	Time Period for	Implementation	Complian	ce with Standards				
Measures 1a: Soil Contamination: (if present) periodically when new Institute all possible measures (e.g. water and rain water into drains, ra <i>situ</i> soils (underlying the area) and Do not spray excessive volumes o stockpiles as this may lead to anthracite/coal (and other potent during the rainy season for the sar to limit dust. Soil compaction is not	Sweep up accum cessary; Constru secondary drair ather than allowi d water-tables; S f water (that dra 'acid rock dra cially polluting) ne reason. Tarpa can issue since th	ct concrete pads is, and berms) to en ng trapped water t pray water for rav ains through the p inage' to the un stockpiles with a fulin cover over ha the underlying soils	the concrete pad ot already exist. run-off of 'dirty' nto the buried <i>in</i> - ust suppression; e anthracite/coal yers; Cover the permeable sheet rail vehicle bins uried.	Immediately (const When necessary Daily (sp Continuously (ta	truct concrete pads), -monthly (sweep), ray water), rpaulin bin cover)	Chamber o	of Mines Guidelines				
Measures 1b: Soil Contaminativegetation) of the 'dirty' water runwater diversion drains/berms. Tderived from elsewhere from enter	ion: Maintain o n-off intercept d 'he aforemention ring these areas.	optimum function rains/berms to the ned will limit 'dirt	Quarterly (drainage features-monitor and maintain)		Chamber o	Chamber of Mines Guidelines					
Impact AFTER Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			



ACTIVITIES (AND ASPECTS): Ferrochrome Break Floor Area (Mechanical Activity), Finished Product Plant (Storage of Final Product), Primary Chrome Recovery Plant (Stockpiling of Product), Product Rail Dispatch Area (Product Stockpiles) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination of Buried Underlying/Surrounding <i>in-situ</i> soils (or 'wastes' and 'non-wastes') due to the infiltration/leaching of 'dirty' water and rain water through the final product into the soils and run-off into the drainage systems, as well as the contamination of downwind soils due to the settling of blown dust. <i>Note:</i> Soil compaction is not an issue since the underlying soils are deeply buried										
	SIGNIFICANCE	+/-	Confidence							
Impact BEFORE Management	BEFORE Management Moderate Long Term Local Medium Possible Medium -									
Management Measures					Time Period for	Implementation	Compliance with Standards			
Measures 1a: Soil Contamination periodically when necessary; Instit encourage the run-off of 'dirty' w water to infiltrate into the buried <i>i</i> for chrome fines dust suppression dust.	When necessary Daily (spi Continuously (ta	-monthly (sweep), ray water), rpaulin bin cover)	Chamber c	of Mines Guidelines						
Measures 1b: Soil Contaminati vegetation) of the 'dirty' water rur water diversion drains/berms. T derived from elsewhere from enter	Quarterly (drainage fe maintain)	eatures-monitor and	Chamber of Mines Guidelines							
Impact AFTER Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	Medium		



ACTIVITIES (AND ASPECTS): Existing and New Salvage Yard (Yard Footprint) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination of Underlying/Surrounding in-situ soils due to Seepage of 'dirty' water below Yard Footprint and Run-off										
	Magnitud	e Duratio	n Scal	e Consequ	ience	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Major	Medium Te	erm Loca	l Medi	ım	Definite	Medium	-	High	
Management Measures		Time Period for	· Implementation	Complian	Compliance with Standards					
Measures 1a: Soil Contaminati materials/chemicals or oils. Perio material that accumulates overly appropriate facility) or re-process for dust suppression when necessa unwanted materials as soon as post	ion: Monito dically Scrap ing the conc as applicable ry. Maintain sible.	and Clean u e off the overbu rete pads or <i>in</i> Periodically cle the roofed area a	rdous fines in an water cell off	Immediately (clean or immediately after pads), Monthly (sc 'waste' or 'non-waste' necessary (spra (maintenance of roo re-use or selling of	up spillages), Monthly, a spill (clean concrete rape up accumulated 'fines materials), When y water), Ongoing fed area and pads, and unwanted materials)	Chamber of Mines Guidelines and Authors opinion				
Measures 1b: Soil Contamination and vegetation) of the earth 'clean Yard Footprint, together with its a as the earth 'dirty' water intercep Footprint. The aforementioned wi well as intercept 'dirty' water run-c	Quarterly (drainage mai	Quarterly (drainage features-monitor and maintain) Chamber of Mines Gu		of Mines Guidelines						
Impact AFTER Management	Minor	Short Term	Site	Low		Possible	Low	-	High	



ACTIVITIES (AND ASPECTS): Re-Use [Screening, Stockpiling, Internal Use and /or Selling] of Slag Sand at the Fine Slag Processing Plant (Feed Material from CRP, Screening and Separation Plant, Spiral Plant, Fine Chrome Bin (Product), Slag Sand, Water Recovery Sumps), Re-Use [Screening, Stockpiling, Internal Use and /or Selling] of Coarse Slag at the CRP (Screening Plant, Stockpiling of Coarse Slag). Slag Stockpiling Areas (Storage of Slag), Primary Chrome Recovery Plant (Current Arising Slag Loading, Crushing and Screening Plant) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination of Buried Underlying/Surrounding insitu soils (or 'wastes' and 'non-wastes') due to the infiltration/leaching of 'dirty' water and rain water through the 'waste' slag/slag sand materials into the soils and run-off into the drainage systems, as well as the contamination of downwind soils due to the settling of blown dust. Note: Soil compaction is not an issue since the underlying soils are deeply buried

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	High	
Management Measures					Time Period for	Implementation	Compliance with Standards		
Measures 1a: Soil Contamination accumulated slag layer that is spr daily generated slag on a continual or re-process scraped up slag as Institute all possible measures (e.g water and rain water into drains, ra <i>situ</i> soils (underlying the area) and	: Firstly, scrap ead out over e ongoing basis applicable; Ta secondary dra ather than allow water-tables; S	e up and remo xtensive areas (especially in s rpaulin cover ins, and berms ving trapped w Spray water for	ally thick historically crape up and remove the rainy season); Sell uck bin to limit dust. ge the run-off of 'dirty' rate into the buried <i>in</i> - ssion.	Immediately (scra historical slag layer), up generated da Continuously (tarpaul Daily (sp	pe up accumulated Continuously (scrape ily slag material), in haul tuck bin cover), ray water)	Chamber of Mines Guidelines			
Measures 1b: Soil Contaminativegetation) of the 'dirty' water runwater diversion drains/berms. Therived from elsewhere from enter	ion: Maintain n-off intercept 'he aforementi 'ing these areas	optimum fun drains/berms oned will limi s.	Quarterly (drainage features-monitor and chamaintain)		Chamber of	Chamber of Mines Guidelines			
Impact AFTER Management	Major	Long Term	Site	High	Definite	High	-	High	



ACTIVITIES (AND ASPECTS): Expansion of the OB Plant Tailings Storage Facility [TSF] (Clearance of Vegetation, Stabilisation of Facility Walls, Disposal to TSF), HERNIC Tailings Storage Facility [TSF] and Return Water Dam [RWD] (Disposal to TSF), Platinum Group Minerals [PGM] Plant (Pump Tailings to TSF) - IMPACT CATEGORY: Soil Contamination, Soil Erosion, Soil Quality - IMPACT DESCRIPTION: 1a. TSF: Soil Contamination of the Underlying/Surrounding *in-situ* soils due to Seepage of 'dirty' water below TSF and through walls; or due to Erosion of Tailings on side-slopes of the TSF; or due to over-topping of the TSF. 1b. Piping: Soil Contamination of the Underlying/Surrounding *in-situ* soils due to seepage of leaked/spilled tailings slurry from piping. 2a. TSF: Soil Erosion of Soil paddock walls , 'clean' water diversion drains/berms, and 'dirty' water intercept drains/berms; due to rainfall run-off on possibly excessive side-slopes (>6.4 degrees, 11.2 % percentage grade), as well as due to possible poor vegetative cover. 2b. Piping: Soil Erosion of Earth ('Topsoil' or Other material) Bund Walls and Underlying/Surrounding *in-situ* soils due to rainfall run-off or possible run-off from leaking piping, as well as due to possible poor vegetative cover (or non-vegetated) on bund walls. 3a. TSF: Soil Quality reduction of the vegetated (grass) soil paddock walls and drain berms due to possible non-fertilisation.3b. Piping: Soil Quality reduction of the vegetated (grass) earth bund walls due to possible non-fertilisation.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Long Term	Local	High	Possible	High	-	High
Management Measures					Time Period for	· Implementation	Complian	ce with Standards
Measures 1a: Soil Contamination text) are likely to have addresse Expansion area. In the Existing TS the TSF (i.e. few moist soils attribu- indicating that the Existing TSF is v via the downslope boreholes. Tailin the paddock walls upslope of the p- (unlikely to be any since over-topp re-deposit on top of the TSF. Mor vegetation) of the earth 'clean' wat together with its adjacent soil ben 'dirty' water intercept drain/be aforementioned will limit 'clean' v	(TSF): The 'N ed the majorit F area, the soil utable to the T well constructed addocks; Imme bing of the TSF nitor and main ter diversion du rm (entire leng rm surroundin water run-off epage derived	ew' Activities y of the pote survey indica SF in a downsl d.Monitor soil n the side slop diately scrape is carefully co tain optimum rain surroundi th on the down of the down rom entering from the TSF re	Monitoring of Contan as per Groundwater S recomme Immediately (scrape spills from Quarterly (drainage main	nination (ongoing basis Specialist Study Report endations), up and remove tailings a paddocks), features-monitor and ntain)	Chamber o Groundwa R Auth	of Mines Guidelines, ter Specialist Study eport, and lors opinions		
Measures 2a: Soil Erosion (TSF): I paddock walls and drain berms; paddock walls and drain berms to Mature seeded grass may be move drain berms in sections that display	Monitor soil ero Soil Erosion r < 6.4 degrees (1 n from elsewhe y a poor grass b	osion and main nay be reduce 11.2 % percent re and then sp basal cover; No	tain the veget ed by reducin age grade) wi read out on t grazing or bu	tative cover of the soil ng side-slopes of the here necessary. he paddock walls and urning allowed.	Biannually (monitor soil erosion and vegetative cover / maintain soil paddock and berm walls - spring before- and autumn after- the rains)		d Chamber of Mines Guidelines	
Measures 3a: Soil Quality (TSF):: every 3 -4 years in spring in order thereby limiting soil erosion and co	Sample/Fertiliz er to maintain ontinually refre	te the soil pad soil fertility a shing the repro	dock walls a nd vegetative oductive seed	nd drain berms once e (grass) basal cover, l-bank.	Once every 3-4 years sample ar	s (fertility monitoring: nd fertilise)	Chamber of Mines Guidelines	
Measures 1b: Soil Contamination immediately; as well as that spil pipelines where necessary.	on (Piping):Cle led from haul	an up tailing trucks (if an	s from pipel y); Monitor,	Immediately (clean up leaked or spilled tailings), Daily (monitor for piping leaks – may also be indicated by a drop in slurry pressure), Immediately (repair slurry piping leaks)		Chamber o	of Mines Guidelines	



Measures 2b: Soil Erosion (Pipi ('topsoil' or other) Bund walls (veg maintain the vegetative cover of th side-slopes of the bund walls to < 6 seeded grass may be mown from el display a poor grass basal cover; No	ng):Monitor s getated) along he earth bund 5.4 degrees (11 lsewhere and t o grazing or but	oil erosion and l the entire length o walls; Soil Erosion 2 % percentage g hen spread out on ming allowed.	Biannually (monit vegetative cover / ma - spring before- and a	tor soil erosion and intain earth bund walls utumn after- the rains)	Chamber o	of Mines Guidelines	
Measures 3b: Soil Quality (Piping) spring in order to maintain soil fe erosion and continually refreshing	Once every 3-4 years sample ar	s (fertility monitoring: ad fertilise)	Chamber o	of Mines Guidelines			
Impact AFTER Management	Moderate	Medium Term	Site	Medium	Possible	Medium-Low	High



ACTIVITIES (AND ASPECTS): Decommissioning of two Historic Slimes Dams (Excavate Historic Slimes, Transport Historic Slimes to H:H Slimes Dam, Dispose Historic Slimes on H:H Slimes Dam), Decommissioning of Phase 1 of the H:H Slimes Dam (Capping of H:H Slimes Dam), Decommissioning of the Morula Dewatering Dam (Dewatering of Dam, Removal of Contaminated Sediment on Basin, Flatten and Shape Dam Walls, Re-vegetate) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination of the Underlying/Surrounding Soils and Water-Tables due to the Infiltration/leaching of rain water through 'waste' or residual 'waste' layers, and the resultant Seepage of 'dirty' water below dam.2. Soil Erosion due to excessive side-slopes and possibly poor vegetative (grass) basal cover.3. Soil Quality reduction due to possible non-fertilisation.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High	
Management Measures	-				Time Period for Implementation		Complian	Compliance with Standards	
Measures 1: Soil Contamination Decommissioning (Refer to Co compacted-'re-moulded' vertic s appropriate impermeable Memb an overlying compacted -'re-m possibly a compacted-'re-mould likely to be an issue. Monitor and of the earth 'clean' water diversi features, together with the drain as the earth 'dirty' water inte decommissioned features. The a rehabilitated feature areas, as w rehabilitated feature areas respe	a: The features construction Ta coil 'seal' layer orane liner seal noulded' vertic ed' vertic soil d maintain opt on drain surro s adjacent soil ercept drain/b aforementione ell as intercep octively.	will have been s ables): - Two H , - Phase 1 of H:I s to prevent infil s soil 'seal' laye (seal' layer, Thus imum functioning unding the upslo berm (entire lengerm surroundin d will limit 'clean t 'dirty' water see	Decommissioning /'n 'New' Activities (R Tables), Quarterly monitor ar	rehabilitation' of these efer to Construction (drainage features- ad maintain)	Chamber o	of Mines Guidelines			
Measures 2: Soil Erosion: The f percentage grade) during Decon not likely to be an issue. Monito Mature seeded grass may be mon that display a poor grass basal co	eatures will ha mmissioning (l or and maintai wn from elsew over; No grazin	ave ideally been a Refer to Construc n soil erosion and here and then sp g or burning allow	re-sloped to < ction Tables). d vegetative o read out on th wed.	< = 5.7 degrees (10 % Thus, soil erosion is cover on the features; he features in sections	Biannually (monitor soil erosion and vegetative cover / maintain side-slopes - spring before- and autumn after- the rains)		Chamber of Mines Guidelines		
Measures 3: Soil Quality: T Decommissioning (Refer to Cons in order to maintain soil fertility and continually refreshing the re	The features struction Table y and vegetative productive see	will have been s). Sample/Fertil /e (grass) basal (ed-bank.	Once every 3-4 years (fertility monitoring: sample and fertilise)		Chamber of Mines Guidelines				
Impact AFTER Management	Minor- Moderate	Short-Long Term	Site-Local	Low-Medium	Unlikely-Possible	Low-Medium	-	High	



ACTIVITIES (AND ASPECTS): Morula Mining Opencast Operation (Steep Slopes / Uneven Surfaces, Existence of the Void) - IMPACT CATEGORY: Soil Distribution (Subsidence) - IMPACT DESCRIPTION: 1. Soil Contamination of the Surrounding in-situ soil areas as a result of 'dirty' rainwater run-off and blown dust from the Opencast area

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High
Management Measures	-	-			Time Period for	Implementation	Complian	ce with Standards
Measures 1a: Soil Contamination rock and fines) around the outer only along those sections where Construction phase (certain section this berm feature is to intercep Vegetated 'topsoil' stockpile ber (downslope) of the 'softs' berms previously stripped during the 'topsoiling' purposes during the beneficial during mechanical op 'topsoiling' process as the raised trucks and vehicle traffic must of Although extensive sections of th graded (re-sloped) [as indicated still remain to be 'topsoiled' a opencast area have not yet bees back-filled with potentially non completion of these rehability and closure phases of the p Impact/Mitigation Tables for the	on: Construct a boundary of t to boundary of t to this feature tions, particula pt 'dirty' wate rms should all s. These 'topso construction closure phase. berations relat d moisture cor bey speed limit ne opencast are on the map set nd re-vegetate n re-graded, w n-polluting spe ation operatio project. Detaile closure phase	a vegetated berm f he opencast (rock d was not already pr irly along the south r rainfall run-off o ready exist (as they cil' 'stockpile' berm phase, and that w The spraying of w the spraying of w ted to the back-fill itent will in this ca is in order to reduce a have been back-fill to the term 'level' ed. Furthermore, n chile two opencast pil, waste rock, an ons will be ongoin ed rehabilitation i	Immediately durin (surrounding 'softs established during th Immediately when r water during bac Continuously (speed and ve Continuously or Operational and Closu re-grading/'topsoili veget	g Operational phase ' berm, if not already he construction phase), hecessary (spraying of ck-filling process), I limits for haul trucks ehicles), ngoing during the hre phases (back-filling, ng'/soil sampling/re- tation)	Chamber o	of Mines Guidelines		
Measures 1b: Soil Contamin vegetation) of the 'dirty' water water diversion drains/berms. derived from elsewhere from see	ation: Mainta run-off interce The aforemer	in optimum func pt drains/berms to ntioned will limit ' e areas.	Quarterly (drainage features-monitor and maintain)		Chamber of Mines Guidelines			
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	-	High



ACTIVITIES (AND ASPECTS): Morula Mining Shaft Complex (Emergency ROM Stockpile), Mine Waste Rock Dump (Storage of Waste Rock on Un-lined Footprint), Re-Use of Mine Waste Rock at the Mine Waste Rock Stockpile (Crushing and Screening Plant, Stockpiling of Waste Rock Product), Ore Beneficiation Plant-Crushing and Screening (Transport of Ore, Crushing and Screening, Storage of Mixed Materials), Mixed Material Stockpiling and Screening (Storage of Mixed Materials), Returns Materials Stockpiles (Storage of Returns Materials) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination of Buried Underlying/Surrounding *insitu* soils (or 'wastes' and 'non-wastes') due to the infiltration/leaching of 'dirty' water and rain water through the surface materials into the soils and run-off into the drainage systems, as well as the contamination of downwind soils due to the settling of blown dust.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	High
Management Measures	-				Time Period for	Implementation	Complian	ce with Standards
Measures 1a: Soil Contamination spread out in these sites before (e.g. secondary drains, and berr drains, rather than allowing tra some of these areas) and water-t truck bins to limit dust.	on: Scrape up a commencing ns) to encoura pped water to ables; Spray w	and process the his with new material ge the run-off of ' o infiltrate into the ater for dust suppre	Immediately (historio Continuously (tai Daily (sp	cal accumulated layer), rpaulin bin cover), ray water)	Chamber o	of Mines Guidelines		
Measures 1b: Soil Contamin vegetation) of the 'dirty' water i water diversion drains/berms. derived from elsewhere from ent	ation: Mainta run-off interce The aforeme tering these are	in optimum func pt drains/berms to ntioned will limit eas.	Quarterly (drainage main	features-monitor and ntain)	Chamber o	of Mines Guidelines		
Impact AFTER Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High



ACTIVITIES (AND ASPECTS): Ore Beneficiation Plant -Lumpy Section HMS Plant (HMS Waste Material), Primary Chrome Recovery Plant (Stockpiling of Waste), OB Plant Fines in Open Pit-Slurry (Disposal of OB Plant Fines in Open Pit), OB Plant Coarse Waste in Open Pit-Trucks (Disposal of OB Plant Coarse Waste in Open Pit) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination of Buried Underlying/Surrounding in-situ soils (or 'wastes' and 'non-wastes') due to the infiltration/leaching of 'dirty' water and rain water through the 'waste' materials into the soils and run-off into the drainage systems, as well as the contamination of downwind soils due to the settling of blown dust. Note: Soil compaction is not an issue since the underlying soils are deeply buried										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Major	Long term	Local	High	Definite	High	-	High		
Management Measures					Time Period for	Implementation	Complian	ce with Standards		
Measures 1a: Soil Contamination layer that is spread out over exter basis (especially in spring before concrete slabs, secondary drains water into drains, rather than a (underlying the area) and water- opencast pit (if potentially non-p polluting); Tarpaulin cover over (if any)	n: Firstly scrap ensive areas; C e the rainy seas s, and berms) allowing trapp tables; Spray v colluting) or a c haul truck bin	the up and remove to lean up and remove son); Institute all p to encourage the red water to infiltr vater for dust supp lesignated 'waste' s to limit dust; Bund	ated historical 'waste' n a continual ongoing asures (e.g. additional dirty' water and rain e buried <i>in-situ</i> soils insport 'wastes' to the lity (TSF if potentially g slurry piping routes	Immediately (scra historical 'v Continuously (gene Continuously (tar Daily (sp	upe up accumulated vaste' layer), rated daily 'wastes'), rpaulin bin cover), ray water)	Chamber c	of Mines Guidelines			
Measures 1b: Soil Contamina vegetation) of the 'dirty' water r water diversion drains/berms. derived from elsewhere from ent	Quarterly (drainage main	Quarterly (drainage features-monitor and maintain) Chamber of Mines Guide								
Impact AFTER Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High		



ACTIVITIES (AND ASPECTS): Rehabilitated Quarry Area (Uneven Surfaces), Morula Mining Opencast Operation Rehabilitated area (Uneven Surfaces), Morula Shaft Complex Rehabilitated area (Uneven Surfaces) - IMPACT CATEGORY: Soil Erosion *versus* Land Capability; AND Soil Quality *versus* Land Use - IMPACT DESCRIPTION: 1. Soil Erosion *versus* Land Capability: potential Soil Erosion increase leading to a change in the post-rehabilitation Land Capability, as a result of excessive soil depth loss due to possible poor vegetative (grass) basal cover. 2. Soil Quality *versus* Land Use: potential Soil Quality reduction due to non-sampling/fertilisation of the soils, leading to a loss/reduction in the post-rehabilitation grass basal cover required for the stated end-land use of Extensive Grazing.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High
Management Measures	•				Time Period for	- Implementation	Complian	ce with Standards
Measures 1: Soil Erosion versu highly unlikely given that the po- Information' are generally well degrees (11.2 % percentage gra depth that currently generally well class) will not be reduced by ero already monitored the post-dist up (glean) and dispose of the s areas, since these impact on the % of surface cover.Maintain opt water run-off intercept drains drains/berms. The aforement elsewhere from entering these a	Biannually (soil er monitoring: spring after- tl Immediately Post-I rehabilitation land monitored by means Immediately Post-I needs to glean and di and p Quarterly (drainage main	osion and vegetative before- and autumn he rains), Rehabilitation (post- d capability already of current soil survey), Rehabilitation (client spose of surface stones rocks), features-monitor and ntain)	Chamber o	of Mines Guidelines				
Measures 2: Soil Quality <i>vers</i> Sample/Fertilize the 'topsoiled' maintain soil fertility and veg continually refreshing the repro- sustaining indigenous (to the an naturally. Mature seeded grass r areas that display a poor grass b that may sprout in the rehabil rehabilitated areas currently me Grazing. No grazing or burning a	us Land Use: rehabilitated getative (grass ductive seed-b rea) 'grasses', y nay be mown f pasal cover. Re itated (and ot ets the standar llowed until th	Monitor soil fertil areas once every 3) basal cover, the bank. Vegetative co while indigenous to rom elsewhere and move alien (non-in her) areas. The e rd required for the e post-closure phas	Immediately after rel exercise, and once eve (fertility monitoring Biannually (soil ere monitoring: spring after- the rains, a rem	nabilitation 'topsoiling' ery 3-4 years thereafter : sample and fertilise), osion and vegetative before- and autumn lso including weed toval)	Chamber o	of Mines Guidelines		
Rehabilitated Areas – General Information: The standard of the rehabilitation operations in the various areas are described: HERNIC OWNED AREAS: - Alloys Smelting Plant Facilities area (back-filled and 'topsoiled' quarry or 'borrow pit') – rehabilitated to a high standard (rehabilitated grazing capability class 'topsoiling' depth of 50 - 60cm, 2 degree slope, 10 % small surface stones in some areas acceptable);- Morula Mining Operation – Opencast Operation area (north-eastern edge of opencast) – rehabilitated to an acceptable standard (rehabilitated grazing capability class 'topsoiling' depth of 30 - 50cm, 2 degree slope, 5 % surface rocks must be removed); and - Morula Mining Operation - Shaft Complex area (band to the south of the internal tar road that divides the opencast area from the underground area) – rehabilitated to a relatively low to moderate standard						-	So	il Specialist



(rehabilitated grazing capability surface rocks must be removed).	class 'topsoilir	ng' depth of 20 -	30cm, 2 - 8 d					
NON-HERNIC OWNED (BUT SUR back-filled and 'topsoiled' opend Former area rehabilitated to a 'topsoiling' depth of 20 - 30cm, standard (south - rehabilitated slope, 30 - 40 % surface rocks (rehabilitated grazing capability slope, 5 - 20 % surface rocks mus	VEYED) SURR cast area, and a high standar average 2 deg wilderness ca must be remo class 'topsoilir st be removed)	OUNDING AREAS two 'topsoiled' lo rd (north - reha grees evenly slop pability class 'top ved). Latter area ng' depth of 20 - 3						
Impact AFTER Management	O % surface rocks must be removed). Term of the surface rocks must be removed. TER Management Minor Short Term Site Low Unlikely Low - High							



ACTIVITIES (AND ASPECTS): Morula Mining Shaft Complex ('Topsoil' Stockpile) - IMPACT CATEGORY: Soil Quality (Fertility and Compaction), Soil Erosion, and Soil Contamination - IMPACT DESCRIPTION: 1. Soil Quality (Compaction and Fertility): Increase in soil compaction, reduction in soil fertility, and reduction of reproductive seed-bank in the pile due to excessive stockpile heights (>2.5m) as well long periods of storage before utilisation for rehabilitation 'topsoiling' purposes. 2. Soil Erosion: Increased soil erosion due to excessive side-slopes (>6.4 degrees, 11.2 % percentage grade), possible poor vegetative (grass) basal cover, and possible absence of a downslope soil berm to intercept run-off. 3. Soil Contamination: Increased soil contamination due to the accidental mixing/stockpiling of 'dirty' polluted 'waste' materials in the pile, the stockpiling of polluted soil, the seepage of polluted water into the base of the pile, or wind deposition of contaminated dust on the pile.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Medium Term	Site	Medium	Definite	Medium	-	High
Management Measures					Time Period for	Implementation	Complian	ce with Standards
Measures 1: Soil Quality: Monit 3 -4 years in spring in order to limiting soil erosion and contin should be comprised of self-sus and shrubs may re-colonise natu spread out on areas of the pile th	oring required maintain soil f nually refreshi taining indiger rally. Mature so at display a po	. Sample/Fertilize th fertility and vegetative ing the reproductive hous (to the area) 'g eeded grass may be r or grass basal cover.	' stockpile once every basal cover, thereby nk. Vegetative cover rhile indigenous trees m elsewhere and then g or burning allowed.	Immediately after stockpiling, and once every 3-4 years thereafter (fertility monitoring: sample and fertilise)			of Mines Guidelines	
Measures 2: Soil Erosion: Monit grade) and a high grass basal co of the stockpile. The establishm stockpile will intercept run-off, siltation of the surrounds. The s pile since the stockpiled vertic to	oring required. ver (refer to M ent of a soil be /eroded soil d praying of wat psoils are not s	Reduced slopes (<= leasures 1) will limit erm (grassed) on the lerived from the sto er for dust suppress susceptible to wind e	es, 11.2 % percentage ion on the side-slopes ope boundaries of the nd will thus prevent ot be required on the	Biannually (erost monitoring: spring after- tl	ion and vegetative before- and autumn he rains)	Chamber o	of Mines Guidelines	
Measures 3: Soil Contamination to become contaminated; by m deposit contaminated 'waste' ma stockpile may be developed for 'dirty' water (or 'waste'). 'Wast Maintain optimum functioning intercept drains/berms to the H aforementioned will limit 'dirty' these areas. The spraying of recommended) will limit dust po	i: Monitoring re- eans of the in- aterials on the ' soils that wer te' must be id (remove silta PCD's, as well and 'clean' ru water for d llution of the 't	equired. The 'topsoil' nplementation of th 'clean' 'topsoil' stock e previously (before entified/removed fr tion and vegetation as the 'clean' water .n-off water derived lust suppression in opsoil' stockpile.	Annually (contami Quarterly (drainage main	nation monitoring), features-monitor and ntain)	Chamber o	of Mines Guidelines		
Measures - General Information the operational phase (i.e. further stripped as per the depths ind construction and operational ph machinery for stripping/stock wheeled), and should operate du to stockpile the soils wherever it in an area that is being rehabilitat stockpiling of excess 'topsoil'	Operatio	onal phase	Chamber o	of Mines Guidelines				



phase.Implement any of the aforementioned measures that are not already in place.								
Impact AFTER Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High



ACTIVITIES (AND ASPECTS): Morula Mining Shaft Complex (Decline Shafts), Morula Mining Underground Operation (Underground Mining) - IMPACT CATEGORY: Soil Distribution (Subsidence) - IMPACT DESCRIPTION: 1. Loss of Soil Distribution due to possible Surface Subsidence in cases where the underground mining is either conducted relatively close to the soil surface, or alternatively where an insufficient density of un-mined underground pillars are left intact in order to support the 'roof' from collapse. Impacts of underground 'roof' collapse may include limited differential surface subsidence, localised soil erosion in areas of resultant increased slope, an interruption to the free-drainage of surface water, the artificial surface ponding of water in patches, and infiltration of water into the underground area via cracks in the rock sub-strata. 2. Resultant Potential Change in Land Capability. E.g. arable, grazing, or non-grazing capability class; may change to the anthropogenic wetland in patches. 3. Resultant Potential Change in Land Use. E.g. cultivated areas or grazing grasslands; may change to non-productive anthropogenic wetland in patches.

-	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Possible	Medium	-	High
Management Measures					Time Period	for Implementation	Compliand	ce with Standards
Measures 1: Soil Distribution: A underground design. Re-grade (vertic broad soil group that ov draining final topography. The id slope grade, slope shape (contor 'topsoil') and re-vegetation (loca flow of rainfall run-off and limit use in repair work during the functioning (remove siltation an PCD's, as well as the 'clean' wa 'clean' run-off water derived from	a sufficient safe (re-slope) to a rerlies the uno deal aim (usua urs), drainage ally indigenous e rosion. Thus e operational, d vegetation) ater diversion n elsewhere fro	ety factor (leaving slope of <= 6.4 lerground mining lly not entirely p density and drai grasses) may be , limited 'topsoil' closure and po of the 'dirty' wat drains/berms. T om entering these	Operational pha Immediately a grading/'tops during the Ope Post-Closure p Quarterly (drai and	ase (un-mined pillars), after subsidence (re- oiling'/re-vegetation erational, Closure, and ohases of the project), nage features-monitor maintain)	Chamber o	f Mines Guidelines		
Measures 2: Land Capability: Refinal topography.	e-grading and	limited 'topsoilin	g' in order to	re-establish a free draining	Immediately a grading/ 'tops during the	Immediately after subsidence (re- grading/ 'topsoiling'/ re-vegetation during the Operational Phase		
Measures 3: Land Use: Re-grad topography, as well as re-vegetat establish the pre-disturbance lan	ling and limite tion of 'topsoil id use.	d 'topsoiling' in o ed' or re-graded a	order to re-es areas in order	stablish a free draining final to limit soil erosion and re-	Immediately after subsidence (re- grading/ 'topsoiling'/ re-vegetation during the Operational Phase			f Mines Guidelines
Subsided Areas - General Information may be relevant) could be unstated surface. Underground mining materia the probability is considered term. Nevertheless, the method for Mitigation Measures are equated of the project, the aforemention they occur. Thus, the current subsequent phase of the project.	rmation: Area ble, and partic ay also exist a ed negligible th for rehabilitati lly applicable oned since su t Table will b ct.	s of underground rularly so when the t the non-HERNI hat underground ng subsided areas to the Operation bsided areas m e largely replic	Immediately a grading/ 'tops during the	after subsidence (re- oiling'/ re-vegetation Operational Phase				
Impact AFTER Management	Minor	Long Term	Site	Medium	Unlikely	Low	-	High



ACTIVITIES (AND ASPECTS): New Morula PCD, New Storm Water PCD No. 1, New Storm Water PCD No. 2, New Storm Water PCD No. 3, New Storm Water PCD No. 4, New OB Plant Process Water Dam, New Plant Process Water Dam, New CRP Process Water Dam (Clearance of Vegetation, Storage of Process Water). Morula Mining Shaft Complex (Water Storage Dams), Morula Dewatering Dam (Storage of Process Water), H:H Slimes Dam and Return Water Dam [RWD] (RWD Dam), HERNIC Tailings Storage Facility [TSF] and Return Water Dam [RWD] (RWD Dam), Plant Process Water Dam and Silt Traps (Storage of Process Water), OB Plant Return Water Dam (Storage of Process Water), Chrome Recovery Plant Process Water Dam (Storage of Process Water), Plant Storm Water Pollution Control Dam [PCD] (Storage of Process Water), Emergency Dam (Expansion of the Storm Water Process Water Dam. Currently not Operational) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination and Soil Erosion due to a possible shortage of pollution control and process water dams; as well as in some instances a possible poor construction technique in the past. 2a. Soil Contamination of the Underlying/Surrounding in-situ soils due to seepage of 'dirty' water below the base of- or through the walls of- the dams; as a result of being either poorly sealed (impermeable membrane liner) or poorly compacted (compacted-'remoulded' soils) bases/walls. 2b. Soil Contamination of the 'topsoiled' (some instances) dam walls due to the dumping of 'dirty' sludge materials derived from the dredging of the base of the dams. 3. Soil Contamination of the 'topsoiled' (some instances) dam walls due to possible excessive side-slopes (>6.4 degrees, 11.2 % percentage grade), or alternatively possible poor vegetative (grass) basal cover. 4. Soil Quality reduction of the 'topsoiled' (some instances) dam walls due to possible excessive side-slopes (>6.4 degrees, 11.2 % percentage grade), or alternatively possible poor vegetative (grass) basal cover. 4. Soil Quality reduction of the 'topsoiled

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Long Term	Local	High	Possible	High	-	Medium
Management Measures	-				Time Period for Implementation Compliance with Stand			ce with Standards
Measures1: Soil Contamination orange text) are likely to have ad	and Soil Eros dressed the ma	ion: The 'New' A ajority of these is	ctivities and sues.	Aspects (indicated in	Refer to Cons	Refer to Construction phase Chamber of Mines Guidelin		
Measures 2a and 2b: Soil Conta features. Monitor and maintain of 'dirty' water intercept drain dow length on the downslope side). disposed of in the TSF (high pol dam/drain walls or in surroundi	mination: 2a. optimum functi vnslope of eac 2b. Dredged llution potentiang areas.	Monitor seepage oning (remove si h dam, together material from th al) or re-process	Quarterly (dams-me Quarterly (drainage mair Annually (dredgin	onitor and maintain), features-monitor and ntain), g where necessary)	Chamber o	of Mines Guidelines		
Measures 3: Soil Erosion: Moni the 'topsoil' dam walls. Soil Eros % percentage grade) where new then spread out on the dam wa allowed.	tor soil erosion ion may be rec cessary. Matur ills that displa	n, and monitor an luced by reducing e seeded grass n y a poor grass b	nd maintain t g side-slopes nay be mown pasal cover; N	he vegetative cover of to < 6.4 degrees (11.2 from elsewhere and lo grazing or burning	Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains)		Chamber o	of Mines Guidelines
Measures 4: Soil Quality: Sampl in order to maintain soil fertility and continually refreshing the re	Once every 3-4 years (fertility monitoring: sample and fertilise)		Chamber o	mber of Mines Guidelines				
Impact AFTER Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High



ACTIVITIES (AND ASPECTS): Groundwater Treatment Plant (Settling Pond A & B, Dosing Pump) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination of Buried Underlying/Surrounding <i>in-situ</i> soils due to possible leakage or spills of contaminated groundwater, and subsequent infiltration into the soils and run-off into the drainage systems										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Moderate	Medium Term	ium Term Site Medium Possible Medium - Medium							
Management Measures	-				Time Period for I	mplementation	Complian	ce with Standards		
Measures 1: Soil Contamination: Monitor, repair leaks, and clean up accidental spillages. Immediately (leaks and spills), Daily (monitor) Soil Scientist										
mpact AFTER Management Minor Short Term Site Low Possible Low - Medium										

ACTIVITIES (AND ASPECTS): Plant Drinking Water Dam (Dam Footprint), Plant Drinking Water Dam Treatment Plant (Sand Filters, Chlorination Pump) - IMPACT CATEGORY: Soil Contamination, Soil Erosion - IMPACT DESCRIPTION: 1. Soil Contamination of the Underlying/Surrounding *in-situ* soils due to seepage of 'dirty' water below the base of- or through the walls of- the dam; as a result of being either poorly sealed (impermeable membrane liner) or poorly compacted (compacted 'remoulded' soils) bases/walls.2. Soil Erosion of the 'topsoiled' dam wall due to excessive side-slopes (>6.4 degrees, 11.2 % percentage grade) on some sections and poor vegetative (grass) basal cover.3. Soil Quality reduction of the 'topsoiled' dam wall due to possible non-fertilisation.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Major	Medium Term	Site	Medium	Possible	Medium	-	Medium	
Management Measures					Time Period for Implementation		Complian	Compliance with Standards	
Measures 1: Soil Contamination dam, and levels of thus 'dirty' wa and maintain this existing featur pollution) reservoir that stores in terms of human health (in rele- poorly sited, will become contam due to the following points: La position from the plant; high dus to seal a potentially non-polluti some sections of the lower walls.	Immediately (remov from the lo Monthly (monit contamination and s existing Immediately (upgrado necessary in relevan re-locate if feature	e any dumped 'waste' ower walls), or levels of water eepage; and maintain feature), e to reservoir if deemed t Specialist Reports, or e will remain a dam)	Soil Scientist						
Measures 2: Soil Erosion: Moni the 'topsoil' dam walls. Soil Eros % percentage grade) where ne- then spread out on the dam wal burning allowed.	he vegetative cover of to < 6.4 degrees (11.2 from elsewhere and l cover; No grazing or	Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains)		Chamber of Mines Guidelines					
Measures 3: Soil Quality: Although 'topsoil' dam walls should normally be fertilised once every 3 – 4 years, the walls of the 'drinking water dam' should not, the aforementioned since fertiliser may leach into the dam with rainfall run-off.					-		Soil Scientist		
Impact AFTER Management	Major	Medium Term	Site	Medium	Possible	Medium	-	Medium	



ACTIVITIES (AND ASPECTS): Mine and Plant Sewage Plant (Sludge Drying Beds) - IMPACT CATEGORY: Soil Contamination, Soil Erosion - IMPACT DESCRIPTION: 1. Soil Contamination of the Underlying/Surrounding <i>in-situ</i> soils due to seepage of 'dirty' water below the base of- or through the walls of- the drying beds; as a result of being either poorly sealed (impermeable membrane liner) or poorly compacted (compacted-'remoulded' soils) bases/walls. 2. Soil Erosion of the 'topsoiled' drying bed walls due to excessive side-slopes (>6.4 degrees, 11.2 % percentage grade) on some sections and possible poor vegetative (grass) basal cover. 3. Soil Quality reduction of the 'topsoiled' drying bed walls due to possible non-fertilisation.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Short Term	Site	Low	Possibly	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measures 1: Soil Contamination into the underlying/surroundin sewage sludge material must be Opencast areas that are being re Closure phases.	: Monitor leve ng soils, and n scraped up pe ehabilitated or	ls of 'dirty' water maintain the exi priodically and ut n an ongoing bas	seepage from sting feature ilised as a 'to is during the	n the drying beds es. The dried up psoil' fertiliser in Operational and	Biannually (monitor le maintain existing feature autumn after- the rains (scrape up sludge and fertilis	vels of seepage and s - spring before- and), Annually in spring utilise as a 'topsoil' er)	Chamber o and	of Mines Guidelines Soil Scientist		
Closure phases. Tertiliser) Measures 2: Soil Erosion: Monitor soil erosion, and monitor and maintain the vegetative cover of the 'topsoil' drying bed walls. Soil Erosion may be reduced by reducing side-slopes to 										
Measures 3: Soil Quality: Sample in spring in order to maintain so soil erosion and continually refre	e/Fertilize the il fertility and eshing the repr	'topsoil' drying b vegetative (grass oductive seed-ba	ed walls once) basal cover nk.	Once every 3-4 years (1 sample and	fertility monitoring: fertilise)	Chamber o	of Mines Guidelines			
Impact AFTER Management	Minor	Short Term	Site	Low	Possibly	Low	-	High		



ACTIVITIES (AND ASPECTS): Water Supply (Canal and Pump Station), Morula Mining Opencast Operation (Water Abstraction and Pipelines) - IMPACT CATEGORY: Soil Erosion, Soil Contamination - IMPACT DESCRIPTION: 1. Soil Erosion of Underlying/Surrounding <i>in-situ</i> soils due to possible leakage of water from piping.2. Soil Contamination of the Underlying/Surrounding <i>in-situ</i> soils due to seepage of leaked/spilled oil/fuel from the pump motors (if mechanical).										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Short Term	Site	Low	Definite	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measures 1: Soil Erosion: Monitor and repair water piping leaks; Monitor and maintain earth Bund walls along piping routes. Daily (monitor for piping leaks -may also be indicated by a drop in water pressure), Immediately (repair water piping leaks), Biannually (monitor/ maintain earth bund walls - opring before, and autumn after, the ming) Chamber of Mines Guidelines								f Mines Guidelines		
Measures 2: Soil Contamination immediately; Clean concrete pad up minor oil/fuel leakage; Ongoin	 Clean up of below pumps ng maintenanc 	il/fuel spillages h in pump station e of equipment.	oelow pumps periodically, i	Immediately (clean up oil/ (clean concrete pad in pu (equipment m	fuel spillages), Monthly ump station), Ongoing aintenance)	Soil Scient	ist			
Impact AFTER Management	Minor	Short Term	Site	Low	Possible	Low	-	High		



ACTIVITIES (AND ASPECTS): New Process Water and Storm Water Canal System including Silt Traps (Reduction of Run-off to Natural Resources), Existing Storm Water Berms and Canals (Reduction of Run-off to Natural Resources) - IMPACT CATEGORY: Soil Contamination - IMPACT DESCRIPTION: 1. Soil Contamination / Soil Erosion due to a possible shortage of canals, drains or berms; as well as in some instances a possible poor construction technique in the past. 2. Soil Contamination due to seepage of 'dirty' (in some instances) water below possibly poorly compacted/sealed existing canals/drains, or due to possible siltation/vegetative growth in canals/drains. 3. Soil Erosion of the adjacent (to canals/drains) 'topsoil' berms due to either possible excessive side-slopes (>6.4 degrees, 11.2 % percentage grade), or alternatively possible poor vegetative (grass) basal cover. 4. Soil Quality reduction due to possible non-fertilisation of the 'topsoil' berms.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Long Term	Local	High	Possible	High	-	Medium
Management Measures					Time Period for	Implementation	Complian	ce with Standards
Measures 1: Soil Contamination text) are likely to have addressed	and Soil Erosi I the majority o	on:'New' Activitie of these issues.	s and Aspect	s (indicated in orange	Refer to Cons	struction phase	Chamber o	of Mines Guidelines
Measures 2: Soil Contamination vegetation) of the 'dirty' water f water diversion drains/berms. Promote water flow in the canal sealed. Dredged material from pollution potential) or re-proce surrounding areas.	: Monitor and n run-off interce The aforemen s/drains in orc the canals/dra essed (plant),	naintain optimun pt drains/berms tioned will limit ler to limit seepa ains must either but not dumped	Quarterly (drainage features-monitor and maintain), Chamber of Mi Annually (dredging where necessary)		of Mines Guidelines			
Measures 3: Soil Erosion: Monit the 'topsoil' berms. Soil Erosion percentage grade) where necess spread out on berms that display	tor soil erosior may be reduc ary. Mature se a poor grass b	n, and monitor an ed by reducing sid eded grass may b asal cover; No gra	he vegetative cover of < 6.4 degrees (11.2 % n elsewhere and then ing allowed.	Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains)		of Mines Guidelines		
Measures 4: Soil Quality:Sampl order to maintain soil fertility ar continually refreshing the reproc	e/Fertilize the nd vegetative (luctive seed-ba	'topsoil' berms o grass) basal cove ank.	Once every 3-4 years (fertility monitoring: sample and fertilise)		Chamber of Mines Guidelines			
Impact AFTER Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	Medium



ACTIVITY: Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Slag Sand at the Fine Slag Processing Plant; Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Coarse Slag at the CRP - ASPECTS: Fine Slag Processing Plant: Feed Material from CRP, Screening and Separation Plant, Spiral Plant, Fine Chrome Bin (Product), Slag Sand, Water Recovery Sumps. CRP: Screening Plant, Stockpiling of Coarse Slag - IMPACT CATEGORY: Soil Distribution, Soil Contamination - IMPACT DESCRIPTION: 1. Loss of Soil Distribution (depth/horizons) during excavation of 'clean' water diversion drain/berm and 'dirty' water intercept drain/berm, as well as during the excavation of foundation holes for structures. 2. Soil Contamination due to the settling of dust on the downwind soil surface, as well as the infiltration of rain water through the slags on site

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	High
Management Measures			Time Period for Imp	lementation	Complianc	e with Standards		
Measure 1: Excavate <i>in-situ</i> 'topso water diversion drain and 'dirty' foundation holes.	During construction/o	levelopment process	Chamber of	Mines Guidelines				
Measure 2: Spray water to limit bl. Construct an earth 'clean' water di together with its adjacent soil be 'dirty' water intercept drain downs length on the downslope side); Cor of the 'dirty' water drain to achie layer; Re-vegetate (locally indigeno	During construction/o	levelopment process	Chamber of	Mines Guidelines				
Impact AFTER Management	Major	Medium Term	Local	Medium	Definite (soil contamination)	Medium	-	High

ACTIVITY: Re-Use of Mine Waste Rock at the Mine Waste Rock Stockpile - ASPECTS: Crushing and Screening Plant, Stockpiling of Waste Rock Product - IMPACT CATEGORY: Soil Contamination - TYPE OF IMPACT: Indirect - IMPACT DESCRIPTION: 1. Soil Contamination due to the settling of dust on the downwind soil surface, as well as the infiltration of rain water through the waste rock on site

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	High
Management Measures					Time Period for Imp	lementation	Compliance with Standards	
Measure 1: Spray water to limit blown dust during construction/development/stockpiling.					During constructi stockpiling process	on/ development/	Chamber of	Mines Guidelines
Impact AFTER Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High



Table 9.2(g): Geology Operational Phase Impact and Risk Significance Table

ACTIVITY: Morula Mining Shaft Complex - ASPECT - Decline Shafts - IMPACT DESCRIPTION - Changes in lithology due to the development of the underground workings.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Definite	Medium	-	High		
Management Measures					Time Period for Implementation Con			Compliance with Standards		
Measure 1: Mining Engineer / Surveyor to inspect development of the mining shaft complex.				Operational Phase Design Speci			gn Specifications			
Impact AFTER Management	Moderate	Long Term	Site	Medium	Definite	Medium	-	High		

ACTIVITY: Morula Mining Opencast Operation – ASPECT – Backfilling of opencast pits with Waste Rock and Topsoil – IMPACT DESCRIPTION - Changes in lithology due to the backfilling of the opencast pits.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Definite	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with S			nce with Standards		
Measure 1: Relevant personnel to note and record material being backfilled into the opencast pits.				Opera	tional Phase	Water Use Licence				
Impact AFTER Management	Moderate	Long Term	Site	Medium	Definite	Medium	-	High		

ACTIVITY: Morula Mining Underground Operation – ASPECT – Underground Mining – IMPACT DESCRIPTION - Changes in lithology due to mining from the underground workings.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Definite	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with Stand					
Measure 1: Mining Engineer / Surveyor to inspect development of the underground workings.				rground workings.	Operational Phase Desigr			gn Specifications		
Impact AFTER Management	Moderate	Long Term	Site	Medium	Definite	Medium	-	High		



ACTIVITY: Pelletizing and Sintering Plants 1 & 2 – ASPECT – Structure/Complex – IMPACT DESCRIPTION - Sterilization of mineral resources due to the existence of infrastructure at the surface on potential future mining areas.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		
Management Measures					Time Period for Implementation Compliance with Stan			nce with Standards		
Measure 1: Maintain the current footprint area for the current Pelletizing and Sintering Plants during the operation thereof.				Operat	tional Phase	No				
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		

ACTIVITY: Furnaces 1, 2, 3 and 4 – ASPECT – Structure/Complex – IMPACT DESCRIPTION - Sterilization of mineral resources due to the existence of infrastructure at the surface on potential future mining areas.										
	Magnitu de	Duration	Scale	Consequence	Probability	Confidence				
Impact BEFORE Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		
Management Measures					Time Period for Implementation Compliance with Standa					
Measure 1: Maintain the current footprint area for the 4 Furnaces during the operation thereof.				Operational Phase No			No			
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		


Table 9.2(h): Groundwater Operational Phase Impact and Risk Significance Table

ACTIVITY: Fuel Supply- ASPECT: Diesel Fuel Tanks- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of fuel (hydrocarbons) from the fuel tanks.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures Time Period for Implementation Compliance with Standard											
Measure 1: Responsible personn of potential spillages / leaks. (Sou	el to inspect the arce Control Mea	Diesel Fuel Tanks sure)	and Collection	on Sumps for evidence	C	Continuously		No			
Measure 2: Any leaks and spillag to be cleaned up accordingly. (So	orted to the relevar (sure)	Immediately. le	Within 1 day of recorded ak / spillage.		No						
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Internal Roads- ASPECT: Dust Suppression- IMPACT DESCRIPTION:- Deterioration of the groundwater resource quality due to the infiltration of contaminated water used for dust suppression on internal road surface.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Perio	d for Implementation	Complia	nce with Standards				
Measure 1: No process water should be used for dust suppression. Only groundwater abstracted from the underground workings or groundwater abstracted from the groundwater remediation abstraction boreholes (once treated at the treatment plant) should be used for dust suppression. (Source Control Measure)						ontinuously	Yes (V	Vater Use Licence)			
Measure 2: Monitor & report th suppression. (Source Control Mea	e quality (quart sure)	erly) and quantity	of water used for dust	Quarterly and Monthly Yes		Yes (V	Vater Use Licence)				
Measure 3: Continue monitoring	the groundwate	r resource quality.	Quarterly Yes (Water Use Licer		Vater Use Licence)						
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			



ACTIVITY: Morula Mining Shaft Complex- ASPECT: Decline Shafts - IMPACT DESCRIPTION: Depletion in the quantity of groundwater and the formation of a groundwater cone of depression in the aquifers adjacent to the Mining Shaft Complex.											
	Magnitude	Duration	Scale	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	ment Minor Medium Term Local Low Definite Medium -										
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Minimize groundw abstraction by pumping water di adjacent abstraction boreholes. (F	vater cone of o rectly from the s Resource Directed	lepression extent haft during the op d Measure)	ize groundwater ase and not from	Con	tinuously		No				
Measure 2: Monitor groundwate zone groundwater monitoring box	r levels adjacent reholes. (Resour	to the decline sha ce Directed Measur	Qı	uarterly	Yes (W	/ater Use Licence)					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	- High				

ACTIVITY: Morula Mining Shaft Complex- ASPECT: Water Storage Dams- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and/or the infiltration of soluble contaminants into the subsurface through the footprints of the dams.											
	Magnitude	Duration	Scale	Consequence	+/-	Confidence					
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Responsible engineer Control Measure)	r to inspect and r	record the status /	he dams. (Source	А	nnually		No				
Measure 2: The water levels in Operating Level (MOL) at all time	the dams are t s. (Source Contro	o be operated be l Measure)	low the calc	ulated Maximum	Con	tinuously		No			
Measure 3: Monitor groundwa weathered zone monitoring borel	ter resource qua noles adjacent to	ality and quantity the dams. (Resour	(water leve ce Directed M	els) at dedicated ⁄leasure)	Quarterly (or as specified in the amended WUL). Yes (Water Use Licence)			/ater Use Licence)			
Measure 4: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	ls in the grour es are to be repo nediation plan. (R	dwater quality r rted and assessed, esource Directed N	Immediately	if/when identified.	Yes (N	ational Water Act)					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			



ACTIVITY: Morula Mining Opencast Operation- ASPECT: Water Abstraction- IMPACT DESCRIPTION: Depletion in the quantity of groundwater and the formation of a groundwater cone of depression in the aquifers adjacent to the opencast pits.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confider										
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High		
Management Measures				Time Period f	or Implementation	Complia	nce with Standards			
Measure 1: Minimise cone of de pits and not from adjacent abstrat	pression extent ction boreholes.	by abstracting wat (Resource Directed	er directly fi Measure)	rom the opencast	Con	tinuously		No		
Measure 2: Monitor groundwat zone groundwater monitoring box	Qı	uarterly	Yes (W	/ater Use Licence)						
Impact AFTER Management	Management Minor Medium Term Local Low Definite Medium - H							High		

ACTIVITY: Morula Mining Opencast Operation- ASPECT: Backfilling of Open Void with Waste Rock- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of leachable contaminants from the waste rock which is backfilled in the open voids into the adjacent aquifers.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Definite	Medium	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Drill and construct opencast pits once backfilled with the water in the rehabilitated pit.	t groundwater h Waste Rock and (Source Control	monitoring boreho d shaped at the sur Measure)	Immediately	after rehabilitation		No					
Measure 2: Monitor groundwa boreholes adjacent to the rehabil	ter resource qu itated opencast p	ality at dedicated vits. (Resource Dire	weathered ected Measur	zone monitoring e)	Quarterly (or as specified in the amended WUL). Yes			Vater Use Licence)			
Measure 3: Any adverse trend monitoring boreholes are to be specific groundwater remediation	ls in the grour reported and as n plan. (Resource	ndwater quality r ssessed, followed Directed Measure	Immediately	if/when identified.	Yes (N	ational Water Act)					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			



ACTIVITY: Morula Mining Underground Operation- ASPECT: Underground Mining- IMPACT DESCRIPTION: Depletion in the quantity of groundwater and the formation of a groundwater cone of depression in the aquifers adjacent to the underground workings.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Consequence											
Impact BEFORE Management	mpact BEFORE Management Minor Medium Term Local Low Definite Medium - H										
Management Measures Time Period for Implementation Compliance with Standar											
Measure 1: Minimise cone of underground workings and no Measure)	depression ex ot from adjacer	tent by abstractin nt abstraction bo	irectly from the esource Directed	Con	tinuously		No				
Measure 2: Monitor groundwate dedicated weathered zone ground	Qı	uarterly	Yes (W	/ater Use Licence)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low - High					

ACTIVITY: Mine Waste Rock Dump- ASPECT: Storage of Waste Rock on un-lined footprint- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of soluble contaminants into the subsurface through the footprints of the waste rock dumps.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standard										
Measure 1: Remove waste rock of pits, once space becomes available	lump footprints e, as part of the r	by placing the was ehabilitation there	te rock back of. (Source C	into the opencast ontrol Measure)	Immediately once opencast pi	space is available in the its for backfilling.		No.		
Measure 2: Monitor groundwa boreholes adjacent to the unlined	ter resource qu waste rock dum	ality at dedicated ps. (Resource Dired	Quarterly (or as s	pecified in the amended WUL).	Yes (W	/ater Use Licence)				
Impact AFTER Management	Act AFTER Management Minor Medium Term Local Low Possible Low -							High		



ACTIVITY: Morula Dewatering Dam- ASPECT: Storage of Process Water - IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and/or the infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High			
Management Measures				Time Period f	for Implementation	Complia	nce with Standards				
Measure 1: Responsible enginee Control Measure)	r to inspect and	record the status /	the dam. (Source	А	nnually	Yes (W	/ater Use Licence)				
Measure 2: The water level in the Level (MOL) at all times, until the Control Measure)	e dam is to be op e dam is replace	erated below the c d by the Morula P	alculated Max ollution Cont	ximum Operating rrol Dam. (Source	Con	tinuously	Yes (Na Wat	ntional Water Act & ter Use Licence)			
Measure 3: Monitor groundwa weathered zone monitoring borel	ter resource quand	ality and quantity the dam. (Resourc	v (water leve e Directed Me	els) at dedicated easure)	Quarterly (or as s	pecified in the amended WUL).	Yes (W	/ater Use Licence)			
Measure 4: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	Immediately	if/when identified.	Yes (N	ational Water Act)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: Raw Materials Stockpile Area 1– ASPECT: Storage of Raw Materials – IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of soluble contaminants into the subsurface through the footprints of the raw material stockpiles.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Co										
Impact BEFORE Management	EFORE Management Moderate Medium Term Local Medium Possible Medium -									
Management Measures Time Period for Implementation Compliance with Standard										
Measure 1: Monitor groundwar boreholes adjacent to the raw mar	ter resource qu terial stockpiles.	ality at dedicated (Resource Directed	weathered d Measure)	zone monitoring	Quarterly (or as s	pecified in the amended WUL).	Yes (W	/ater Use Licence)		
Measure 2: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	ls in the grour es are to be repo rediation plan. (R	ndwater quality ro rted and assessed, desource Directed M	Immediately	if/when identified.	Yes (N	ational Water Act)				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	- High			



ACTIVITY: Raw Materials Stockpile Area 2– ASPECT: Storage of Raw Materials – IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of soluble contaminants into the subsurface through the footprints of the raw material stockpiles.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confi									
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Monitor groundwat boreholes adjacent to the raw ma	ter resource qua terial stockpiles.	ality at dedicated (Resource Directe	weathered d Measure)	zone monitoring	Quarterly (or as s	pecified in the amended WUL).	Yes (W	/ater Use Licence)		
Measure 2: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	Immediately	if/when identified.	Yes (N	ational Water Act)						
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	- High			

ACTIVITY: Slag Stockpiling Areas- ASPECT: Storage of Slag - IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of soluble contaminants into the subsurface through the footprints of the current arising slag stockpiles.											
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE										
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Re-work the current the residence time of the slag mat	arising slag stoc terial at the surfa	kpiles as quickly a ce.	Con	tinuously		No					
Measure 2: Monitor groundwat boreholes adjacent to the current	ter resource qua arising slag stoc	ality at dedicated kpiles. (Resource I	weathered Directed Mea	zone monitoring sure)	Quarterly (or as s	pecified in the amended WUL).	Yes (W	/ater Use Licence)			
Measure 3: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	ls in the grour les are to be repo nediation plan. (I	dwater quality root orted and assessed, Resource Directed 1	Immediately	if/when identified.	Yes (N	ational Water Act)					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			



ACTIVITY: Primary Chrome Recovery Plant- ASPECT: Stockpiling of Waste- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of soluble contaminants into the subsurface through the footprints of the slag stockpiles.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Re-work the slag storeduce the residence time of the s	ockpiles at the F slag material at t	Primary CRP as qu ne surface.	sible, in order to	Con	tinuously		No				
Measure 2: Monitor groundware boreholes adjacent to the Primary	ter resource qu y CRP slag stockp	ality at dedicated biles. (Resource Dir	weathered ected Measu	zone monitoring re)	Quarterly (or as s	pecified in the amended WUL).	Yes (W	/ater Use Licence)			
Measure 3: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	ls in the grour les are to be repo nediation plan. (I	ndwater quality roorted and assessed, Resource Directed 1	Immediately	if/when identified.	Yes (N	ational Water Act)					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	- High				

ACTIVITY: H:H Slimes Dam and Return Water Dam (RWD)– ASPECT: Storage of Return Water in the RWD – IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of contaminated water from and/or the infiltration of soluble contaminants into the subsurface through the footprint of the dam.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Major	Medium Term	Local	Medium	Definite	Medium	-	High		
Management Measures	-				Time Period f	or Implementation	Complia	+/- Confidence - High Compliance with Standards Yes (Water Use Licence) Yes (National Water Act & Water Use Licence) Yes (Water Use Licence)		
Measure 1: Responsible enginee Control Measure)	r to inspect and	record the status /	the dam. (Source	А	nnually	Yes (W	/ater Use Licence)			
Measure 2: The water level in the Level (MOL) at all times. (Source 6	e dam is to be op Control Measure	erated below the ca	ximum Operating	Continuously Ye		Yes (Na Wat	tional Water Act & er Use Licence)			
Measure 3: Monitor groundwa weathered zone monitoring borel	ter resource qu holes adjacent to	ality and quantity the dam. (Resourc	(water leve e Directed M	els) at dedicated easure)	Quarterly (or as s	pecified in the amended WUL).	Yes (W	/ater Use Licence)		
Measure 4: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	ds in the grour es are to be repo nediation plan. (R	ndwater quality r rted and assessed, desource Directed N	Immediately	if/when identified.	Yes (N	ational Water Act)				
Impact AFTER Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High		



ACTIVITY: HERNIC Tailings Storage Facility (TSF) and Return Water Dam (RWD)- ASPECT: Disposal to TSF - IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of soluble contaminants into the subsurface through the footprint of the TSF.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High		
Management Measures				Time Period f	or Implementation	Complia	nce with Standards			
Measure 1: Monitor groundwar weathered zone monitoring bore	ter resource qu noles adjacent to	ality and quantity the TSF. (Resource	y (water leve e Directed Me	els) at dedicated easure)	Quarterly (or as s	pecified in the amended WUL).	Yes (W	/ater Use Licence)		
Measure 2: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	ls in the grour es are to be repo nediation plan. (F	ndwater quality r orted and assessed, Resource Directed N	Immediately	if/when identified.	Yes (N	ational Water Act)				
Impact AFTER Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High		

ACTIVITY: HERNIC Tailings Storage Facility (TSF) and Return Water Dam (RWD)– ASPECT: RWD Dam – IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of contaminated water from and/or the infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Responsible enginee Control Measure)	r to inspect and	record the status /	the dam. (Source	A	nnually	ly Yes (Water Use Licence)					
Measure 2: The water level in the Level (MOL) at all times. (Source 6	e dam is to be op Control Measure	erated below the c	alculated Ma	ximum Operating	Con	tinuously	Yes (Na Wat	ational Water Act & ter Use Licence)			
Measure 3: Monitor groundwa weathered zone monitoring borel	ter resource qu noles adjacent to	ality and quantity the dam. (Resourc	v (water leve e Directed M	els) at dedicated easure)	Quarterly (or as s	pecified in the amended WUL).	Yes (V	Vater Use Licence)			
Measure 4: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	ls in the grour es are to be repo nediation plan. (F	ndwater quality r orted and assessed, Resource Directed N	Immediately	if/when identified.	Yes (N	ational Water Act)					
Impact AFTER ManagementMinorMedium TermLocalLowPossibleLow-High											



ACTIVITY: OB Plant Fines in O quality due to the infiltration of	ACTIVITY: OB Plant Fines in Open Pit (Slurry)- ASPECT: Disposal of OB plant Fines in Open Pit- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of leachable contaminants from the OB Plant Fines which is backfilled in the open voids into the adjacent aquifers.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Drill and construct opencast pits once backfilled w rehabilitated pit. (Source Control	t groundwater i ith OB Plant Fin Measure)	nonitoring borehouses, to monitor the	the rehabilitated the water in the	Immediately	after rehabilitation		No				
Measure 2: Maintain the water within the adjacent aquifers. (Sou	level in the pit irce Control Meas	at depths below t sure)	he groundwa	ater level depths	Con	tinuously		No			
Measure 3: Monitor groundwat boreholes adjacent to the rehability	ter resource qua itated opencast p	ality at dedicated its. (Resource Dire	weathered cted Measure	zone monitoring e)	Quarterly (or as specified in the amended WUL). Yes			/ater Use Licence)			
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan. (Resource Directed Measure)					Immediately	if/when identified.	Yes (N	ational Water Act)			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: OB Plant Coarse Waste in Open Pit (Trucks)- ASPECT: Disposal of OB Plant Coarse Waste in Open Pit- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of leachable contaminants from the OB Plant Coarse Waste which is backfilled in the open voids into the adjacent aquifers.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation	+/- Confidence - High Compliance with Standards No			
Measure 1: Drill and construc opencast pits once backfilled wi rehabilitated pit. (Source Control	t groundwater i ith OB Plant Fin Measure)	nonitoring boreho es, to monitor the	the rehabilitated the water in the	Immediately	after rehabilitation		No			
Measure 2: Maintain the water within the adjacent aquifers. (Sou	level in the pit irce Control Meas	at depths below t sure)	he groundwa	ater level depths	Con	tinuously	No			
Measure 3: Monitor groundwa boreholes adjacent to the rehabili	ter resource quant	ality at dedicated its. (Resource Dire	weathered cted Measure	zone monitoring e)	Quarterly (or as s	pecified in the amended WUL).	Yes (Water Use Licence)			
Measure 4: Any adverse trend monitoring boreholes are to be specific groundwater remediation	ds in the grour reported and as plan. (Resource	dwater quality r sessed, followed l Directed Measure	Immediately	if/when identified.	Yes (N	ational Water Act)				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		



ACTIVITY: Plant Process Water due to spillages and infiltratio and/or silt trap.	ACTIVITY: Plant Process Water Dam and Silt Traps- ASPECT: Storage of Process Water/ Silt- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of contaminated water from and/or the infiltration of soluble contaminants into the subsurface through the footprint of the dam and/or silt trap.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Responsible enginee Control Measure)	r to inspect and	record the status /	Annually Yes (Water Use Licence)			Vater Use Licence)					
Measure 2: The water level in the Level (MOL) at all times, until t (Source Control Measure)	e dam is to be op he dam is repla	erated below the ca ced by the propos	alculated Ma ed Plant Pro	ximum Operating ocess Water Dam.	Con	tinuously	Yes (Na Wat	ntional Water Act & ter Use Licence)			
Measure 3: Monitor groundwa weathered zone monitoring bore	ter resource qu holes adjacent to	ality and quantity the dam. (Resourc	(water leve te Directed M	els) at dedicated leasure)	Quarterly (or as specified in the amended WUL). Yes (Wat			Vater Use Licence)			
Measure 4: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	Immediately	if/when identified.	Yes (N	ational Water Act)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: OB Plant Return Wa and infiltration of contaminated	CTIVITY: OB Plant Return Water Dam– ASPECT: Storage of Process Water– IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages nd infiltration of contaminated water from and/or the infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High				
Management Measures				Time Period f	or Implementation	Complia	nce with Standards					
Measure 1: Responsible engineer Control Measure)	r to inspect and	record the status /	the dam. (Source	A	nnually	Yes (V	Vater Use Licence)					
Measure 2: The water level in the Level (MOL) at all times, until the (Source Control Measure)	e dam is to be op e dam is replace	erated below the c d by the proposed	ximum Operating ocess Water Dam.	Con	tinuously	Yes (Na Wa	ational Water Act & ter Use Licence)					
Measure 3: Monitor groundwat weathered zone monitoring bore	ter resource qua holes adjacent to	ality and quantity the dam. (Resourc	(water leve ce Directed M	els) at dedicated leasure)	Quarterly (or as s	pecified in the amended WUL).	Yes (Water Use Licence)					
Measure 4: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	Immediately	if/when identified.	Yes (N	ational Water Act)								
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High				



ACTIVITY: Chrome Recovery Pl due to spillages and infiltration	ACTIVITY: Chrome Recovery Plant Process Water Dam– ASPECT: Storage of Process Water– IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of contaminated water from and/or the infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High				
Management Measures				Time Period f	or Implementation	Complia	nce with Standards					
Measure 1: Responsible engineer Control Measure)	r to inspect and	record the status /	the dam. (Source	А	nnually	Yes (W	Vater Use Licence)					
Measure 2: The water level in the Level (MOL) at all times, until t (Source Control Measure)	e dam is to be op the dam is repla	erated below the ca ced by the propos	alculated Ma sed CRP Pro	ximum Operating cess Water Dam.	Con	tinuously	Yes (Na Wat	ational Water Act & ter Use Licence)				
Measure 3: Monitor groundwat weathered zone monitoring bore	ter resource qua holes adjacent to	ality and quantity the dam. (Resourc	(water leve e Directed M	els) at dedicated leasure)	Quarterly (or as s	pecified in the amended WUL).	Yes (Water Use Licence)					
Measure 4: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	Immediately	if/when identified.	Yes (N	ational Water Act)								
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High				

ACTIVITY: Plant Storm Water Pollution Control Dam (PCD)- ASPECT: Storage of Process Water- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of contaminated water from and/or the infiltration of soluble contaminants into the subsurface through the footprint of the dam.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High
Management Measures	-				Time Period for Implementation Compliance with Standard			
Measure 1: Responsible enginee Control Measure)	r to inspect and	record the status /	the dam. (Source	А	nnually	Yes (W	Vater Use Licence)	
Measure 2: The water level in the Level (MOL) at all times, until th Control Dam No.1. (Source Contro	ximum Operating 1 Water Pollution	Con	Continuously Yes (Nation Water U		ational Water Act & ter Use Licence)			
Measure 3: Monitor groundwa weathered zone monitoring borel	ter resource qu noles adjacent to	ality and quantity the dam. (Resourc	v (water leve e Directed M	els) at dedicated easure)	Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	Immediately	if/when identified.	Yes (N	ational Water Act)				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High



ACTIVITY: Abstraction Boreholes- ASPECT: Cone of Depression- IMPACT DESCRIPTION: Depletion in the quantity of groundwater and the formation of a groundwater cone of depression in the aquifer(s) adjacent to the groundwater abstraction boreholes.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Moderate Short Term Local Low Definite Medium - I									
Management Measures				Time Period f	for Implementation	Complia	nce with Standards				
Measure 1: Only abstract the au abstraction boreholes. (Resource	thorised volume Directed Measur	e of groundwater e)	r from ea	ch of the 3 authorised	Con	tinuously	Yes (W	Vater Use Licence)			
Measure 2: Optimise the abstract abstraction volumes remain const	Con	tinuously		No							
Impact AFTER Management	Minor	MinorShort TermLocalLowPossibleLow-I									

ACTIVITY: Abstraction Boreholes– ASPECT: Removal of Contaminants from Aquifer – IMPACT DESCRIPTION: Improvement to the groundwater resource quality due to the removal of contaminants from the weathered zone aquifers by pumping groundwater from selected groundwater remediation abstraction boreholes.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor +	Long Term	Local	Medium	Definite	Medium	+	High		
Management Measures				Time Period f	or Implementation	Complia	nce with Standards			
Measure 1: Optimise the abstract abstraction volumes remain consi	ion of groundwa stent and do not	ter from each of fluctuate. (Resou	the 3 boro arce Direc	eholes so that the daily cted Measure)	Con	tinuously		No		
Measure 2: Abstract the autho abstraction boreholes. (Resource	Con	tinuously	Yes (W	/ater Use Licence)						
Impact AFTER Management	Minor + Long Term Local Medium Definite Medium + H							High		



ACTIVITY: Development of the Morula PCD- ASPECT: Storage of Process Water- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Period f	for Implementation	Compliance with Standards					
Measure 1: Responsible enginee Control Measure)	r to inspect and	d record the status	s / integri	ity of the dam. (Source	А	nnually	Yes (W	/ater Use Licence)			
Measure 2: The water level in the Level (MOL) at all times. (Source	e dam is to be o Control Measu	perated below the re)	e calculate	ed Maximum Operating	Con	tinuously	Yes (N	ational Water Act)			
Measure 3: Implement groundw Measure)	vater monitorii	ng plan adjacent t	to the dat	m. (Resource Directed	Immediately on specified in t	ice constructed (or as he amended WUL).	Yes (N	ational Water Act)			
Measure 4: Monitor groundwa boreholes adjacent to the dam. (F	ter resource q Resource Direct	uality and quanti ed Measure)	ty (wate	r levels) at dedicated	Quarterly (or as specified in the amended WUL). Yes (National Water Ac			ational Water Act)			
Measure 5: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	Immediately	if/when identified.	Yes (N	ational Water Act)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: Expansion of Storm Water PCD No. 1– ASPECT: Storage of Process Water– IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Responsible enginee Control Measure)	r to inspect ar	nd record the status	s / integri	ty of the dam. (Source	А	nnually	Yes (W	/ater Use Licence)			
Measure 2: The water level in the Level (MOL) at all times. (Source 6	e dam is to be Control Measu	operated below the re)	d Maximum Operating	Con	tinuously	Yes (N	ational Water Act)				
Measure 3: Implement groundw Measure)	vater monitor	ing plan adjacent t	to the dat	m. (Resource Directed	Immediately on specified in t	ce constructed (or as he amended WUL).	Yes (N	ational Water Act)			
Measure 4: Monitor groundwa boreholes adjacent to the dam. (R	ter resource esource Direc	quality and quanti ted Measure)	ty (wate	r levels) at dedicated	Quarterly (or as specified in the amended WUL). Yes (National Wate			ational Water Act)			
Measure 5: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	Immediately	if/when identified.	Yes (N	ational Water Act)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			



ACTIVITY: Development of Storm Water PCD No. 2– ASPECT: Storage of Process Water– IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Period f	or Implementation	Complia	Compliance with Standards				
Measure 1: Responsible enginee Control Measure)	er to inspect an	d record the statu	s / integri	ity of the dam. (Source	А	nnually	Yes (W	/ater Use Licence)			
Measure 2: The water level in Operating Level (MOL) at all time	calculated Maximum	Con	tinuously	Yes (N	ational Water Act)						
Measure 3: Implement groundv Measure)	vater monitori	ng plan adjacent t	to the dat	m. (Resource Directed	Immediately on specified in t	ce constructed (or as he amended WUL).	Yes (N	ational Water Act)			
Measure 4: Monitor groundwa boreholes adjacent to the dam. (F	ter resource c Resource Direct	uality and quant ed Measure)	ity (wate	r levels) at dedicated	Quarterly (or as specified in the amended WUL). Yes (National Water			ational Water Act)			
Measure 5: Any adverse trend groundwater monitoring borehol of a site specific groundwater rend	Immediately	if/when identified.	Yes (N	ational Water Act)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: Development of Stor to spillages and infiltration of s	ACTIVITY: Development of Storm Water PCD No. 3- ASPECT: Storage of Process Water- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High				
Management Measures				Time Period f	or Implementation	Complia	nce with Standards					
Measure 1: Responsible enginee Control Measure)	r to inspect and	d record the status	s / integri	ty of the dam. (Source	А	nnually	Yes (W	/ater Use Licence)				
Measure 2: The water level in the Level (MOL) at all times. (Source	d Maximum Operating	Con	tinuously	Yes (N	ational Water Act)							
Measure 3: Implement groundv Measure)	vater monitorii	ng plan adjacent t	to the da	m. (Resource Directed	Immediately on specified in t	ce constructed (or as he amended WUL).	Yes (N	ational Water Act)				
Measure 4: Monitor groundwa boreholes adjacent to the dam. (R	ter resource q esource Direct	uality and quanti ed Measure)	ty (wate	r levels) at dedicated	Quarterly (or as specified in the amended WUL). Yes (National Water A			ational Water Act)				
Measure 5: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	Immediately	if/when identified.	Yes (N	ational Water Act)								
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High				



ACTIVITY: Expansion of the OB Plant Process Water Dam- ASPECT: Storage of Process Water- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Period f	or Implementation	Complia	Compliance with Standards				
Measure 1: Responsible enginee Control Measure)	r to inspect and	d record the status	s / integri	ity of the dam. (Source	Annually Yes (Water Use Licence)			Vater Use Licence)			
Measure 2: The water level in the Level (MOL) at all times. (Source	e dam is to be o Control Measu	perated below the re)	calculate	d Maximum Operating	Con	tinuously	Yes (N	ational Water Act)			
Measure 3: Implement groundw Measure)	vater monitorii	ng plan adjacent t	to the dat	m. (Resource Directed	Immediately on specified in t	ce constructed (or as he amended WUL).	Yes (N	ational Water Act)			
Measure 4: Monitor groundwar boreholes adjacent to the dam. (F	ter resource q Resource Direct	uality and quanti ed Measure)	ty (wate	r levels) at dedicated	Quarterly (or as specified in the amended WUL). Yes (National Water			ational Water Act)			
Measure 5: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	Immediately	if/when identified.	Yes (N	ational Water Act)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: Expansion of the Plant Process Water Dam- ASPECT: Storage of Process Water- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Responsible enginee Control Measure)	er to inspect a	nd record the statu	s / integri	ity of the dam. (Source	А	nnually	Yes (W	/ater Use Licence)			
Measure 2: The water level in Operating Level (MOL) at all time	Measure 2: The water level in the dam is to be operated below the calculated Maximum Operating Level (MOL) at all times. (Source Control Measure)						Yes (N	ational Water Act)			
Measure 3: Implement groundv Measure)	water monitor	ing plan adjacent t	to the dat	m. (Resource Directed	Immediately on specified in t	ce constructed (or as he amended WUL).	Yes (N	ational Water Act)			
Measure 4: Monitor groundwa boreholes adjacent to the dam. (R	ter resource esource Direc	quality and quant ted Measure)	ity (wate	r levels) at dedicated	Quarterly (or as specified in the amended WUL). Yes (National Wa			ational Water Act)			
Measure 5: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	Immediately	if/when identified.	Yes (N	ational Water Act)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			



ACTIVITY: Expansion of the CRP Process Water Dam– ASPECT: Storage of Process Water– IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the dam.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Responsible enginee Control Measure)	r to inspect and	d record the status	s / integri	ty of the dam. (Source	А	nnually	Yes (W	Vater Use Licence)			
Measure 2: The water level in the Level (MOL) at all times. (Source	e dam is to be o Control Measu	perated below the re)	d Maximum Operating	Con	tinuously	Yes (National Water Act)					
Measure 3: Implement groundw Measure)	vater monitorii	ng plan adjacent t	to the dat	m. (Resource Directed	Immediately on specified in t	ce constructed (or as he amended WUL).	Yes (N	ational Water Act)			
Measure 4: Monitor groundwar boreholes adjacent to the dam. (F	ter resource q Resource Direct	uality and quanti ed Measure)	ty (wate	r levels) at dedicated	Quarterly (or as specified in the amended WUL). Yes (National Water			ational Water Act)			
Measure 5: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	Immediately	if/when identified.	Yes (N	ational Water Act)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: Expansion of the OB Plant Tailings Storage Facility (TSF)- ASPECT: Disposal to TSF- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the TSF.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Major	Medium Term	Local	Medium	Definite	Medium	-	High			
Management Measures					Time Period f	or Implementation	Complia	nce with Standards			
Measure 1: Responsible engineer Control Measure)	r to inspect and	d record the status	ty of the dam. (Source	A	nnually	Yes (W	/ater Use Licence)				
Measure 2: Monitor groundwat weathered zone monitoring borel	ter resource q noles adjacent t	uality and quanti to the TSF. (Resour	ty (water ce Directe	r levels) at dedicated ed Measure)	Quarterly (or as s	pecified in the amended WUL).	Yes (W	/ater Use Licence)			
Measure 3: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	ds in the grou es are to be rep nediation plan.	undwater quality ported and assesse (Resource Directed	Immediately	if/when identified.	Yes (N	ational Water Act)					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			



ACTIVITY: Screening, Stockpiling, Internal Use and /or Selling of Slag Sand at the Fine Slag Processing Plant– ASPECT: Slag Sand– IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of soluble contaminants into the subsurface through the unlined footprints of the slag sand stockpiles.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period f	or Implementation	Complia	nce with Standards			
Measure 1: Re-work the current the residence time of the slag mat	arising slag sto terial at the sur	ockpiles as quickly face.	ble, in order to reduce	Con	tinuously		No				
Measure 2: Monitor groundwar boreholes adjacent to the current	ter resource q arising slag sto	uality at dedicate ockpiles. (Resource	ed weathe Directed	ered zone monitoring Measure)	Quarterly (or as sp	pecified in the amended WUL).	Yes (W	Vater Use Licence)			
Measure 3: Any adverse trend groundwater monitoring borehol of a site specific groundwater ren	ls in the grou les are to be rep nediation plan.	undwater quality ported and assesse (Resource Directe	Immediately	if/when identified.	Yes (N	ational Water Act)					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: Screening, Stockpili Deterioration of the groundwat	ng, Internal Us ter resource q	se and /or Selling uality due to spill	CTIVITY: Screening, Stockpiling, Internal Use and /or Selling of Slag Sand at the Fine Slag Processing Plant- ASPECT: Water Recovery Sumps- IMPACT DESCRIPTION: eterioration of the groundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the sumps.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence						
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High						
Management Measures			Time Period f	or Implementation	Complia	nce with Standards								
Measure 1: Operate the sumps a Measure)	as empty as po	ssible and inspect	Con	tinuously	No									
Measure 2: Implement groundw Measure)	water monitori	ng plan adjacent t	to the dat	m. (Resource Directed	Immediately	once constructed.	d. Yes (Water Use Licence)							
Measure 3: Monitor groundwa boreholes adjacent to the dam. (R	ter resource o esource Direct	quality and quant ed Measure)	ity (wate	r levels) at dedicated	Quarterly (or as specified in the amended WUL). Yes (Water Use Licen			/ater Use Licence)						
Measure 4: Any adverse tren groundwater monitoring borehol of a site specific groundwater rem	Immediately	if/when identified.	Yes (N	ational Water Act)										
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High						



ACTIVITY: Screening, Stockpiling, Internal Use and /or Selling of Coarse Slag at the CRP– ASPECT: Stockpiling of Coarse Slag– IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of soluble contaminants into the subsurface through the unlined footprints of the coarse slag stockpiles.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Re-work the current the residence time of the slag mat	arising slag sto erial at the sur	ockpiles as quickly face.	ble, in order to reduce	Con	tinuously		No				
Measure 2: Monitor groundwat boreholes adjacent to the current	ter resource q arising slag sto	uality at dedicate ckpiles. (Resource	d weathe Directed	ered zone monitoring Measure)	Quarterly (or as sp	pecified in the amended WUL).	Yes (W	Vater Use Licence)			
Measure 3: Any adverse trend groundwater monitoring borehol of a site specific groundwater rem	ls in the grou es are to be rep nediation plan.	undwater quality ported and assesse (Resource Directed	Immediately	if/when identified.	Yes (N	ational Water Act)					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: Screening, Stockpili groundwater resource quality of	CTIVITY: Screening, Stockpiling, Internal Use and /or Selling of Coarse Slag at the CRP- ASPECT: Water Recovery Sumps- IMPACT DESCRIPTION:Deterioration of the roundwater resource quality due to spillages and infiltration of soluble contaminants into the subsurface through the footprint of the sumps.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High				
Management Measures			Time Period f	or Implementation	Complia	nce with Standards						
Measure 1: Operate the sumps a Measure)	is empty as pos	ssible and inspect	Con	Continuously No								
Measure 2: Implement groundv Measure)	vater monitorii	ng plan adjacent t	to the dat	m. (Resource Directed	Immediately	Immediately once constructed. Yes (Water Use Licence)						
Measure 3: Monitor groundwa boreholes adjacent to the dam. (F	ter resource q Resource Direct	uality and quanti ed Measure)	ty (wate	r levels) at dedicated	Quarterly (or as specified in the amended WUL). Yes (Water Use Licen			/ater Use Licence)				
Measure 4: Any adverse trend groundwater monitoring boreho of a site specific groundwater ren	Immediately	if/when identified.	Yes (N	ational Water Act)								
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High				



Table 9.2(i): Surface Water Operational Phase Impact and Risk Significance Table

ACTIVITY: Internal Roads – ASPECT: Gravel Hard Surfaces – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on internal roads, as well as the capture of contaminated storm water run-off in Pollution Control Dams.										
	Duration	Scale	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Long Term	Local	Medium	Definite	Medium	-	High			
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Close transport truck	ks with tarpauli	n sheet during tra	ansport.		Opera	Operational Phase None applicable.				
Measure 2: Clean road surfaces a	r ditches on regul	ar basis.		Opera	tional Phase		None applicable.			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Internal Roads – ASPECT: Gravel Hard Surfaces – IMPACT DESCRIPTION: Contamination of the surface water resource due to contaminated run-off from "dirty areas" directly into the surface water resources and/or spillages of contaminated water from tanks, sumps, pipes and dams.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Definite	Medium	-	High
Management Measures			Time Period for Implementation Compliance with Standards					
Measure 1: Maximise interception isolation/diversion berms and addition/diversion berms and additional berge additionadditationad berge additional berge additionad berge additiona	viding		Opera	tional Phase		Class C liner		
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High

ACTIVITY: Primary CRP – ASPECT: Current Arising Slag Loading/Crushing and Screening Plant/Stockpiling of Product/Stockpiling of Waste – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the new PCD2.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High
Management Measures					Time Period for Implementation Compliance with Standards			Compliance with Standards
Measure 1: Minimising intercept water around plant and stockpile	vater by isolating	dirty area	Operat	tional Phase		None applicable		
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High



ACTIVITY: Primary CRP – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the new PCD2.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation	Compliance with Standards			
Measure 1: Provision of addition			Opera	tional Phase		Class C liner				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Upgrading of the CRP Process Water Dam – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages from the new PCD2 in A3.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with Standards					
Measure 1: Provision of addition	7.			Operational Phase Class C liner		Class C liner				
Impact AFTER Management	Minor+	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Coarse Slag at the CRP – ASPECT: Screening Plant/ Stockpiling of Coarse Slag – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at the screening plant, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High	
Management Measures				Time Period for Implementation			Compliance with Standards		
Measure 1: Minimising interception of surface water by isolating dirty area and diverting water around screening plant and coarse slag stockpile.						ational Phase		None applicable.	
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High	



ACTIVITY: Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Slag – ASPECT: Feed Material from CRP – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at the feed material process, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High
Management Measures				Time Period for Implementation Compliance with Standards			Compliance with Standards	
Measure 1: Minimising intercept water around feed material plant	vater by isolating pile.	dirty area	and diverting	Opera	tional Phase		None applicable.	
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High

ACTIVITY: Fuel Supply/Offices/Finished Product Plant/Wash Bay – ASPECT: Tanks/Impermeable Areas/Storage of Final Product/Truck Wash – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated in these areas, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High
Management Measures					Time Period for Implementation Compliance with Standards			
Measure 1: Minimising intercept surface water around facilities an	vater by isolating stockpile.	dirty area	and diverting	Opera	tional Phase		None applicable.	
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High

ACTIVITY: Wash Bay - ASPECT: Truck Wash - IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from wash bay.										
	Magnitude Duration Scale Consequence Probability SIGNIFICATION					SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures				Time Period f	or Implementation		Compliance with Standards			
Measure 1: Provision of suitable wash bay.	olation berms to	prevent sp	oillage from	Opera	tional Phase		None applicable.			
Measure 2: Proper Operation an	procedures to be	adhered t	0.	Opera	Operational Phase O&M Manual		O&M Manual			
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High		



ACTIVITY: Groundwater Treatment Plant - ASPECT: Settling Pond A & B - IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the ponds. Confidence Magnitude Duration Scale Consequence **Probability** SIGNIFICANCE +/-**Impact BEFORE Management** Medium -Minor Long Term Local Medium Definite High **Management Measures Time Period for Implementation Compliance with Standards Operational Phase** Measure 1: Reduced volumes of groundwater to be treated for use. None applicable. **Impact AFTER Management** Long Term Medium Definite Medium Minor+ Local High -

ACTIVITY: Groundwater Treatment Plant - ASPECT: Settling Pond A & B - IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the ponds. **Probability** SIGNIFICANCE Confidence Magnitude Duration Scale Consequence +/-**Impact BEFORE Management** Long Term Medium Definite Medium Minor Local -High **Time Period for Implementation Compliance with Standards Management Measures Measure 1:** Provision of sufficient PCD capacity for storage of untreated ground water. **Operational Phase** None applicable. **Measure 2:** Optimal use of water for dust suppression/processes to minimise ground **Operational Phase** None applicable. water storage requirement. **Impact AFTER Management** Minor+ Long Term Local Medium Definite Medium High -

ACTVITY: Sand at the Fine Slag Processing Plant – ASPECT: Screening and Separation Plant/Spiral Plant/Fine Chrome Bin/Slag Sand – IMAPCT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these processes, as well as the capture of contaminated storm water run-off in the water recovery sumps.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High
Management Measures					Time Period for Implementation Compliance with Standards			Compliance with Standards
Measure 1: Minimising intercept water around processing plant.	water by isolating	dirty area	Opera	tional Phase		None applicable.		
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High



ACTIVITY: Sand at the Fine Slag Processing Plant – ASPECT: Water Recovery Sumps – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the water recovery sumps.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Provide silt traps to i	y sumps.		Opera	tional Phase		Engineer's Design Specifications.				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTVITY: Fuel Supply/Contractors Transport Yard/Raw Materials Stockpile Area 2 – ASPECT: Tanks/Earth Surface Yard/Storage of Raw Materials – IMAPCT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Minimising intercept water around plant and raw mate	dirty area	and diverting	Opera	Operational Phase None applicable.		None applicable.				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTVITY: Development of Storm Water PCD No. 2 - ASPECT: Storage of Run-off Water – IMAPCT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from PCD2.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with Standards					
Measure 1: Provision of addition	capturing of	dirty wate	r.	Opera	tional Phase	Phase Class C liner				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		



ACTIVITY: Offices/General Plant Infrastructure/Redundant Historic Bag Plant/Old Salvage Yard – ASPECT: Impermeable areas/footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Minimising intercept water around plant.	ion of surface v	water by isolating	dirty area	and diverting	Operational Phase None applicable			None applicable		
Measure 2: Provision of addition	dirty wate	er.	Operational Phase		Class C liner					
Impact AFTER Management	Minor+	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Pelletizing and Sintering Plants 1 & 2/Furnaces 1, 2, 3 and 4 – ASPECT: Structure/Complex – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Minimising intercept water around plant.	water by isolating	dirty area	and diverting	Operational Phase None applicable			None applicable			
Measure 2: Provision of addition	of for capturing of	dirty wate	r.	Opera	tional Phase	se Class C liner				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Expansion of the Tap Hole Fume Extraction System & Finished Product Plant Dust Abatement System – ASPECT: Scrubber Effluent – IMPATC DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the expanded areas, as well as the capture of contaminated storm water runoff in the upgraded storm water PCD1A and 1B.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High
Management Measures					Time Period	for Implementation		Compliance with Standards
Measure 1: Minimising intercept Extraction and Dust Abatement a	vater by isolating ing water around	Tap Hole these area	Fume as.	Oper	rational Phase		None applicable	
Measure 2: Provision of addition	for capturing of	effluent w	ater.	Oper	Operational Phase Class C liner		Class C liner	
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High



ACTIVITY: Ferrochrome Break Floor Area – ASPECT: Ferrochrome Break Floor Area – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE							Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Minimising intercept water around break floor area.	tion of surface v	vater by isolating	dirty area	and diverting	Oper	rational Phase		None applicable		
Measure 2: Provision of addition	v for capturing of	dirty wate	er.	Oper	ational Phase		Class C liner			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Raw Materials Stockpile Area/Mixed Material Stockpiling and Screening 1/Returns Materials Stockpile 2 – ASPECT: Storage of Materials – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High	
Management Measures				Time Period	for Implementation		Compliance with Standards		
Measure 1: Minimising interception of surface water by isolating dirty area and diverting water around stockpile areas.						ational Phase		None applicable	
Measure 2: Provision of addition	of for capturing of	dirty wate	r.	Oper	ational Phase		Class C liner		
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High	

ACTIVITY: Ore Beneficiation Plant – ASPECT: Transport of Ore/Crushing and Screening/ HMS Waste Material – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B2.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Minimising intercept water around crushing/screening	vater by isolating	dirty area	and diverting	Oper	ational Phase	None applicable				
Measure 2: Provision of addition	v for capturing of	dirty wate	r.	Oper	ational Phase		Class C liner			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		



ACTIVITY: PGM Plant – ASPECT: Pumping of PGM Feed Material – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B2.										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICA								Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Minimising intercept diverting water around the area.	tion of surface v	water by isolating	PGM feed	area and	Opera	tional Phase		None applicable		
Measure 2: Provision of addition	dirty wate	er.	Opera	tional Phase		Class C liner				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Mixed Material Stockpiling and Screening/Slag Stockpiling Areas – ASPECT: Storage of Mixed Materials/Slag – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these materials, as well as the capture of contaminated storm water run-off in the new storm water PCD3.										
	Magnitude	SIGNIFICANCE	+/-	Confidence						
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Minimising intercept water around the screening and s	tion of surface v stockpile areas.	water by isolating	dirty area	and diverting	Opera	tional Phase		None applicable		
Measure 2: Provision of addition	y for capturing of	dirty wate	er.	Opera	tional Phase		Class C liner			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Development of Storm Water PCD No. 3 – ASPECT: Storage of Run-off Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from PCD3.										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation	Compliance with Standards			
Measure 1: Provision of addition	dirty wate	er.	Opera	tional Phase		Class C liner				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		



ACTIVITY: SW Canal System – ASPECT: Reduction of Run-off to Natural Resource – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated in drainage area A1, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.										
MagnitudeDurationScaleConsequenceProbability							+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Imple	Period for ementation	Compliance with Standards			
Measure 1: Minimise interceptio water diversion berms.	noff by p	Opera	tional Phase	None applicable.						
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	+	High		

ACTIVITY: H:H Slimes Dam and Return Water Dam – ASPECT: RWD (Return Water Dam) – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated in drainage area A6, as well as the capture of slimes dam leachate in the RWD.											
	MagnitudeDurationScaleConsequenceProbability						+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High			
Management Measures					Time Period	l for Implementation		Compliance with Standards			
Measure 1: Decommissioning an	d capping of th	e two Historic Slii	nes Dams		Oper	rational Phase		Waste Management Regulations			
Measure 2: Monitor seepage qua	capping efficiency	7.	Oper	rational Phase	S 241	outh African National Standard (SANS) :2011 Drinking Water Standards & Water Use Licence					
Impact AFTER Management	Minor+	Medium Term	Local	Low	Possible	Low	-	High			

ACTIVITY: H:H Slimes Dam and Return Water Dam – ASPECT: RWD (Return Water Dam) – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the RWD.											
	Magnitude	+/-	Confidence								
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High			
Management Measures					Time Period	for Implementation		Compliance with Standards			
Measure 1: Decommissioning an of run-off from capped slimes dat	ld capping of th m to clean wate	e two Historic Slii r environment.	mes Dams	and diversion	Oper	rational Phase		Waste Management Regulations			
Measure 2: Monitor quality of w	confirm capping	efficiency.		Oper	rational Phase	S 241	outh African National Standard (SANS) :2011 Drinking Water Standards & Water Use Licence				
Impact AFTER Management	Moderate+	Long Term	Local	Medium	Possible	Medium	-	High			



ACTIVITY: Morula Mining Shaft Complex & Offices – ASPECT: B Ore/Waste Rock Transfer House – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new Morula Storm Water PCD.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Consequence							Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with Standards					
Measure 1: Minimising intercept house and diverting contaminate	water by isolating e new storm wate	ore/waste r PCD.	e rock transfer	Opera	tional Phase		None applicable.			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Morula Mining Shaft Complex & Offices - ASPECT: Water Storage Dams - IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Water Storage Dams.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with Standards					
Measure 1: Decommissioning of	watering Dam.			Opera	Operational Phase None applicable.		None applicable.			
Impact AFTER Management	Minor+	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Morula Mining Shaft Complex & Offices - ASPECT: Water Storage Dams - IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the Storage Dams.										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE							+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Removal of contamin	nated sediment	in basin.			Operational Phase O&M Manual			O&M Manual		
Measure 2: Decommissioning of	watering Dam			Oper	ational Phase		Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		



ACTIVITY: Morula Mining Opencast Operation – ASPECT: Water Abstraction and Pipelines – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation		Compliance with Standards		
Measure 1: Isolate water abstract the void.	ne areas and dive	rt contami	nated water to	Operational Phase None applicable		None applicable				
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Morula Mining Accommodation – ASPECT: Impermeable Area – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Isolate dirty areas an to the natural environment.	ninated water to t	the void ar	nd clean water	Oper	ational Phase		None applicable			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Mine Sewage Plant - ASPECT: Sludge Drying Beds - IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Sludge Drying Beds.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with Standards					
Measure 1: No feasible measure to mitigate impact.						ational Phase		None applicable		
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		



ACTIVITY: Morula Dewatering Dam – ASPECT: Storage of U/G Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Water Storage Dams.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Proper operation and	d maintenance	of Morula Dewate	ring Dam.		Oper	ational Phase	O&M Manual			
Measure 2: Divert clean water pa	vatering Dam.			Oper	ational Phase		None applicable			
Impact AFTER Management	Local	Low	Possible	Low	-	High				

ACTIVITY: Morula Dewatering Dam – ASPECT: Storage of U/G Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the Morula Dewatering Dam.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFI							Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Proper operation and dirty water.	d maintenance	of the Morula Dev	vatering D	am to contain	Oper	ational Phase		O&M Manual		
Measure 2: Divert clean water pa	vatering Dam.			Oper	ational Phase		None applicable			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Re-Use of Mine Waste Rock at the Mine Waste Rock Stockpile – ASPECT: Crushing and Screening Plant A7B Stockpiling of Waste Rock Product – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new Morula Storm Water PCD.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Minimising intercept rock product and diverting conta	water by isolating into the new stor	Plant area m water P	a and waste CD.	Oper	ational Phase		None applicable			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		



ACTIVITY: Opencast Operations – ASPECT: Water Abstraction and Pipelines – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Divert all run-off wat processes, thereby reducing use of	rea to the void for rom the canal sys	[.] re-use in tem.	the mining	Oper	ational Phase		None applicable			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Opencast Operations – ASPECT: Steep Slopes/Uneven Surfaces/Existence of the Void – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period f	for Implementation		n the quantity of surface water due to Confidence High Compliance with Standards None applicable High		
Measure 1: Flatten steep slopes a the area to the void for re-use in t from the canal system.	faces and divert a cesses, thereby re	ll run-off ducing use	water within e of clean water	Opera	tional Phase		None applicable			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: OB Plant Fines in Open Pit (Slurry) – ASPECT: Disposal of OB plant Fines in Open Pit – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation	ation Compliance with Standards			
Measure 1: Divert all run-off water within the area to the void for re-use in the mining processes, thereby reducing use of clean water from the canal system.						Operational Phase None applicable				
Impact AFTER Management	Local	Low	Possible	Low	-	High				



ACTIVITY: OB Plant Coarse Waste in Open Pit (Trucks) – ASPECT: Disposal of OB Plant Coarse Waste in Open Pit – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Divert all run-off water within the area to the void for re-use in the mining processes, thereby reducing use of clean water from the canal system.						Operational Phase None applicable				
Impact AFTER Management	Local	Low	Possible	Low	-	High				

ACTIVITY: Storage Facility (TSF) and Return Water Dam (RWD) – ASPECT: Disposal to TSF/A11 RWD – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the RWD.									
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High	
Management Measures				Time Period f	or Implementation	Compliance with Standards			
				1		•			
Measure 1: Contain contaminate clean water run-off to the existing	d water within g clean water ci	TSF and RWD bou ut-off drain.	undaries a	nd maximise	Operat	tional Phase		0&M Manual	

ACTIVITY: Expansion of the OB to the capture of direct rainfall	ACTIVITY: Expansion of the OB Plant Tailings Storage Facility – ASPECT: New extended footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the RWD.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High			
Management Measures					Time Period f	or Implementation		Compliance with Standards			
Measure 1: Move existing clean off into relocated drain	clean stor	Operational Phase None applicable									
on meo relocatea aram.											



ACTIVITY: Plant Process Water Dam & Silt Trap/OB Plant Return Water Dam/Plant Storm Water Pollution Control Dam (PCD) – ASPECT: Storage of Process Water/Silt – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the silt traps and various process water and pollution control dams.										
	Magnitude	Duration	Scale	Consequence	Confidence					
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation	Compliance with Standards			
Measure 1: Proper operation and captured water.	d maintenance	of the dams, PCD'	s and silt t	raps to utilise	Oper	ational Phase		O&M Manuals		
Measure 2: Divert clean water pa			Oper	ational Phase	None applicable					
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Plant Process Water Dam & Silt Trap/OB Plant Return Water Dam/Plant Storm Water Pollution Control Dam (PCD) – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the various dams listed here.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	/- Confidence		
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation		- High Compliance with Standards O&M Manuals		
Measure 1: Proper operation and water.	d maintenance	of the dams and P	'CD's to co	ntain dirty	Oper	rational Phase	O&M Manuals			
Measure 2: Regular removal of s	ilt and cleaning	g of silt traps.			Oper	Operational Phase 0&M Manuals		O&M Manuals		
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Expansion of Storm Water PCD No. 1- ASPECT: Storage of runoff Water – IMAPCT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the silt traps and various process water and pollution control dams.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High	
Management Measures				Time Period	for Implementation		Compliance with Standards		
Measure 1: Proper operation and	d maintenance	of the Storm Wate	er PCD.		Oper	ational Phase	O&M Manuals		
Measure 2: Divert clean water pa	ast PCD.				Oper	ational Phase	e None applicable		
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High	



ACTIVITY: Expansion of Storm Water PCD No. 1- ASPECT: Storage of runoff Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from PCD1.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Proper operation and	d maintenance	of the PCD to cont	ain dirty v	water.	Operational Phase O&M Manuals			O&M Manuals		
Measure 2: Regular removal of s			Oper	Operational Phase O&M Manuals		O&M Manuals				
Impact AFTER Management	Local	Low	Possible	Low	-	High				

ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps – ASPECT: Reduction of run-off to Natural Resource – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the silt traps and various process water and pollution control dams.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High	
Management Measures				Time Period	for Implementation		Compliance with Standards		
Measure 1: Proper operation and and silt traps.	d maintenance	of the Process & S	Storm Wat	er Canal system	Oper	ational Phase		O&M Manual	
Measure 2: Divert clean water p	al system	and traps.	Oper	Operational Phase None applicable		None applicable			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High	

ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the canal system and silt traps.

	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period	for Implementation		Compliance with Standards		
Measure 1: Proper operation and and silt traps.	d maintenance	of the Process & S	torm Wat	er Canal system	Oper	rational Phase		O&M Manual
Measure 2: Regular removal of s	Measure 2: Regular removal of silt and cleaning of silt traps						Operational Phase O&M Manual	
Impact AFTER Management Minor Medium Term Local Low					Possible	Low	-	High



ACTIVITY: Upgrading of the Process Water Dams for the OB Plant & Plant – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these dams, as well as the capture of contaminated storm water run-off in the process water dams.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with Standards			Compliance with Standards		
Measure 1: Proper operation and maintenance of the Process Water Dams and surface water diversion berms.						Operational Phase O&M Manual				
Impact AFTER Management	Local	Low	Possible	Low	-	High				

ACTIVITY: Upgrading of the Process Water Dams for the OB Plant & Plant – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the process water dams.									
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Possible	Medium	-	High	
Management Measures					Time Period for Implementation Compliance with Standard			Compliance with Standards	
Measure 1: Proper operation and	d maintenance	of the Process Wa	ter Dams.		Oper	Operational Phase O&M Manual			
Impact AFTER Management Minor Medium Term Local Low					Possible	Low	-	High	

ACTIVITY: Railway Lines – ASPECT: Railroad and Rail Vehicles – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated materials from rail trucks, as well as the capture of contaminated storm water run-off in the new storm water PCD4.									
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High	
Management Measures						Time Period for Implementation		Compliance with Standards	
Measure 1: Close transport trucks with tarpaulin sheets during transport.						Operational Phase		None applicable	
Measure 2: Clean railway line storm water drains on regular basis.						Operational Phase		0 & M Manual	
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High	



ACTIVITY: Product Rail Dispatch Area – ASPECT: Product Stockpiles – IMPACT DESCRIPTION: Contamination of the surface water resource due to flow of contaminated rainfall from stockpiles, as well as the capture of contaminated storm water run-off in the new storm water PCD4.									
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High	
Management Measures						Time Period for Implementation		Compliance with Standards	
Measure 1: Isolate dispatch area with berms and contain dirty water.						Operational Phase		None applicable	
Measure 2: Divert clean surface water run-off past the dispatch area into the natural environment.						Operational Phase		None applicable	
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High	

ACTIVITY: New Salvage Yard – ASPECT: Yard Footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the new storm water PCD4.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	-	High		
Management Measures						Time Period for Implementation		Compliance with Standards		
Measure 1: Divert all clean surface water run-off past the salvage yard into the natural environment.						Operational Phase		None applicable		
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		

ACTIVITY: Rehabilitated Quarry Area - ASPECT: Uneven Surfaces - IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall by ponding. Magnitude Duration Scale Consequence **Probability SIGNIFICANCE** +/-Confidence **Impact BEFORE Management** Local Definite High Minor Medium Term Low Medium -**Time Period for Implementation Compliance with Standards Management Measures** Measure 1: Ongoing rehabilitation and provision of free drainage of the Returns Materials **Operational Phase** None applicable area and existing rehabilitated area to maximise clean water run-off. Measure 2: Installation of silt fences to manage sediments. **Operational Phase** None applicable Impact AFTER Management Minor+ Medium Term Local Possible Low Low -High


ACTIVITY: Sewage Plant – ASPECT: Sludge Drying Beds – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Sludge Drying Beds.												
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Minor	Medium Term	Local	Low	Definite	Medium	- High					
Management Measures					Time Perio	d for Implementation		Compliance with Standards				
Measure 1: Proper operation and	d maintenance	of the sludge dryin	ıg beds.		Ope	erational Phase		O&M Manual				
Measure 2: Diversion of clean wa			Ope	Operational Phase None applicable								
Impact AFTER Management	Minor	Medium Term	Local	Low	Definite	Medium	- High					



Table 9.2(j): Plant Life Operational Phase Impact and Risk Significance Table

ACTIVITY: Access Roads and Internal Roads – ASPECT: Road Verge – IMPACT DESCRIPTION: Proliferation of alien floral species.												
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence												
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	- High					
Management Measures				Time Period	Time Period for ImplementationCompliance with Standards							
Measure 1: Ensure that alien sp	oecies prolifera	tion is managed a	nd control	led according to	Oper	ational Phase	NEMBA	(Act 10 of 2004): Alien and Invasive				
an alien and invasive species man			Operational Phase		Species Regulations, GN R598 of 2014							
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High				

ACTIVITY: Fuel Supply – ASPECT: Diesel Fuel Tanks – IMPACT DESCRIPTION: Accidental spillage of hydrocarbons polluting the soil and in turn floral habitat										
	Magnitude	SIGNIFICANCE	+/-	Confidence						
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation Co			Compliance with Standards		
Measure 1: Ensure that all stora	ge tanks compl	y with the relevan	t standard	s and that tanks	Oper	ational Phase	S۵	BS standards for storage of fuel		
are regularly inspected for leaks			Oper	ational r hase	34	ibs standards for storage of fuer				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Morula Mining Shaft Complex – ASPECT: Water Storage Dams – IMPACT DESCRIPTION: Possible discharge and spillages degrading floral habitat										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-							+/-	Confidence		
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation	tation Compliance with Standards			
Measure 1: Ensure that all water storage facilities are managed as 'zero-discharge' facilities and that all facilities are designed to accommodate a 1:100 year storm event.						ational Phase	Surface	Water Balance Report and Water Use License		
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	- High			



ACTIVITY: Expansion of the Tap Hole Fume Extraction System and Finished Product Plant Dust Abatement System – ASPECT: Particulate Matter Emissions – IMPACT DESCRIPTION: Impact on photosynthetic processes of plants due to particulate matter fallout on leaf surfaces.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/-											
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures	Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Ensure that particulat	e matter emissi	ons comply with t	ne relevar	nt standards.	Constructi	on Phase	Air Emission Lice Rej	nse and Air Quality port.			
Measure 2: Monitor surrounding affecting leaf surfaces and photosy	vegetation to nthetic process	determine whethe es.	Construction Phase		Air Emission License and Air Quality Report.						
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely Low -						

ACTIVITY: Expansion of the Tap Hole Fume Extraction System and Finished Product Plant Dust Abatement System – ASPECT: Scrubber Effluent – IMPACT DESCRIPTION:												
Possible discharge and spillages degrading floral habitat												
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence												
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible Medium - High							
Management Measures					Time Period for I	mplementation	Compliance w	vith Standards				
Measure 1: Ensure that the facility	y is managed a	s 'zero-discharge'	facility ar	nd that no effluent is	Constructi	on Dhaca	Surface Water Bala	ance Report, Waste				
discharged into the environment.			Construction Phase		License and Water Use License.							
Impact AFTER Management Minor Medium Term Local Low Unlikely Low High												

ACTIVITY: Expansion of the OB Plant Tailings Storage Facility (TSF) – ASPECT: Disposal to TSF – IMPACT DESCRIPTION: Possible discharge and spillages degrading floral habitat												
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible Medium - High							
Management Measures	Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Ensure that the TSF is managed as 'zero-discharge' facility and that the facility is Surface Water Balance Report and Water												
Measure 1: Ensure that the TSF	is managed as	'zero-discharge' f	acility an	d that the facility is	Constructio	on Phase	Surface Water Balan	ce Report and Water				
Measure 1: Ensure that the TSF designed to accommodate a 1:100	is managed as vear storm ever	ʻzero-discharge'f nt.	acility an	d that the facility is	Constructio	on Phase	Surface Water Balan Use Li	ce Report and Water icense.				



ACTIVITY: Morula Mining Shaft Complex – ASPECT: Topsoil Stockpile – IMPACT DESCRIPTION: Alien floral proliferation is possible if not correctly re-vegetated and managed.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation	Compliance with Standards				
Measure 1: Ensure that topsoi	il stockpiles aı	e vegetated with	indigenou	is and endemic	Onor	ational Dhaco	NEMBA	(Act 10 of 2004): Alien and Invasive			
species and that alien species pro	oliferation is mo	onitored and mana	ged.		Oper	ational Fliase	Spec	ies Regulations, GN R598 of 2014			
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Salvage Yard and Mine Sewage Plant – ASPECT: Sludge Drying Beds – IMPACT DESCRIPTION: Possible discharge and spillages degrading floral habitat										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-								Confidence		
Impact BEFORE Management	Remanagement Minor Long Term Local Medium Possible Medium - High									
Management Measures					Time Period for ImplementationCompliance with Standards			Compliance with Standards		
Measure 1: Ensure that no spilla	ge or discharge	e of sludge into the	surroundi	ng environment	Oper	ational Phase		Waste License		
occurs and that all sludge is treat	waste disp	oosal site.	operational r hase		Waste Litense					
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	- High			

ACTIVITY: Storm Water Berms and Canals and Emergency Dam – ASPECT: Reduction of Run-off to Natural Resource – IMPACT DESCRIPTION: Possible impact on floral species sensitive to changes in surface water flow volumes causing a reduction in floral species diversity.									
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence									
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High	
Management Measures					Time Period	for Implementation	(Compliance with Standards	
Measure 1: Ensure that any reduction in runoff to natural resources stays within the permitted parameters of the ecological reserve						Operational Phase		Ecological Reserve and Water Use License	
Impact AFTER Management Minor Medium Term Local Low Unlikely Low - High							High		



ACTIVITY: Morula Dewatering Dam – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Possible discharge and spillages degrading floral habitat.										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence								Confidence		
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures				Time Period for ImplementationCompliance with Standards			Compliance with Standards			
Measure 1: Ensure that all water	r storage facilit	ies are managed a	s 'zero-dis	charge' facilities	Operational Phase Surface Water Balance Report a			Water Balance Report and Water Use		
and that all facilities are designed	orm event.		Operational Phase		License					
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	- High			

ACTIVITY: HMS Waste Material, Raw Materials, Ore, Mixed Materials, Slag and Return Materials Storage- ASPECT: Storage and stockpiling of HMS Waste Material Raw Materials, Ore, Mixed Materials, Slag and Return Materials – IMPACT DESCRIPTION: Possible discharge and spillages degrading floral habitat. SIGNIFICANCE Confidence Magnitude Duration Scale Consequence **Probability** +/-**Impact BEFORE Management** Minor Long Term Local Medium Possible Medium -High **Compliance with Standards Management Measures Time Period for Implementation**

Measure 1: Ensure that all stock facilities and that all pollution costorm event.	piles and stora ontrol facilities	age facilities are m are designed to a	anaged as .ccommoda	'zero-discharge' ate a 1:100 year	Oper	Operational Phase		Water Balance Report and Water Use License
Impact AFTER Management	Local	Unlikely	Low	-	High			

ACTIVITY: Primary Chrome Recovery Plant and Ore Beneficiation Plant - ASPECT: Crushing and Screening and Internal Transport and Contractors Yard and Wash Bay -IMPACT DESCRIPTION: Impact on photosynthetic processes of plants due to particulate matter fallout on leaf surfaces Magnitude **Duration** Scale Consequence **Probability** SIGNIFICANCE +/-Confidence **Impact BEFORE Management** Minor Long Term Local Medium Possible Medium -High **Time Period for Implementation Compliance with Standards Management Measures Measure 1:** Ensure that particulate matter emissions comply with the relevant standards. **Operational Phase** Air Emission License and Air Quality Report Measure 2: Monitor surrounding vegetation to determine whether particulate matter Annually during Operational Phase Air Emission License and Air Quality Report fallout is affecting leaf surfaces and photosynthetic processes. **Impact AFTER Management** Minor Medium Term Local Low Unlikely Low -High



ACTIVITY: H:H Slimes Dam and	d Return Wat	er Dam (RWD), R	WD Dam,	Disposal to TSF	, HERNIC Taili	ngs Storage Facility (FSF) and R	eturn Water Dam (RWD) OB Plant			
Coarse Waste in Open Pit (Tru	cks), OB Plan	t Return Water D	am, Chroi	me Recovery, Pla	ant Process Wa	ater Dam, Plant Storm	Water Po	llution Control Dam (PCD), Settling			
Pond A & B, Plant Drinking Water Treatment Plant, OB Plant Return Water Dam, Chrome Recovery Plant Process Water Dam - ASPECT: Dam Footprint, Storage of Process											
Water/ Silt, Plant Process Water Dam and Silt Traps, Storage of Process Water, Chrome Recovery Plant Process Water Dam, Plant Storm Water Pollution Control Dam											
(PCD) – IMPACT DESCRIPTION: Possible discharge and spillages degrading floral habitat											
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation	(Compliance with Standards			
Measure 1: Ensure that the TSF i	is managed as '	zero-discharge' fa	cility and t	hat the facility is	Oper	ational Dhace	Surface	Water Balance Report and Water Use			
designed to accommodate a 1:100 year storm event.											
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			



Table 9.2(k): Animal Life Operational Phase Impact and Risk Significance Table

ACTIVITY: Access Roads and Internal and Roads Railway Lines – ASPECT: Railroad and Rail Vehicles and Road Surface – IMPACT DESCRIPTION: Vehicle collisions with faunal species.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management Minor Long Term Local Medium Possible Medium - High										
Management Measures	Management Measures Time Period for Implementation Compliance with Standards									
Measure 1: Implement a 60km where roads traverse sensitive fa collisions.	on all internal ro varning motorists	ads and p of the pos	Oper	ational Phase		Speed Limit on Mine				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Power Supply – ASPECT: Overhead Power Lines – IMPACT DESCRIPTION: Collisions of avifaunal species with powerlines.											
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence											
Impact BEFORE Management Minor Long Term Local Medium Possible Medium - High											
Management Measures	Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Place bird-flappers in areas where powerlines traverse sensitive faunal habitat such as freshwater features						ational Phase]	Faunal Ecological Assessment			
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Security Fence and Access and Morula Shaft Mining Complex – ASPECT: Fences and Booms and Conveyors – IMPACT DESCRIPTION: Loss of faunal migratory connectivity										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management Minor Long Term Local Medium Possible Medium - High										
Management Measures					Time Period	for Implementation	(Compliance with Standards		
Measure 1: Ensure that fences are permeable for smaller faunal species to allow movement through the fences. Establish a pass-through every 50m for the conveyors.						Operational Phase Faunal Ecological Assessme				
Impact AFTER Management	Local	Low	Unlikely	Low	-	High				



ACTIVITY: Fuel Supply – ASPECT: Diesel Fuel Tanks – IMPACT DESCRIPTION: Accidental spillage of hydrocarbons polluting the soil and in turn faunal habitat										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management Minor Long Term Local Medium Possible Medium - High										
Management Measures				Time Period	for Implementation	(Compliance with Standards			
Measure 1: Ensure that all storage tanks comply with the relevant standards and that tanks are regularly inspected for leaks						ational Phase	SA	BS standards for storage of fuel		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Morula Mining Shaft Complex - ASPECT: Water Storage Dams - IMPACT DESCRIPTION: Possible discharge and spillages degrading faunal habitat										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE								Confidence		
Impact BEFORE Management	High									
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Ensure that all water storage facilities are managed as 'zero-discharge' facilities and that all facilities are designed to accommodate a 1:100 year storm event.						ational Phase	Surface '	Water Balance Report and Water Use License		
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High		

ACTIVITY: Morula Mining Shaft Complex – ASPECT: Topsoil Stockpile – IMPACT DESCRIPTION: Alien floral proliferation is possible if not correctly re-vegetated and										
managed.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	act BEFORE Management Moderate Long Term Local Medium Possible Medium - High									
Management Measures					Time Period	for Implementation	(Compliance with Standards		
Measure 1: Ensure that topso species and that alien species pro	re vegetated with onitored and mana	indigenoι ged.	is and endemic	Operational Phase NEMBA (Act 10 of 2004): Alien an Species Regulations, GN R598 ((Act 10 of 2004): Alien and Invasive ies Regulations, GN R598 of 2014			
Impact AFTER Management	Medium Term	Unlikely	Low	-	High					

ACTIVITY: Salvage Yard and Mine Sewage Plant – ASPECT: Sludge Drying Beds – IMPACT DESCRIPTION: Possible discharge and spillages degrading faunal habitat										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confid										
Impact BEFORE Management Minor Long Term Local Medium Possible Medium - High										
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Ensure that no spillage or discharge of sludge into the surrounding environment occurs and that all sludge is treated at an appropriate and licensed waste disposal site.						ational Phase		Waste License		
Impact AFTER Management Minor Medium Term Local Low					Unlikely	Low	-	High		



ACTIVITY: Storm Water Berms and Canals and Emergency Dam – ASPECT: Reduction of Run-off to Natural Resource – IMPACT DESCRIPTION: Possible impact on faunal species dependent on freshwater ecosystems.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Ensure that any repermitted parameters of the ecol	eduction in ru ogical reserve	noff to natural re	esources s	tays within the	Oper	ational Phase	Ecolog	cical Reserve and Water Use License		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Morula Dewatering Dam – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Possible discharge and spillages degrading faunal habitat.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE							+/-	Confidence		
Impact BEFORE Management	Moderate	Long Term	Local	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation	(rading faunal habitat. Confidence High Compliance with Standards Water Balance Report and Water Use License High		
Measure 1: Ensure that all water storage facilities are managed as 'zero-discharge' facilities and that all facilities are designed to accommodate a 1:100 year storm event.						ational Phase	Surface	Water Balance Report and Water Use License		
Impact AFTER Management Minor Medium Term Local L					Unlikely	Low	-	High		

ACTIVITY: HMS Waste Material, Raw Materials, Ore, Mixed Materials, Slag and Return Materials Storage – ASPECT: Storage and stockpiling of HMS Waste Material Raw Materials, Ore, Mixed Materials, Slag and Return Materials – IMPACT DESCRIPTION: Possible discharge and spillages degrading faunal habitat.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Minor	Long Term	Local	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation	(Hign Compliance with Standards		
Measure 1: Ensure that all stockpiles and storage facilities are managed as 'zero-discharge' facilities and that all pollution control facilities are designed to accommodate a 1:100 year storm event.						ational Phase	Surface	Water Balance Report and Water Use License		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: H:H Slimes Dam and Return Water Dam (RWD), RWD Dam, Disposal to TSF, HERNIC Tailings Storage Facility (TSF) and Return Water Dam (RWD) OB Plant Coarse Waste in Open Pit (Trucks), OB Plant Return Water Dam, Chrome Recovery, Plant Process Water Dam, Plant Storm Water Pollution Control Dam (PCD), Settling Pond A & B, Plant Drinking Water Treatment Plant, OB Plant Return Water Dam, Chrome Recovery Plant Process Water Dam – ASPECT: Dam Footprint, Storage of Process Water/ Silt, Plant Process Water Dam and Silt Traps, Storage of Process Water, Chrome Recovery Plant Process Water Dam, Plant Storm Water Pollution Control Dam (PCD) – IMPACT DESCRIPTION: Possible discharge and spillages degrading faunal habitat

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Long Term	Local	M edium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation			Compliance with Standards		
Measure 1: Ensure that the facilities are managed as 'zero-discharge' facilities and that each facility is designed to accommodate a 1:100 year storm event.						ational Phase	Surface	Water Balance Report and Water Use License		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Expansion of the Tap Hole Fume Extraction System and Finished Product Plant Dust Abatement System – ASPECT: Gaseous and Particulate Matter Emissions – **IMPACT DESCRIPTION: Impact on respiratory systems of fauna due to gaseous emissions and particulate matter.** Magnitude Duration Scale Consequence Probability **SIGNIFICANCE** +/-Confidence **Impact BEFORE Management** Local Medium Possible Medium -Minor Long Term High **Management Measures Time Period for Implementation Compliance with Standards** Air Emission License and Air Quality **Measure 1:** Ensure that particulate matter emissions comply with the relevant standards. **Construction Phase** Report **Impact AFTER Management** Minor Medium Term Local Unlikely Low Low -High

ACTIVITY: Expansion of the Tap Hole Fume Extraction System and Finished Product Plant Dust Abatement System – ASPECT: Scrubber Effluent – IMPACT DESCRIPTION: Possible discharge and spillages degrading faunal habitat

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period f	or Implementation	Compliance with Standards			
Measure 1: Ensure that the facility discharged into the environment.	'zero-discharge' fa	Constr	uction Phase	Su	rface Water Balance Report, Waste License and Water Use License			
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High



ACTIVITY: Expansion of the OB Plant Tailings Storage Facility (TSF) – ASPECT: Disposal to TSF – IMPACT DESCRIPTION: Possible discharge and spillages degrading faunal habitat											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period f	or Implementation		Compliance with Standards			
Measure 1: Ensure that the TSF i designed to accommodate a 1:100	s managed as ' year storm ever	zero-discharge' fa nt.	Constru	uction Phase	Surfa	ace Water Balance Report and Water Use License					
Impact AFTER Management	Minor	Medium Term	Local	Medium	Unlikely	Low	-	High			



Table 9.2(1): Wetlands Operational Phase Impact and Risk Significance Table

ACTIVITY: Fuel Supply – ASPECT: Diesel Fuel Tanks – IMPACT DESCRIPTION: Accidental spillage of hydrocarbons polluting freshwater habitat										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confide								Confidence		
Impact BEFORE Management Minor Long Term Local Medium Possible Medium -										
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Ensure that all storage tanks comply with the relevant standards and that tanks are regularly inspected for leaks.						ational Phase		SABS standards for storage of fuel		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Morula Mining Shaft Complex – ASPECT: Water Storage Dams – IMPACT DESCRIPTION: Possible discharge and spillages degrading freshwater habitat										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE						+/-	Confidence		
Impact BEFORE Management	Long Term	Possible	Medium	-	High					
Management Measures					Time Period	for Implementation		- High Compliance with Standards Surface Water Balance Report and Water Use		
Measure 1: Ensure that all water s and that all facilities are designed t	s are managed as ' e a 1:50 year storn	zero-dis 1 event.	Oper	ational Phase	Surfa	ace Water Balance Report and Water Use License				
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High		

ACTIVITY: Morula Mining Underground Operation, Morula Mining Shaft Complex and Morula Mining Opencast Operation – ASPECT: Underground Mining, Decline Shafts, Abstraction and Existence of the Void – IMPACT DESCRIPTION: Cone of depression as a result of abstraction, opencast and underground mining leading to dewatering of wetlands.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period for Implementation Compliance with Standards					
Measure 1: Ensure that groundwater monitoring is implemented and if a significant change in the cone of depression occurs, that possibly affected surface water systems be inspected for possible water stress.						ational Phase	Geohy	vdrological Report and Water Use License
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High



ACTIVITY: Morula Mining Shaft Complex – ASPECT: Topsoil Stockpile – IMPACT DESCRIPTION: Increase in sediment rich runoff if not effectively vegetated, resulting in impacts on freshwater habitat.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Moderate Long Term Local Medium Possible Medium - High											
Management Measures					Time Period	for Implementation		Compliance with Standards			
Measure 1: Ensure that topsoil species and that erosion is monitor	vegetated with in ed.	ndigenou	is and endemic	Operational Phase		Rehabilitation Plan and Stormwater Management Plan					
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Salvage Yard and Mine Sewage Plant – ASPECT: Sludge Drying Beds – IMPACT DESCRIPTION: Possible discharge and spillages degrading freshwater habitat										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence									
Impact BEFORE Management	High									
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Ensure that no spillage or discharge of sludge into the surrounding environment occurs and that all sludge is treated at an appropriate and licensed waste disposal site.						ational Phase		Waste License		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Storm Water Berms and Canals and Emergency Dam – ASPECT: Reduction of Run-off to Natural Resource – IMPACT DESCRIPTION: Reduction in runoff and catchment yield, leading to impacts on freshwater habitat and ecological structure, service provision capability and hydrological function.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management Moderate Long Term Local Medium Possible Medium - High										
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Ensure that any red permitted parameters of the ecolog	off to natural res	ources s	Oper	ational Phase	Ecological Reserve and Water Use License					
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Morula Dewatering Dam – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Possible discharge and spillages degrading freshwater habitat.										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE								Confidence		
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation		egrading freshwater habitat. Confidence High Compliance with Standards ace Water Balance Report and Water Use License High		
Measure 1: Ensure that all water and that all facilities are designed t	s are managed as ' e a 1:50 year storm	ˈzero-dis 1 event.	Oper	ational Phase	Surfa	ace Water Balance Report and Water Use License				
Impact AFTER Management Minor Medium Term Local Low					Unlikely	Low	-	High		

ACTIVITY: Primary Chrome Recovery Plant, Mine Waste Rock Dump - HMS Waste Material, Raw Materials, Ore, Mixed Materials, Slag and Return Materials Storage – ASPECT: Storage of Waste Rock on un-lined footprint, Storage and stockpiling of HMS Waste Material Raw Materials, Ore, Mixed Materials, Slag and Return Materials, Storage of Product – IMPACT DESCRIPTION: Possible discharge and spillages degrading freshwater habitat.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period for Implementation Compliance wit			Compliance with Standards		
Measure 1: Ensure that all stockpiles and storage facilities are managed as 'zero-discharge' facilities and that all pollution control facilities are designed to accommodate a 1:50 year storm event.						ational Phase	Surfa	ace Water Balance Report and Water Use License
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High

ACTIVITY: Wash Bay, H:H Slimes Dam and Return Water Dam (RWD), RWD Dam, Disposal to TSF, HERNIC Tailings Storage Facility (TSF) and Return Water Dam (RWD) OB Plant Coarse Waste in Open Pit (Trucks), OB Plant Return Water Dam, Chrome Recovery, Plant Process Water Dam, Plant Storm Water Pollution Control Dam (PCD), Settling Pond A & B, Plant Drinking Water Treatment Plant, OB Plant Return Water Dam, Chrome Recovery Plant Process Water Dam – ASPECT: Dam Footprint, Storage of Process Water/ Silt, Plant Process Water Dam and Silt Traps, Storage of Process Water, Chrome Recovery Plant Process Water Dam, Plant Storm Water Pollution Control Dam (PCD) – IMPACT DESCRIPTION: Possible discharge and spillages degrading freshwater habitat

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures				Time Period	for Implementation	Compliance with Standards		
Measure 1: Ensure that the TSF is managed as 'zero-discharge' facility and that the facility is designed to accommodate a 1:50 year storm event.						ational Phase	Surfa	ace Water Balance Report and Water Use License
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High



ACTIVITY: Expansion of the Tap Hole Fume Extraction System and Finished Product Plant Dust Abatement System – ASPECT: Scrubber Effluent – IMPACT DESCRIPTION: Possible discharge and spillages degrading freshwater habitat										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation	(Confidence - High Compliance with Standards face Water Balance Report, Waste License and Water Use License - High		
Measure 1: Ensure that the facility is managed as 'zero-discharge' facility and that no effluent is discharged into the environment.						ruction Phase	Surface V	Nater Balance Report, Waste License and Water Use License		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Coarse Slag at the CRP and Re-Use of Mine Waste Rock at the Mine Waste Rock Stockpile – ASPECT: Stockpiling of Waste Rock Product and Coarse Slag - Possible discharge and spillages degrading freshwater habitat – IMPACT DESCRIPTION: Possible discharge and spillages degrading freshwater habitat											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation		Compliance with Standards			
Measure 1: Ensure that all stockpi facilities and that all pollution constorm event.	les and storage trol facilities a	e facilities are man are designed to ac	aged as commod	'zero-discharge' late a 1:50 year	Const	ruction Phase	Surface	Water Balance Report and Water Use License			
Impact AFTER Management Minor Medium Term Local Medium Unlikely Low - High											



Table 9.2(m): Aquatic Ecosystems Operational Phase Impact and Risk Significance Table

ACTIVITY: Access roads; security fences and booms; railway lines – ASPECT – Road surface; road verge; fences and booms; railroad and rail vehicles – IMPACT CATEGORY – Water quality; Altered drainage patterns; Erosion - IMPACT DESCRIPTION - Contamination of water due to runoff from roads, potential spills and site clearing activities; Sediment-laden runoff entering riparian habitat, smothering vegetation and leading to loss of aquatic habitat and loss of refugia for aquatic communities. Altered topography/geomorphology, leading to altered runoff patterns and formation of preferential flow paths; Sheet runoff and runoff from road surfaces may result in erosion and incision, leading to sedimentation and loss of habitat in the aquatic resources present.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Possible	Medium	-	High
Management Measures					Time Period fo	or Implementation	ompliance with Standards	
Measure 1: Erosion control and s	storm water ma	anagement.		Operational Phase		Ecological Reserve and Water Use License		
Measure 2: Ensure that alien sp controlled according to an alien a	ion along road ver ecies management	Operat	ional Phase	NEMBA (Act 10 of 2004): Alien and Invasive Species Regulations, GN R598 of 2014				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High

ACTIVITY: Water supply – ASPECT – Canal and pump station; Water abstraction and pipelines – IMPACT CATEGORY – Loss of biodiversity - IMPACT DESCRIPTION – Loss of surface water recharge. Water use and water abstraction activities from rivers and groundwater resources are likely to result in a loss of surface water recharge and loss of catchment yield, leading to loss of habitat and biodiversity.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Possible	Medium	-	High
Management Measures		Time Period for Implementation		C	Compliance with Standards			
Measure 1: Very strict control must take place and where all wa	mption must take continuously be o	Operat	ional Phase		Water Use License			
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High

ACTIVITY: Fuel Supply - ASPECT- Diesel Fuel Tanks – IMPACT CATEGORY – Loss of biodiversity - Spills related to refueling activities can impact water quality and result in loss of stream connectivity (physico-chemical) and loss of species diversity.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period fo	or Implementation	C	ompliance with Standards		
Measure 1: Ensure that all stor regularly inspected for leaks.	ly with the relevar	Operational Phase		SABS standards for storage of fuel						
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		



ACTIVITY – Power supply; Office complexes; Morula mining shaft complex; Morula mining accommodation; General plant infrastructure - ASPECT – Eskom Yard and Substations; Paving and infrastructure; Offices and workshops; Change house complex; Grout plant; People's walkway; Paving and buildings -IMPACT CATEGORY – Erosion; Water quality; Loss of biodiversity; Altered drainage patterns – IMPACT DESCRIPTION - Sheet runoff and runoff from paved and cleared surfaces and infrastructure may result in impacts to water quality and erosion and incision, leading to sedimentation and loss of habitat in the aquatic resources present; Potential loss of catchment yield due to decreased clean water runoff surface area; Inadequate sewage and disposal of hazardous wastes and non-hazardous materials in riparian areas, leading to altered water quality, possible changes to flow patterns as a result of blockages caused by solid wastes/rubble.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period fo	or Implementation	C	ompliance with Standards		
Measure 1: Limit the footprint a order to minimise the loss of cleat the area.	onal activities to eas and the cono	Operat	ional Phase	Sto	orm Water Management Plan			
Measure 2: Erosion control and s	igement.	Operational Phase		Storm Water Management Plan				
Impact AFTER Management	Minor	Long Term	Site	Medium	Unlikely	Low	-	High

ACTIVITY: Morula Mining Shaft Complex; H:H Slimes Dam and RWD; HERNIC TSF and RWD; Plant process water dam and silt traps; OB plant RWD; Chrome recovery plant process water dam; Plant storm water pollution control dam (PCD); Emergency dam; Development of the Morula PCD; Expansion of stormwater PCD No. 1, 2 and 3; Development of the OB plant process water dam; Expansion of the plant process water dam; Expansion of the CRP process water dam – ASPECT – Storage of process water; Water storage dams; IMPACT CATEGORY – Loss of biodiversity and habitat – IMPACT DESCRIPTION - Risk of pollution of surface water as a result of discharges, seepage, spills, leaks. Potentially inadequate design of dam liners leading to failure and contamination of the aquatic resources downstream of the Process Water Storage Facilities. Increased risk of pollution of groundwater, potentially leading to the formation of a contaminated groundwater plume, which may migrate downgradient of the surface infrastructure, thus possibly affecting the downgradient aquatic ecosystems. Loss of catchment yield due to storm water containment leading to a reduction in volume of water entering the freshwater resource and resulting in a loss of recharge (and thus desiccation) of downstream system and altered vegetation communities due to increased moisture stress.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures					Time Period fo	or Implementation	C	ompliance with Standards
Measure 1: Ensure that all wate that all facilities are designed to a	s are managed a 100 year storm	Operat	ional Phase	Surf	ace Water Balance Report and Water Use License			
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High



ACTIVITY: Morula Mining Shaft Complex; Mine waste rock dumps; Raw material stockpile areas; Slag stockpiling areas; Product rail dispatch area- ASPECT - Emergency ROM stockpile and topsoil stockpile; Storage of waste rock on un-lined footprint; Product stockpiles; Storage of mixed materials; HMS waste material; storage of mixed materials; Storage of returns materials; Storage of raw materials; Storage of slag - IMPACT CATEGORY - Water quality and sedimentation; Loss of biodiversity and habitat - IMPACT DESCRIPTION - Possible contamination of surface and ground water, leading to impaired water quality and salinization of soils and sediments within the aquatic resources. Sedimentation of aquatic resource could lead to altered water quality, altered channel competency and altered vegetation community composition; Increased risk of pollution of groundwater, potentially leading to the formation of a contaminated groundwater plume, which may migrate downgradient of the surface infrastructure, thus possibly affecting the downgradient freshwater system

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period fo	Time Period for Implementation Compliance with Standa				
Measure 1: Ensure that topsoil and that alien species proliferation	stockpiles are on is monitored	vegetated with in and managed.	Operational Phase		NEMBA (Act 10 of 2004): Alien and Invasive Species Regulations, GN R598 of 2014			
Measure 2: Ensure that all sto facilities and that all pollution co event.	ockpiles and st ontrol facilities	orage facilities ar are designed to ac	l as 'zero-discharge' e a 1:100 year storm	Operational Phase		Surface Water Balance Report and Water Use License		
Measure 3: Ensure that where prevent runoff and erosion from	piles are capped a s to the receiving e	Operat	ional Phase	Storm Water Management Plan				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High

ACTIVITY: Salvage Yard and Mine Sewage Plant – ASPECT - Sludge Drying Beds – IMPACT CATEGORY - Water quality and sedimentation - Increased surface water runoff, leading to erosion, and sedimentation of riparian habitat. Loss of catchment-yield due to separation of clean and dirty water runoff. Proliferation of alien vegetation as a result of disturbances and site clearing activities

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period fo	or Implementation	C	ompliance with Standards		
Measure 1: Ensure that no spil occurs and that all sludge is treat	rge of sludge into oriate and licensed	Operat	ional Phase		Waste License			
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High



ACTIVITY: Storm Water Berms and Canals – ASPECT - Reduction of Run-off to Natural Resource – IMPACT CATEGORY – Loss of catchment yield - IMPACT DESCRIPTION Potential loss of catchment yield due to decreased clean water runoff surface area. Increased flood peaks as a result of formalisation and concentration of surface runoff. Potential for erosion of terrestrial areas as a result of the formation of preferential flow paths, leading to sedimentation of the aquatic resources. Reduction in volume of water entering the aquatic resources, leading to loss of recharge (and thus desiccation) of downstream system; Altered vegetation communities due to increased moisture stress.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Ensure that any reduction in runoff to natural resources stays within the permitted Ecological Reserve and Water Use										

parameters of the ecological reserve	rve		5	Ĩ	Operational Phase		License	
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High

ACTIVITY: Primary Chrome Recovery Plant and Ore Beneficiation Plant; Pelletizing and sintering plants 1 and 2; Furnaces 1, 2, 3 and 4, Finished product plant; Ferrochrome break floor area – ASPECT - Crushing and Screening and Internal Transport and Contractors Yard and Wash Bay; Structure/complex; Conveyors; Mechanical activity – IMPACT CATEGORY – Water quality and loss of biodiversity IMPACT DESCRIPTION - Contamination of water due to spills associated with the transport of ore leading to a loss of aquatic community integrity and diversity. Possible contamination of surface and ground water, leading to impaired water quality and salinization of soils and sediments within the aquatic resources. Sedimentation of aquatic resource could lead to altered water quality, altered channel competency and altered vegetation community composition. Sediment-laden runoff entering riparian habitat leading to altered water quality and smothering of vegetation. Altered topography/geomorphology, leading to altered runoff patterns and formation of preferential flow paths. Increased risk of pollution of groundwater, potentially leading to the formation of a contaminated groundwater plume, which may migrate downgradient of the surface infrastructure, thus possibly affecting the downgradient freshwater system. Impacts to water quality as a result of mechanical spills and compaction of soils leading to alterations of natural flow and runoff patterns and resulting in erosion and alteration to the natural vegetation profiles.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures					Time Period fo	or Implementation	Co	ompliance with Standards
Measure 1: Ensure that operation prevent runoff and contamination	tional surfaces n of the surface	are appropriately and groundwater	and sealed so as to present.	Operat	ional Phase	Waste Licence and Storm Water Management Plan		
Measure 2: All spills must be imposed waste management procedures.	ed up and suitably	Operat	ional Phase	Waste Licence and Storm Water Management Plan				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High



ACTIVITY: Platinum group minerals (PGM) plant – ASPECT – Pumping of PGM feed material; Spiral ball milling; Thickening and flotation process – IMPACT CATEGORY – Loss of habitat biodiversity; Water quality and sedimentation – IMPACT DESCRIPTION - Possible contamination of surface and ground water, leading to impaired water quality and salinization of soils and sediments within the aquatic resources. Sedimentation of aquatic resource could lead to altered water quality, altered channel competency and altered vegetation community composition. Sediment-laden runoff entering riparian habitat leading to altered water quality and smothering of vegetation. Increased risk of pollution of groundwater, potentially leading to the formation of a contaminated groundwater plume, which may migrate downgradient of the surface infrastructure, thus possibly affecting the downgradient freshwater system as a result of spills or disposal of hazardous wastes.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period fo	or Implementation	C	ompliance with Standards		
Measure 1: Ensure that operation prevent runoff and contamination	tional surfaces n of the surface	are appropriately and groundwater	and sealed so as to present.	Operat	Operational Phase		Waste Licence and Storm Water Management Plan	
Measure 2: All spills must be imp waste management procedures.	ed up and suitably	Operat	ional Phase	Waste Licence and Storm Water Management Plan				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High

ACTIVITY: Abstraction boreholes – ASPECT –Cone of depression– IMPACT CATEGORY – Loss of habitat biodiversity – IMPACT DESCRIPTION - Water use and water abstraction activities from rivers and groundwater resources are likely to result in a loss of surface water recharge and loss of catchment yield, resulting in a loss of recharge (and thus desiccation) of downstream systems and altered vegetation communities due to increased moisture stress.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures					Time Peri	iod for Implementation	C	ompliance with Standards
Measure 1: Very strict control monitoring must take place and v	ol of water co where all water	onsumption must usage must contin	take pla uously be	ce and detailed optimised	Operational Phase			Water Use License
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High



Table 9.2(n): Air Quality Operational Phase Impact and Risk Significance Table

ACTIVITY: Stockpiles – ASPECT	ACTIVITY: Stockpiles – ASPECT: Storage of Materials – IMPACT DESCRIPTION: Fine Fugitive Dust											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence												
Impact BEFORE Management Moderate Medium Term Site Medium Definite Medium - High												
Management Measures					Time Period for I	mplementation	Complianc	e with Standards				
Measure 1: Dust Suppression				Operational Phase		-						
Impact AFTER Management	Low	Possible	Low	-	High							

ACTIVITY: Stockpiles – ASPECT	ACTIVITY: Stockpiles – ASPECT: Movement of Materials – IMPACT DESCRIPTION: Fine Fugitive Dust											
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Moderate Medium Term Site Medium Definite Medium - High												
Management Measures					Time Period for In	mplementation	Compliance with Standards					
Measure 1: Dust Suppression				Operational Phase		-						
Impact AFTER Management	Minor	Medium Term	Low	Possible	Low	-	High					

ACTIVITY: Stockpiles/Material	ACTIVITY: Stockpiles/Materials – ASPECT: Vehicle Movement on Gravel Roads – IMPACT DESCRIPTION: Fine Fugitive Dust												
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE												
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High					
Management Measures				Time Period for I	mplementation	Complianc	e with Standards						
Measure 1: Dust Suppression					Operationa	al Phase		-					
Measure 2: Consider alternative move material	techniques to r	educe the extent by	es are used to	Operationa	al Phase								
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	-	High					



ACTIVITY: Stockpiles/Material	s – ASPECT: Ve	ehicle Movement o	n Gravel Roa	ds – IMPACT DESCR	IPTION: Excessive qua	ntity of noxious veh	icle exhaust fu	ımes		
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	ANCE +/- Confid			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High		
Management Measures					Time Period for In	mplementation	Compliance	e with Standards		
Measure 1: Manage Vehicle fleet	and movement	t of vehicles on site			Operationa	al Phase		-		
Measure 2: Limit the use of vehic	cles in poorly v	entilated areas			Operationa	al Phase	-			
Measure 3: Plan routes in such a not to affect air quality to the exte	manner as to a ent whereby ex	llow for exhaust fur ceedences of standa	nes to dispers ards could occu	e sufficiently and ur	Operationa	al Phase	-			
Measure 4: Consider alternative	options to vehi	cles with combustio		Operationa	al Phase	-				
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	-	High		

ACTIVITY: Pelletizing and Sinte	ering Plants ar	nd Furnaces – ASPI	ECT: Uncontro	olled Emission of Pi	rimary Pollutants- IMI	PACT DESCRIPTION:	Particulate Ma	atter Emissions			
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Moderate Medium Term Site Medium Definite Medium -											
Management Measures					Time Period for I	mplementation	Compliance with Standards				
Measure 1: Implement control m and magnitude of uncontrolled en	easures that w missions from p	ill prevent/limit the point sources	Operationa	al Phase		-					
Impact AFTER Management Minor Medium Term Site Low Period						Low	-	High			



ACTIVITY: Various activities taking p IMPACT DESCRIPTION: Noise level e	ACTIVITY: Various activities taking place simultaneously during the DAY IMPACT DESCRIPTION: Noise level exceeding acceptable noise level (55 dBA – outside) at surrounding environment												
Impact BEFORE Management													
Distance from activities	Noise Level (dBA)	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Closer than ± 550m for operation or closer than 200m from noise- generating activity.	55 +	Moderate	Medium	Local	Medium	Unlikely	Low	-	High				
550 – 750 m from operation or within 400m from noise generating activity.	50 – 55	Minor	Medium	Local	Low	Unlikely	Low	-	High				
750 – 1,100mfrom operation or within 600m from noise generating activity.	45 - 50	Minor	Medium	Local	Low	Unlikely	Low	-	High				
Further than 1,100m from operation or further that 600m from noise generating activity	45	Minor	Medium	Local	Low	Unlikely	Low	-	High				
M	lanagement Meas	sures			Time Period for	· Implementation	Compliance	e with S	Standards				
Measure 1: No daytime management m	neasures proposed	l.			Not applicable SANS 10103:2008 (Urban)								
			Impact AFT	ER Managen	nent		I						
Distance from activities	Noise Level (dBA)	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Closer than ± 550m for operation or closer than 200m from noise- generating activity.	55 +	Moderate	Medium	Local	Medium	Unlikely	Low	-	High				
550 – 750 m from operation or within 400m from noise generating activity.	50 - 55	Minor	Medium	Local	Low	Unlikely	Low	-	High				
750 – 1,100mfrom operation or within 600m from noise generating activity.	45 - 50	Minor	Medium	Local	Low	Unlikely	Low	-	High				
Further than 1,100m from operation or further that 600m from noise generating activity	45	Minor	Medium	Local	Low	Unlikely	Low	-	High				



ACTIVITY: Various activities taking IMPACT DESCRIPTION: Noise level e	place simultaneo xceeding accepta	usly at NIGHT ble noise level (45 dBA – outs	ide) at surro	ounding environm	ient								
Impact BEFORE Manag	Impact BEFORE Management (Potential noise impact of medium significance on receptors 11, 10, 9 and 5 – Receptor 5 represent community)													
Distance from activities	Noise Level (dBA)	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence					
Closer than ± 550m for operation or closer than 200m from noise- generating activity.	55 +	Major	Medium	Local	Medium	Definite	Medium	-	High					
550 – 750 m from operation or within 400m from noise generating activity.	50 – 55	Major	Medium	Local	Medium	Probable	Medium	-	High					
750 – 1,100mfrom operation or within 600m from noise generating activity.	45 - 50	Moderate	Medium	Local	Medium	Probable	Low	-	High					
Further than 1,100m from operation or further that 600m from noise generating activity	45	Minor	Medium	Local	Low	Unlikely	Low	-	High					
м	lanagement Mea	sures			Time Period for	Implementation	Compliance	e with S	Standards					
Measure 1: The implementation of a levels are a concern at receptors imple Measure 2: A noise emission audit to c Measure 3: Study to define potential the potential effectiveness of the measure	quarterly noise m ment Measure 2 an letermine the sour nitigation measur ures.	nonitoring progra nd 3. rce of significant n es that could red	amme for 2 ye noises. luce noise level	ars, if noise s as well as	Within a year, within 2 implem	to be completed years after ientation.	SANS 101(03:2008	8 (Urban)					
Impact AFT	ER Management (Effectiveness of	f mitigation m	easures will	depend on the m	itigation measures	implemented)							
Distance from activities	Noise Level (dBA)	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence					
Closer than ± 550m for operation or closer than 200m from noise- generating activity.	55 +	Major	Medium	Local	Medium	Definite	Medium	-	High					
550 – 750 m from operation or within 400m from noise generating activity.	50 - 55	Major	Medium	Local	Medium	Probable	Medium	-	High					
750 – 1200m from operation or within 600m from noise generating activity.	45 - 50	Moderate	Medium	Local	Medium	Probable	Low	-	High					
Further than 1,100m from operation or further that 600m from noise generating activity	45	Minor	Medium	Local	Low	Unlikely	Low	-	High					



Table 9.2(p): Visual Aspects Operational Phase Impact and Risk Significance Table

A: Infrastructure, elements or activities that generate dust or hosts activities that generate dust, visible from close, medium or long range views. A.1: Infrastructure Hosting Activities that Generate Dust, such as Crushing and Screening Operations.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Minor Medium Term Site/Local Low Definite Medium - High											
Management Measures					Time Period for	- Implementation	Complian	ce with Standards			
Measure 1: Dust Suppression.Operational PhaseAir Quality Report											
Impact AFTER Management Minor Medium Term Site/Local Low Possible Low High											

A: Infrastructure, elements or activities that generate dust or hosts activities that generate dust, visible from close, medium or long range views. A.2: Activities that generate dust from construction/decommissioning of site infrastructure and moving vehicles.

		2	•		0			
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Medium Term	Site/Local	Low	Definite	Medium	-	High
Management Measures			Time Period for	Implementation	Compliance with Standards			
Measure 1: Dust Suppression.					Operational Phase		Air Q	uality Report
Impact AFTER Management	Minor	Medium Term	Site/Local	Low	Possible	Low	-	High

A: Infrastructure, elements or activities that generate dust or hosts activities that generate dust, visible from close, medium or long range views. A.3: Activities that generate dust from moving vehicles on internal unpaved roads.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Medium Term	Site/Local	Low	Definite	Medium	-	High
Management Measures	res Time Period for Implementation		Compliance with Standa					
Measure 1: Dust Suppression.					Operational Phase		Air Q	uality Report
Impact AFTER Management	Minor	Medium Term	Site/Local	Low	Possible	Low	-	High



A: Infrastructure, elements or activities that generate dust or hosts activities that generate dust, visible from close, medium or long range views. A.4: Elements that generate Windblown Dust such as dumps and stockpiles.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Minor	Medium Term	Site/Local	Low	Definite Medium - High						
Management Measures	-				Time Period for	Implementation	Complian	ce with Standards			
Measure 1: Dust Suppression. Operational Phase Air Quality Report							uality Report				
Impact AFTER Management	Minor	Medium Term	Impact AFTER Management Minor Medium Term Site/Local Low Possible Low - High								

B: Infrastructure that creates Stack Emissions visible from close, medium or long range views.									
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Medium Term	Site/Local	Medium	Definite	Medium	-	High	
Management Measures	-				Time Period for	Implementation	Complian	ce with Standards	
Measure 1: Particulate Emissions Management.					Operatio	onal Phase	Air Quality Report		
Impact AFTER Management	Management Minor Medium Term Site/Local Low Possible Low -					High			

C: Infrastructure that has a physical size or height as to create a Visual Intrusion in the landscape. Thus these elements are highly visible from close, medium and long range views.									
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence								
Impact BEFORE Management	Moderate	Medium Term	Site/Local	Medium	Definite	Medium	-	High	
Management Measures					Time Period for	Implementation	Complian	ce with Standards	
Measure 1: Particulate Emissions Management.					Operational Phase		Not Applicable		
Impact AFTER Management	Moderate Medium Term Site/Local Medium Definite Medium - High							High	



D: Mining Activities that are subject to shaping of landforms. These activities include for instance stockpiles and dumps that could potentially create a Visual Intrusion in the landscape by taking on contrasting shapes to the natural landscape topography of the area.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Moderate	Medium Term	Site/Local	Medium	Definite Medium - High					
Management Measures					Time Period for	Implementation	Complian	ce with Standards		
Measure 1: Particulate Emission			Operational Phase		Relevant Specialist Reports					
Impact AFTER Management	Minor	Minor Medium Term Site/Local Low Possible Low High								



Table 9.3(a): Socio- Cultural/Economic Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: HERNIC Operations	ACTIVITY: HERNIC Operations – ASPECT: Social Geographic Processes- IMPACT DESCRIPTION: Nuisance factors										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Short Term	Local	Low	Possible	Medium	-	Medium			
Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Community education	n on possible i	mpacts and invo	lvement in k	ey decisions.	Short Term		None				
Measure 2: Grievances register t	hat is easily ex	cisable and regu	larly monito	red.	Mediu	m Term	None				
Measure 3: Implement the mitigation measures set out in the related specialist studies to minimize the impacts on the physical environment and in turn the socio-economic environment.					Mediu	m Term	None				
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	Medium			

ACTIVITY: HERNIC Operations – ASPECT: Economic Efficiency – IMPACT DESCRIPTION: Loss of jobs and income due to closure										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Major	Long Term	Regional	High	Definite	High	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: As per the Social and	nd Labour Plar	develop mecha	anisms to as	sist employees, prior to	Medium	ı Term	Social a	nd Labour Plan		
retrenchment date in the transiti	on phase after of	closure of the op	erations.							
Measure 2: Focus on non-core r	elated local su	oply links durin	g the operati	onal phases of the mine				N		
to facilitate easier transitioning of local suppliers to other industries.					Medium	Term	None			
Impact AFTER Management	Major	Long Term	Regional	High	Definite	High	-	High		

ACTIVITY: HERNIC Operations – ASPECT: Economic Equity – IMPACT DESCRIPTION: Decrease or termination of social funds									
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence								
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	Medium	
Management Measures					Time Period for	mplementation	Complianc	e with Standards	
Measure 1: Plan projects with an exit strategy of which beneficiaries are aware of.					Medium Term		None		
Impact AFTER Management Minor Long Term Local Medium Possible Medium - Medium								Madium	



Table 9.3(b): Heritage Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: HERNIC Operations - ASPECT: Excavation Work- IMPACT DESCRIPTION: Exposure of Fossils/ Heritage Resources									
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Major	Medium Term	Site	Medium	Unlikely	Low	-	Medium	
Management Measures					Time Period f	or Implementation	Compliance with Standards		
Measure 1: Contact Qualified Palaeontologist/ Archaeologist					Decommissioning Phase		None		
Impact AFTER Management	Major	Medium Term	Site	Medium	Unlikely	Low	-	Medium	



Table 9.3(c): Blasting and Vibration Decommissioning and Closure Phase Impact and Risk Significance Table

No Significant Blasting and Vibration Related Impacts identified/expected during the Decommissioning and Closure Phase.



Table 9.3(d	l): Traffic As	pects Decomm	issioning and	Closure Phase Ii	mpact and Risk S	ignificance Table
	- · · · · · · · · · · · · · · · · · · ·	p • • • • • • • • • • • • • • • • • • •				

ACTIVITY: Rubble Removal – ASPECT: Increase in Heavy Vehicles Trips – IMPACT DESCRIPTION: 19 Trips per day and Traffic Congestion									
	Magnitude Duration Scale Consequence Probability Significance +/- Confid								
Impact BEFORE Management	Minor	Short term	Local	Low	Possible	Low	-	Medium	
Management Measures					Time Period for I	mplementation	Compliance with Standards		
Measure 1: Road Safety Awareness Campaigns					Decommissioning Phase		-		
Impact AFTER Management	Minor	Short term	Local	Low	Possible	Low	-	Medium	



Table 9.3(e): Topography Decommissioning and Closure Phase Impact and Risk Significance Table

Activity: Decommissioning of the Two Historic Slimes Dams- Aspect - Excavate Facilities and Dispose to the H:H Facility - Change in Morphology (uneven surfaces) due to excavation activities										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Short Term	Site	Low	Possible	Low	-	High		
Management Measures				Time Period for I	mplementation	Complianc	e with Standards			
Measure 1: Limit excavation activiti	es to footprint a	rea			During decommissioning of the dams -			-		
Measure 2: Even out all rough surfa	ces				During decommission	oning of the dams	-			
Measure 3: Backfill deep voids/ depressions					During decommission	oning of the dams	-			
Impact AFTER Management	Moderate	Short Term	Site	Low	Unlikely	Low	-	High		

ACTIVITY: Morula Mining Shaft Complex - ASPECT: Flatten and Shape Emergency ROM & Topsoil Stockpiles - IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities +/-Magnitude Duration Scale Consequence Probability SIGNIFICANCE Confidence **Impact BEFORE Management** Possible Moderate Medium Term Site Medium Medium High -**Time Period for Implementation Compliance with Standards Management Measures** Measure 1: Reshape disturbed areas and flatten steep slopes Decommissioning Phase -Measure 2: Surface stones/boulders and remnants must be buried **Decommissioning Phase** -Measure 3: Even out all rough surfaces **Decommissioning Phase** -Measure 4: Backfill deep voids/depressions **Decommissioning Phase** -**Impact AFTER Management** Minor Medium Term Site Low Unlikely Low -High



ACTIVITY: Morula Mining Open Cast Operation– ASPECT: Fill, Flatten and Shape Open Pit – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Reshape disturbed area	s and flatten stee	p slopes			Decommissio	oning Phase		-		
Measure 2: Surface stones/boulders	s and remnants n	nust be buried			Decommissio	oning Phase		-		
Measure 3: Even out all rough surfa	ces				Decommissio	oning Phase		-		
Measure 4: Backfill deep voids/depressions					Decommissio	oning Phase	-			
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		

Activity: Decommissioning of the Morula Dewatering Dam– Aspect – Flatten and Shape Dam Walls – Change in Morphology (uneven surfaces) due to flattening and shaping activities

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Short Term	Site	Low	Possible	Low	-	High			
Management Measures					Time Period for Implementation		Compliance with Standards				
Measure 1: Flatten dam walls/ steep slopes					During decommissioning of the dam		Design Specifications				
Measure 2: Even out all rough surfaces					During decommissioning of the dam		Design Specifications				
Measure 3: Backfill deep voids/ depressions					During decommissioning of the dam		Design Specifications				
Impact AFTER Management	Minor	Short Term	Site	Low	Unlikely	Low	-	High			



ACTIVITY: Mine Waste Rock Dump – ASPECT: Flatten and Shape Mine Waste Rock Dump – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation		Compliance with Standards			
Measure 1: Reshape disturbed areas and flatten steep slopes					Decommissioning Phase		-			
Measure 2: Surface stones/boulders and remnants must be buried					Decommissioning Phase		-			
Measure 3: Even out all rough surfaces					Decommissioning Phase		-			
Measure 4: Backfill deep voids/depressions					Decommissioning Phase		-			
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		

ACTIVITY: Raw Material Stockpile Areas – ASPECT: Flatten and Shape Raw Materials Stockpiles – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation		Compliance with Standards			
Measure 1: Reshape disturbed areas and flatten steep slopes					Decommissioning Phase		-			
Measure 2: Surface stones/boulders and remnants must be buried					Decommissioning Phase		-			
Measure 3: Even out all rough surfaces					Decommissioning Phase		-			
Measure 4: Backfill deep voids/depressions					Decommissioning Phase		-			
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		



ACTIVITY: Open Pit (OB Plant Fines and Coarse Waste in Open Pit) – ASPECT: Flatten and Shape Open Pit – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation		Compliance with Standards			
Measure 1: Reshape disturbed areas and flatten steep slopes					Decommissioning Phase		-			
Measure 2: Surface stones/boulders	s and remnants n	nust be buried			Decommissioning Phase		-			
Measure 3: Even out all rough surfaces					Decommissioning Phase		-			
Measure 4: Backfill deep voids/depressions					Decommissioning Phase		-			
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		

ACTIVITY: Ore Beneficiation Plant – ASPECT: Flatten and Shape Mixed Material Stockpiles & HMS Waste Material Stockpiles– IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation		Compliance with Standards			
Measure 1: Reshape disturbed areas and flatten steep slopes					Decommissioning Phase		-			
Measure 2: Surface stones/boulders and remnants must be buried					Decommissioning Phase		-			
Measure 3: Even out all rough surfaces					Decommissioning Phase		-			
Measure 4: Backfill deep voids/depressions					Decommissioning Phase		-			
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		



ACTIVITY: Returns Material Stockpiles – ASPECT: Flatten and Shape Returns Material Stockpiles – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation		Compliance with Standards			
Measure 1: Reshape disturbed areas and flatten steep slopes					Decommissioning Phase		-			
Measure 2: Surface stones/boulders and remnants must be buried				Decommissioning Phase		-				
Measure 3: Even out all rough surfaces					Decommissioning Phase		-			
Measure 4: Backfill deep voids/depressions					Decommissioning Phase		-			
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		

ACTIVITY: Finished Product Plant – ASPECT: Flatten and Shape Final Product Stockpiles – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation		Compliance with Standards			
Measure 1: Reshape disturbed areas and flatten steep slopes					Decommissioning Phase		-			
Measure 2: Surface stones/boulders and remnants must be buried					Decommissioning Phase		-			
Measure 3: Even out all rough surfaces					Decommissioning Phase		-			
Measure 4: Backfill deep voids/depressions					Decommissioning Phase		-			
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		


ACTIVITY: Slag Stockpiling Areas – ASPECT: Flatten and Shape Slag Stockpiles – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures Time Period for Implementation Compliance with S											
Measure 1: Reshape disturbed areas	and flatten steep	o slopes			Decommissio	oning Phase		-			
Measure 2: Surface stones/boulders	and remnants m	ust be buried			Decommissioning Phase -			-			
Measure 3: Even out all rough surfac	es				Decommissioning Phase -		-				
Measure 4: Backfill deep voids/depr	Decommissio	oning Phase		-							
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Primary Chrome Recovery Plant – ASPECT: Flatten and Shape Product Stockpiles & Waste Material Stockpiles – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management MeasuresTime Period for ImplementationCompliance with Standards											
Measure 1: Reshape disturbed area	s and flatten stee	p slopes			Decommissio	oning Phase		-			
Measure 2: Surface stones/boulders	s and remnants n	nust be buried			Decommissioning Phase -			-			
Measure 3: Even out all rough surfa	ces				Decommissioning Phase -		-				
Measure 4: Backfill deep voids/dep	Decommissio	oning Phase		-							
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			



ACTIVITY: Fine Slag Processing Plant – ASPECT: Flatten and Shape Product and Waste Material Stockpiles– IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Reshape disturbed area	s and flatten stee	p slopes			Decommissio	oning Phase		-			
Measure 2: Surface stones/boulder	s and remnants r	nust be buried			Decommissioning Phase -			-			
Measure 3: Even out all rough surfa	ces				Decommissioning Phase -		-				
Measure 4: Backfill deep voids/dep	Decommissio	oning Phase		-							
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Product Rail Dispatch Area – ASPECT: Flatten and Shape Product Stockpiles – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High			
Management Measures Time Period for Implementation Compliance with Standard											
Measure 1: Reshape disturbed area	s and flatten stee	p slopes			Decommissio	ning Phase		-			
Measure 2: Surface stones/boulders	s and remnants n	nust be buried			Decommissioning Phase -			-			
Measure 3: Even out all rough surfa	ces				Decommissioning Phase -		-				
Measure 4: Backfill deep voids/dep	Decommissio	ning Phase		-							
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			



ACTIVITY: Platinum Group Minerals (PGM) Plant – ASPECT: Flatten and Shape Product Stockpiles – IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Reshape disturbed area	s and flatten stee	p slopes			Decommissio	oning Phase		-		
Measure 2: Surface stones/boulder	s and remnants r	nust be buried			Decommissioning Phase -			-		
Measure 3: Even out all rough surfa	ces				Decommissio	Decommissioning Phase -		-		
Measure 4: Backfill deep voids/dep	Decommissio	oning Phase		-						
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High		

ACTIVITY: Tailings Storage Facility (TSF) including the Southern Expansion of the TSF- ASPECT: Flatten and Shape Disposal Facility - IMPACT DESCRIPTION: Creation of dangerous/ uneven surfaces due to decommissioning activities												
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence												
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Definite	Definite Medium - High						
Management Measures					Time Period for I	mplementation	Complianc	e with Standards				
Measure 1: Flatten steep slopes					Decommissioning Phase -			-				
Measure 2: Even out all rough surfa	ces for final land	use form	Decommissio	ning Phase		-						
Impact AFTER Management	Moderate	Long Term	Site	Medium	Definite	Medium	-	High				



Table 9.3(f): Soils and Land Capability Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITIES (AND ASPECTS): Security Fence and Access (Fences and Booms), Power Supply (Eskom Yard and Substations, Overhead Power Lines) - IMPACT CATEGORY: Soil Quality, Soil Erosion - IMPACT DESCRIPTION: 1. Soil Contamination due to the leaching of potential pollutants from mixed (with the 'topsoil') residual (after removal) 'wastes'/'non-wastes'/building materials/hydrocarbons. 2. Soil Distribution loss (loss of horizons/depth) during removal of foundation holes.3. Soil Quality reduction (increased compaction, reduced organic carbon % and decreased nutrient levels) during rehabilitation 'topsoiling' exercise; due to further machinery handling of previously stockpiled 'topsoil' material.4. Soil Erosion increase due to possible excessive slopes and poor vegetative (grass) basal cover.5. Land Use: Achieved/Maintenance of stated End-Land-Use of Extensive Grazing.6. Land Capability: Achieved/Maintenance of stated End-Land Capability of the Chamber of Mines Grazing Capability class standard.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High	
Management Measures	•				Time Period for Imp	lementation	Compliance with Standards		
Measures 1: Soil Contamination 'waste' or 'non-waste' layer the underlying in-situ soils (when pre- steel/roofing/wire/fencing at foundations/platforms/surfaces dust suppression where necessand must obey speed limits in order truck bins to limit dust. Maintand vegetation and remove siltation pollution sources) and 'dirty' (in canals/drains/berms, that may potentially polluting rehabilitate leached contamination on an or boreholes. Excavate additional accordingly, and release back to the Measures 2. Soil Distribution: situ soils that may already be pre- Soil Distribution to some measure Measures : Soil Erosion: Re-grase undisturbed surrounding slopeses grade for vertic 'topsoil' materi undisturbed surrounds where ridges/hollows). Remove loose re- Measures 4: Soil Quality (com 'topsoil' handling during the dry foundation holes with 'topsoil' alternatively source soil from foundations/holes/erosion in the	on: Scrape up a hat is spread resent). Remove the Salvage from the site, ary when work to reduce the in optimum fu of those of the thercepts 'dirty y remain in red areas (not ngoing basis y boreholes wh the environme Avoid unneces resent at the si- resent at the si- re by the process de (re-slope) of 1-4 degreess al [based on si- possible. Esta ocks and stony paction and y season in ord sourced from n the 'topsoil	and remove the gen extensively throug ve the power lines a Yard. Remove and dispose of in t ing with machinery amount of blown nctioning (attend t e 'clean' (re-direct ' water from pollut perpetuity upslop applicable to fen via interpolation o ere deemed neces nt. sary disturbance of te. One of the reha ss of 'topsoiling' the removed facility/fe soll erodibility nom blish a freely dra material. fertility): Machine der to minimise co the adjacent 'tops l' stockpiles. Min over line and fence	nerally thin shout some and fences i imported he opencas y. Haul truc dust; Tarpa o leaks, cle s' clean' wa ced areas) s e/downslo ces and po f the data sary, purify any underl bilitation ol footprints ature footp 6.4 degree nograph]. M ining final ery - utilize mpaction. " soil' berms imal 'topse e areas. Uti	(10-40cm) historical e areas, exposing the from the site. Sell-off concrete/stone/rock et pit. Spray water for cks and vehicle traffic aulin cover over haul ar blockages, remove ater around potential storm water intercept pe (respectively) of ower lines). Monitor from the downslope y the pumped water lying/surrounding in- bjectives is to restore of removed features. prints to approximate es/11.2 % percentage fatch surface level of l landscape (without e tracked vehicles for Topsoil' the removed (where present), or oiling' of excavated ilise live topsoil (and	Decommissioning/ Weekly (al Post-Closur Immediately after ref to determine pos capability as indicated Annually (soil ero monitoring: autur	Closure Supervision: l measures). e Monitoring: habilitation (soil survey t-disturbance land d by 'topsoiling' depth), sion and vegetative mn after the rains).	Chamber o and	of Mines Guidelines Soil Scientist	



'topsoil'. Fertilize (slow release ameliorants) the 'topsoil' immediately after 'topsoiling' and once every 3 - 4 years thereafter. Do not fertilise the soils in areas displaying healthy existing (before rehabilitation) locally indigenous 'grass' cover. Utilise vertic 'topsoil' material in the majority of areas given that this broad soil group occurs extensively.Red apedal or Structured (pedocutanic) 'topsoil' material must be utilised for filling foundation holes or 'topsoiling' along limited sections of the western fence boundary, only in those areas where the aforementioned soil types occur. Measures 5: Land Use: The stated End Land Use for the rehabilitated HERNIC areas in general is Extensive Grazing. Functional surface cover (basal, canopy) to be achieved naturally. Thus, Mature									
Extensive Grazing. Functional surface c Seeded 'Grass' must be mown from	cover (ba	sal, canopy) to b re on the prope	e achieved na erty and the	aturally. Thus, Mature					
'topsoiled' areas during the rainy seaso	on. Therea	after manually/n	nechanically i	re-vegetate (with self-					
sustaining locally indigenous 'grasses')	s') only in	those problemat	tic areas whe	ere the spread seeded					
'grass' did not germinate/create cover	ver. No gra	azing or burning	g allowed un	til vegetation is well					
established in the post-closure phase.									
Measures 6: Land Capability: The sta	tated End	Land Capability	for the rehab	ilitated HERNIC areas					
in general is the Chamber of Mines G	Grazing C	apability Class.	Thus Topsoi	ling' depth >= 25 cm					
(Chamber of Mines Grazing Capability	ty Class d	epth standard),	but preferab	ly more (>= 60 cm -					
Arable Capability Class depth standard	d). Given t	the minimal leve	ls of disturba	nce to the majority of					
these areas, the pre-disturbance land ca	capability	is likely to be re	gained (whe						
intact underlying the removed feature).	e).								
Impact AFTER Management Mi	Minor	Short Term	Site	Low	Possible	Low	-	High	



ACTIVITIES (AND ASPECTS): Access Roads, Internal Roads (Road Surface, Road Verge), Railway Lines (Railroad and Rail Vehicles), Office Complexes (Building Material), Morula Mining Shaft Complex (Offices and Workshops, Change House Complex, Peoples Walkway, Redundant Explosives Magazine), Morula Mining Accommodation (Building Material), General Plant Infrastructure (Building Material, Clinic, Laboratory, Canteen, Change House/Laundry) - IMPACT CATEGORY: Soil Quality, Soil Erosion - IMPACT DESCRIPTION: 1. Soil Contamination due to the leaching of potential pollutants from mixed (with the 'topsoil') residual (after removal) 'wastes'/'nonwastes'/building materials/hydrocarbons. 2. Soil Distribution loss (loss of horizons/depth) during removal of foundations.3. Soil Quality reduction (increased compaction, reduced organic carbon % and decreased nutrient levels) during rehabilitation 'topsoiling' exercise; due to further machinery handling of previously stockpiled 'topsoil' material.4. Soil Erosion increase due to possible excessive slopes and poor vegetative (grass) basal cover.5. Land Use: Achieved/Maintenance of stated End-Land-Use of Extensive Grazing.6. Land Capability: Achieved/Maintenance of stated End-Land Capability of the Chamber of Mines Grazing Capability class standard.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Definite	Medium	-	High	
Management Measures					Time Period for	· Implementation	Compliance with Standards		
Measures 1: Soil Contamination 'waste' or 'non-waste' layer th buildings, and on dirt roads), ex- remove facilities/features ff foundations/platforms/surfaces blockages, remove vegetation an around potential pollution source water intercept canals/drains/b6 Measures 2: Soil Erosion: Re-gr 1-4 degrees, but importantly < 6 [based on soil erodibility nom possible. Establish a freely drain and stony material. Measures 3. Soil Distribution: A situ soils that may already be pr Soil Distribution to some measur Measures 4: Soil Quality (compa dry season in order to minimis (before 'topsoiling').'Topsoil' the (to the roads) 'topsoil' berms stockpiles. Minimal 'topsoiling' ar areas. Utilise live topsoil (and vegetation. Sample and analyses immediately after 'topsoiling' ar areas displaying healthy existing Measures 5: Land Use: Functio Mature Seeded 'Grass' must be m 'topsoiled' areas during the rainy	n: Scrape up a hat is spread kposing the un from the site. I d remove silta es) and 'dirty' erms, that may rade (re-slope) 6.4 degrees/ 1 tograph]. Matc ing final lands Avoid unnecess resent at the si re by the process action and ferti se compaction. removed road (where present of excavated for compost if a the 'topsoil'. nd once every (before rehabi- nal surface co- nown from els y season. There	nd remove the g extensively thro derlying <i>in-situ</i> s site. Remove Maintain optimur tion) of those of (intercepts 'dirty remain in perpet to approximate 1.2 % percentage h surface level cape (without rice ary disturbance te. One of the rel so of 'topsoiling'. lity): Machinery Rip final re-slop l footprints with nt), or alternativ bundations/holes vailable) to rep Fertilize (slow 3 - 4 years ther ilitation) 'grass' c ver (basal, canop ewhere on the pr	enerally thin bughout some soils (when p imported in functioning the 'clean' (re- ' water from cuity. undisturbed se of undisturbed se of undisturbed lges/hollows) of any under habilitation o - utilize track- ped surface t 'topsoil' source soferosion in t lenish soil m release amel eafter. Do no over. by) to be achi operty and th nechanically i	(10-40cm) historical e areas (surrounding resent).Demolish and concrete/stone/rock (attend to leaks, clear e-directs 'clean' water polluted areas) storm surrounding slopes of ertic 'topsoil' material ed surrounds where). Remove loose rocks lying/surrounding <i>in</i> - bjectives is to restore ed vehicles during the to reduce compaction ced from the adjacent oil from the 'topsoil' the removed building nicro-flora before re- liorants) the 'topsoil' t fertilise the soils in ieved naturally. Thus, hen spread out on the re-vegetate (with self-	Decommissioning/ Weekly (al Post-Closur Immediately after ref to determine pos capability as indicated Annually (soil ero monitoring: autur	Closure Supervision: Il measures). e Monitoring: nabilitation (soil survey st-disturbance land d by 'topsoiling' depth), sion and vegetative mn after the rains).	Chamber o and	of Mines Guidelines Soil Scientist	



sustaining locally indigenous 'gr 'grass' did not germinate/create de Measures 6: Land Capability:Th Grazing Capability Class. Thus 'T Class depth standard), but prefer Utilise vertic 'topsoil' material i extensively.	rasses') only t cover. No grazi ne stated plann 'opsoiling' dep ably more (>= n the majority	hose problematic ar ng or fire allowed. ned End Land Capab th >= 25 cm (Chamb 60 cm – Arable Capal 7 of areas given that	eas when ility is th er of Min pility Clas this bro	re the spread seeded he Chamber of Mines hes Grazing Capability ss depth standard). had soil group occurs				
Impact AFTER Management	Moderate	Medium Term	Site	Medium	Possible-Unlikely	Medium-Low	-	High



ACTIVITIES (AND ASPECTS): Morula Mining Shaft Complex (Ore/Waste Rock Transfer House, Grout Plant), Pelletizing and Sintering Plants 1 & 2 (Structure/Complex, Gaseous Emissions, Particulate Matter Emissions), Furnaces 1,2, 3 and 4 (Structure/Complex, Gaseous Emissions, Particulate Matter Emissions), Platinum Group Minerals [PGM] Plant (Spiral Plant, Ball Milling), Redundant Historic Bag Plant (Building Material), Redundant Old Civil Workshop (Building Material), Platinum Group Minerals [PGM] Plant (Pumping of PGM Feed Material, Thickening and Flotation Process), Internal Transport and Contractors Yard and Wash Bay (Gaseous Emissions, Particulate Matter Emissions), Air Quality Control (Gaseous Emissions), Expansion of the Tap Hole Fume Extraction System (Gaseous Emissions, Particulate Matter Emissions), Air Quality Control (Gaseous Emissions), Expansion of the Tap Hole Fume Extraction System (Gaseous Emissions, Particulate Matter Emissions, Scrubber Effluent), Fuel Supply (Diesel Fuel Tanks), Raw Materials Stockpile Area 1 & 2 (Storage of Raw Materials), Morula Mining Shaft Complex (Conveyors), Ferrochrome Break Floor Area (Mechanical Activity), Finished Product Plant (Storage of Final Product), Primary Chrome Recovery Plant (Stockpiling of Product), Product Rail Dispatch Area (Product Stockpiles), New Salvage Yard and Existing Salvage Yard (Yard Footprint) - IMPACT CATEGORY: Soil Quality, Soil Erosion - IMPACT DESCRIPTION: 1. Soil Contamination due to the leaching of potential pollutants from mixed (with the 'topsoil') residual (after removal) 'wastes'/non-waste' layers from the sites.3. Soil Quality reduction (increased compaction, reduced organic carbon % and decreased nutrient levels) during rehabilitation 'topsoiling' exercise; due to further machinery handling of previously stockpiled 'topsoil' material. 4. Soil Erosion increase due to possible excessive slopes and poor vegetative (grass) basal cover. 5. Land Use: Achieved/Maintenance of stated End-Land-Use of Extensive Grazing.6. Land Capability: Achieved

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Major	Long Term	Regional (Cadastral)	Very High	Definite	Very High	-	High	
Management Measures					Time Period for	Implementation	Compliance with Standards		
Measures 1: Soil Contamination historical 'waste' or 'non-was (surrounding buildings, and on d Demolish and remove facilitie concrete/stone/rock foundation (compacted-'re-moulded' soil la features only. Maintain optimum and remove siltation) of those sources) and 'dirty' (intercep canals/drains/berms, that may r The End Land Use of these are (pollution), and only after th current status of the area bee the aforementioned process y currently stored in a deep free Measures 2: Soil Erosion: Re-gr 1-4 degrees, but importantly < 0 [based on soil erodibility nom possible. Establish a freely drain and stony material. Measures 3. Soil Distribution:A <i>situ</i> soils that may already be pr Soil Distribution to some measur	1: Scrape up an te' layer that irt roads), exp s/features/du ns/platforms/s yer) directly n functioning (of the 'clean' (ts 'dirty' wat emain in perpe- eas may rema te completion come determi were collected ze at JMA. "ade (re-slope) 5.4 degrees/ 1 tograph]. Matching final lands void unnecess resent at the si-	nd remove the get t is spread ext osing the underly mps/stockpiles surfaces from th overlying potent (attend to leaks, (re-directs 'clean er from pollute etuity. in Industrial du n of a Contamin inable. The soil d during the co to approximate 1.2 % percentag ch surface level scape (without ri- sary disturbance ite. One of the re ss of 'topsoiling'.	enerally thick (tensively throu ving <i>in-situ</i> soils from the site. ne site. Con tially highly-pol clear blockages d' water around ed areas) stor ne to residual S nated Land As /'waste'/'non- burse of the so undisturbed su e grade for vert of undisturbed dges/hollows). of any underly chabilitation obj	 > 40cm - > 100 cm) ighout some areas i (when present). Remove imported istruct a seal layer lluting rehabilitated s, remove vegetation d potential pollution m water intercept Soil Contamination seessment will the waste' samples for oil survey and are urrounding slopes of tic 'topsoil' material d surrounds where Remove loose rocks ring/surrounding <i>in</i>- jectives is to restore 	Decommissioning/ Daily (all Immediately (Co Assess Post-Closure Immediately after reh to determine pos capability as indicated Biannually (monit vegetative cover - autumn afte	Closure Supervision: measures), ontaminated Land sment). e Monitoring: habilitation (soil survey t-disturbance land d by 'topsoiling' depth), tor soil erosion and spring before- and er- the rains).	Chamber o and	f Mines Guidelines Soil Scientist	



Measures 4: Soil Quality (compaction dry season in order to minimise co (before 'topsoiling'). 'Topsoil' the re 'topsoil' sourced from the adjacent 'f from the 'topsoil' stockpiles. Utilise lif flora before re-vegetation. Sample and 'topsoil' immediately after 'topsoiling soils in areas displaying healthy existin Measures 5: Land Use: The End Land Contamination, pending the comple Contamination). Functional surface of well as by intervention. Thus, Matur property and then spread out on manually/mechanically re-vegetate (areas, as well as those areas where to grazing or fire allowed. It may be determined necessary to areas with high metal or sulphate I Contaminated Land Assessment. Measures 6: Land Capability:The st Capability Class. Thus 'Topsoiling' d depth standard), but preferably more	n and fertil ompaction. emoved fa 'topsoil' be live topsoil d analyse t g' and onc ing (before d Use of the letion of a cover (basa re Seeded ' the 'topso (with self-s the spread bimplemen loads, or c tated End lepth >= 2 e (>= 60 cr	ity): Machinery Rip final re-slo cilities/features, erms (where pro- (and compost if the 'topsoil'. Fert e every 3 - 4 ye rehabilitation) ' ese areas may re a Contaminated l, canopy) to be Grass' must firs biled' areas dur ustaining locally seeded 'grass' or nt Phytoremedi other) as identif Land Capability 5 cm (Chamber n – Arable Capability	- utilize tracke ped surface to /dumps/stock esent), or alte f available) to ilize (slow rele- ears thereafter grass' cover. main Industria Land Assess achieved by b t be mown fro- ring the rainy / indigenous 'f did not germin ation in conta fied during the is the Chaml of Mines Gra pility Class dep	ed vehicles during the o reduce compaction piles footprints with ernatively source soil replenish soil micro- ease ameliorants) the r. Do not fertilise the al due to residual Soil sment (refer to Soil oth natural means as om elsewhere on the y season. Thereafter grasses') problematic nate/create cover. No aminated areas (e.g. ne course of a future per of Mines Grazing zing Capability Class pth standard). Utilise				
depth standard), but preferably more vertic 'topsoil' material in the majorit	oility Class dep oad soil group	oth standard). Utilise occurs extensively						
Impact AFTER Management	Major	Long Term	Local	High	Definite	High	-	High



ACTIVITIES (AND ASPECTS): Re-Use [Screening, Stockpiling, Internal Use and /or Selling] of Slag Sand at the Fine Slag Processing Plant (Feed Material from CRP, Screening and Separation Plant, Spiral Plant, Fine Chrome Bin (Product), Slag Sand, Water Recovery Sumps), Re-Use [Screening, Stockpiling, Internal Use and /or Selling] of Coarse Slag at the CRP (Screening Plant, Stockpiling of Coarse Slag), Slag Stockpiling Areas (Storage of Slag), Primary Chrome Recovery Plant (Current Arising Slag Loading, Crushing and Screening Plant) - IMPACT CATEGORY: Soil Contamination, Soil Erosion, Soil Distribution, Soil Quality, Land Use, Land Capability - IMPACT DESCRIPTION: 1a. Soil Contamination in the form of settled dust (on downwind/surrounding soils) derived from potentially contaminated residual 'wastes' (mostly slag)/'non-wastes'/*in-situ* soil horizons/'topsoil' material during mechanical and transport operations associated with Closure. 1b. Soil Contamination of the underlying/surrounding *in-situ* soil horizons and water-tables due to the downward/lateral movement of leached potential pollutants (metals, salts and hydrocarbons) from potential mixed (with the 'topsoil') residual (after removal) 'wastes' (mostly slag)/'non-wastes'; or below the base of the permanent Slag Dump. 1c. Soils Contamination of the overlying uncontaminated rehabilitation 'topsoil' material (applied during rehabilitation) due to the upward capillary movement of potential pollutants from potentially contaminated underlying *in-situ* soil horizons and residual 'waste' (mostly slag) layers. 2. Soil Distribution loss (loss of horizons/depth) during the scraping up of accumulated 'waste' (mostly slag)/'non-waste' layers from the sites; and during the re-grading of the permanent Slag Dump side-slopes.

3. Soil Erosion increase due to possible excessive slopes and poor vegetative ('grass') basal cover. 4. Soil Quality reduction (increased compaction, reduced organic carbon % and decreased nutrient levels) during rehabilitation 'topsoiling' exercise; due to further machinery handling of previously stockpiled 'topsoil' material. 5. Land Use: Achieved/Maintenance of stated End-Land-Use of Extensive Grazing. 6. Land Capability: Achieved/Maintenance of stated End-Land Capability of the Chamber of Mines Grazing Capability class standard.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	High	
Management Measures				Time Period for	Implementation	Complianc	e with Standards		
Measures 1: Soil Contamination historical slag layer that is spi	on: Scrape up a read extensive	and remove the g ly throughout th	Decommissioning (and T	Closure) Supervision					
stockpiling areas, exposing the	underlying <i>ir</i>	<i>i-situ</i> soils (whe	n present). D	emolish and remove	T 1 1 1 .	D			
the Salvage Yard. Remove imp	piles from the	e sites. Sell-off s e/stone/rock foi	indations/pla	tforms/pads/surfaces	(conduct a Contamin	g Decommissioning ated Land Assessment			
from the sites, and dispose of in	the opencast p	it. Consolidate a	ll unwanted sl	ags at one permanent	of the entire prop				
potentially non-polluting; the a	forementioned	after selling-off	that portion	of the slags that are	completed during				
potentially 'non-polluting/feasib	ole/required.	Spray water for	dust suppress	sion where necessary	Immediately upon closure (scrape up and remove accumulated historical 'waste'				
reduce the amount of blown du	st; Tarpaulin c	over over haul t	ruck bins to li	imit dust. Construct a	[mostly slag]/'non-w	vaste' layer if present),	Chamber of Mines Guidelines		
seal layer (compacted-'re-mould dumps that will remain in perp	ded' soil layer) etuity only. M	directly overlyi aintain optimum	ng potentially 1 functioning (highly-polluting slag attend to leaks, clear	Daily where necessa	ry (spraying of water	and	Soil Specialist	
blockages, remove vegetation ar	nd remove silta	tion) of those of	the 'clean' (re	e-directs 'clean' water	when operating mach	inery and haul trucks),			
water intercept canals/drains	/berms, that	may remain i	n perpetuity	upslope/downslope	Continuously (speed	l limits and tarpaulin			
(respectively) of potentially pol	haul truck	bin cover),							
interpolation of the data from	Daily-Weekly su								
deemed necessary, purify the pu	mped water ac	cordingly, and re	lease back to t	the environment.	Decommissioning				
					compacted surfaces only, pick up loose rocks, 'topsoiling', soil sampling,				



Conduct a Contaminated Land Assessment in order that the Soil Contamination (pollution)	ameliorate/fertilise soils, mow/spread
status of the property may be determined. The soil/'waste'/'non-waste' samples for the	mature 'seeded' grass, thereafter re-
aforementioned process were collected during the course of the soil survey and are	vegetation where necessary),
currently stored in a deep freeze at JMA.	
	Quarterly (drainage features-'dirty'/'clean'
Measures 2: Soil Distribution: Avoid unnecessary disturbance of any underlying/surrounding in-	drains/canals/berms-monitor and maintain-
situ soils that may already be present at the site. One of the rehabilitation objectives are to restore	repair leaks, clear blockages, remove
Soil Distribution to some measure by the process of 'topsoiling' the footprints of removed features	vegetation, remove siltation),
(e.g. removed slag dumps).	
Measures 3: Soil Erosion: Re-grade (re-slope) removed facility/feature footprints to approximate	Periodically (monitor leached contamination
undisturbed surrounding slopes of 1-4 degrees, but importantly < 6.4 degrees/ 11.2 % percentage	via interpolation of the data from the
grade for vertic 'topsoil' material [based on soil erodibility nomograph]. Match surface level of	downslope boreholes. Excavate additional
undisturbed surrounds where possible. Establish a freely draining final landscape (without	boreholes where deemed necessary, purify
ridges/hollows). Slope cannot easily be reduced to this extent for a permanent Slag Dump, and will	the pumped water accordingly, and release
thus not be able to be 'topsoiled'/re-vegetated either (given soil erosion on steep slopes). Thus, slag	back to the environment-refer to
dumps must be re-vegetated using ecological restoration principles and phytoremediation.	Groundwater Specialist Report).
Measures 4: Soil Quality (compaction and fertility): Machinery - utilize tracked vehicles during	
the dry season in order to minimise compaction. Rip final re-sloped surface to reduce compaction	
(before 'topsoiling'). Remove loose rocks and stony material. 'Topsoil' the removed slag dump	
footprints with 'topsoil' sourced from the adjacent 'topsoil' berms (where present), or alternatively	
source soil from the 'topsoil' stockpiles. Utilise live topsoil (and compost if available) to replenish	
soil micro-flora before re-vegetation. Sample and analyse the 'topsoil'. Fertilize (slow release	
ameliorants) the 'topsoil' immediately after 'topsoiling' and once every 3 - 4 years thereafter. Do	
not fertilise the soils in areas displaying healthy existing (before rehabilitation) locally indigenous	
'grass' cover. Utilise vertic 'topsoil' material in the majority of areas given that this broad soil group	
occurs extensively.	
Measures 5: Land Use: The stated End Land Use for the area in general is Extensive Grazing. The	
End Land Use of the footprints of the removed slag dumps may remain Industrial due to residual	
Soil Contamination, the quantification of the aforementioned pending the completion of a	
Contaminated Land Assessment (refer to Soil Contamination). The grazing of 'grasses' from	
contaminated areas may be detrimental to livestock due to both the possible uptake of	
contaminants by the grass roots, as well as settled dust on the 'grass' (both of which need to be	
determined by an independent party). The End Land Use of the slag dumps that remain in	
perpetuity will be Industrial, due to potential contamination and probably steep (unlikely to be less	
than 18.4 degrees after re-grading) side-slopes that are consequently non- or poorly-	
'topsoiled'/vegetated. Functional surface cover (basal, canopy) to be achieved by both natural	
means as well as by intervention. Thus, Mature Seeded 'Grass' must first be mown from elsewhere	
on the property and then spread out on the 'topsoiled' areas during the rainy season. Thereafter	
manually/mechanically re-vegetate (with self-sustaining locally indigenous 'grasses') in	
problematic areas, as well as in those areas where the spread seeded 'grass' did not	
germinate/create cover. No grazing or fire allowed.	



It may be determined necessary to imple	ement Phytoremediation						
with high metal or sulphate loads, or	r other) as identified d						
Contaminated Land Assessment.							
Measures 6: Land Capability: The sta	ated End Land Capabilit	y for the a	rea in general is the				
Chamber of Mines Grazing Capability Cla	ass. Thus 'Topsoiling' de	m (Chamber of Mines					
Grazing Capability Class depth standard)), but preferably more (>						
depth standard). The aforementioned a	applies to the removed	ints. The End Land					
Capability of the slag dumps that remai	in in perpetuity will be I	ndustrial (n	on-grazing capability				
class), due to potential contamination a	and probably steep (unlil	ely to be le	ess than 18.4 degrees				
after re-grading) side-slopes that are con	sequently non- or poorly						
Impact AFTER Management Mode	erate Medium Term	Site	Medium	Definite	Medium	-	High



ACTIVITIES (AND ASPECTS): Expansion of the OB Plant Tailings Storage Facility [TSF] (Clearance of Vegetation, Stabilisation of Facility Walls, Disposal to TSF), HERNIC Tailings Storage Facility [TSF] and Return Water Dam [RWD] (Disposal to TSF) Platinum Group Minerals [PGM] Plant (Pump Tailings to TSF), Decommissioning of two Historic Slimes Dams (Excavate Historic Slimes, Transport Historic Slimes to H:H Slimes Dam, Dispose Historic Slimes on H:H Slimes Dam), Decommissioning of the Morula Dewatering Dam (Dewatering of Dam, Removal of Contaminated Sediment on Basin, Flatten and Shape Dam Walls, Re-vegetate) - IMPACT CATEGORY: Soil Contamination, Soil Erosion, Soil Distribution, Soil Quality, Land Use, Land Capability - IMPACT DESCRIPTION: 1a. Soil Contamination in the form of settled dust (on downwind/surrounding soils) derived from potentially contaminated residual 'wastes' (mostly tailings)/'non-wastes'/*in-situ* soil horizons/topsoil' material during mechanical and transport operations associated with Closure. 1b. Soil Contamination of the underlying/surrounding *in-situ* soil horizons and water-tables due to the downward/lateral movement of leached potential pollutants (metals, salts and hydrocarbons) below the base of, and through walls of the Tailings dam (TSF) and Slimes Dams. 1c. Soils Contamination of the overlying uncontaminated rehabilitation 'topsoil' material (applied during rehabilitation) due to the upward capillary movement of potential pollutants from potentially contaminated underlying *in-situ* soil horizons and residual waste layers. 2. Soil Distribution loss (loss of horizons/depth) during re-grading of the TSF side-slopes. 3. Soil Erosion increase due to possible excessive slopes and poor vegetative ('grass') basal cover. 4. Soil Quality reduction (increased compaction, reduced organic carbon % and decreased nutrient levels) during rehabilitation 'topsoil' material for y storage compaction, reduced organic carbon % and decreased nutrient levels) during rehabilitation 'topsoil' material fop

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High	
Management Measures				Time Period for	Implementation	Complian	ce with Standards		
Management Measures Measures 1: Soil Contamination intercepted by the paddock was spills/accumulation (unlikely to paddocks area and re-deposit on when working with machinery. reduce the amount of blown dus regarding the necessity for the the vertic 'topsoil' material on the tailings stored in the TSF (refer TSF was also well sealed with and during construction. Thus the in 'Two Historic Slimes Dams, Pf (already decommissioned): No layer (compacted-'re-moulded' st that will remain in perpetuity features. The surface of these fe Decommissioning of 'New' Activi - Two Historic Slimes Dams: poss - Phase 1 of H:H Slimes Dam: Set	on: TSF: Tailin Ils upslope of be any since of top of the TSF Haul trucks an st; Tarpaulin co placement of a op of the TSF to relevant Spe impermeable filtration of rai hase 1 of the o 'wastes' requ soil layer) dire atures will hav ities/Aspects (I sibly a compact all with varie	ngs erosion from the paddocks; I ver-topping of th Spray water for d vehicle traffic over over haul tr a compacted-'ren will be determin ecialist Study Rej membrane and a nwater is not like H:H Slimes Da ire to be scraped ectly overlying p orementioned wa ze already been s Refer to Construct ted-'re-moulded' ous appropriate	the side-slop mmediately se e TSF is caref r dust suppress must obey sp uck bins to lin noulded' verti ed by the poll port). Furthen compacted-'r ely to be an iss m, and Moru up in these at otentially hig as previously sealed in the f tion Tables): vertic soil 'sea impermeable	bes of the TSF will be crape up any tailings ully controlled) in the ssion where necessary eed limits in order to mit dust. The decision c soil seal underlying lution potential of the rmore, the base of the re-moulded' soil layer, sue. Ia Dewatering Dam' reas. Construct a seal hly-polluting features conducted for these following ways during al' layer, Membrane liner seals	Time Period for Decommissioning (and T Immediately durin (conduct a Contamin of the entire prop completed during Immediately durin (scrape up and accumulation from th and re-dep Daily where necessa when operating mach Continuously (speed haul truck	Implementation Closure) Supervision Timing: ag Decommissioning ated Land Assessment perty, if not already Operational phase), ag decommissioning remove tailings ne paddocks if present, osit on TSF), ury (spraying of water ninery and haul trucks), d limits and tarpaulin tbin cover), upervision during	Compliand Chamber o and	of Mines Guidelines Soil Scientist	
to prevent infiltration of rain water; possibly with an overlying compacted -'re-moulded' vertic soil 'seal' layer, and - Morula Dewatering Dam: possibly a compacted 're-moulded' vertic soil 'seal' layer					compacted surface	phase (re-grade, rip s only, pick up loose			
- Morula Dewatering Dam: possi	ibly a compacte	ea-re-moulded v	vertic soll seal	layer.	rocks, establishment of a compacted-'re-				



Furthermore, the base of these features was also well sealed with an impermeable membrane and a	moulded' vertic soil seal overlying	
compacted-'re-moulded' soil layer, during construction.	potentially polluting features, 'topsoiling',	
Thus the infiltration of rainwater is not likely to be an issue.	soil sampling, ameliorate/fertilise soils,	
	mow/spread mature 'seeded' grass,	
General:	thereafter re-vegetation where necessary),	
Maintain optimum functioning (attend to leaks, clear blockages, remove vegetation and remove		
siltation) of those of the 'clean' (re-directs 'clean' water around potential pollution sources) and	Quarterly (drainage features-'dirty'/'clean'	
'dirty' (intercepts 'dirty' water from polluted areas) storm water intercept canals/drains/berms,	drains/canals/berms-monitor and maintain-	
that will remain in perpetuity upslope/downslope (respectively) of potentially polluting permanent	repair leaks, clear blockages, remove	
features (e.g. all of aforementioned features, albeit 'rehabilitated'). The aforementioned will limit	vegetation, remove siltation),	
'clean' water run-off from entering these potentially polluting 'rehabilitated' features areas, as well		
as intercept potential (unlikely) 'dirty' water seepage and run-off derived from all of these	Periodically (monitor leached contamination	
potentially polluting 'rehabilitated' feature areas respectively. Monitor leached contamination on	via interpolation of the data from the	
an ongoing basis via interpolation of the data from the downslope boreholes. Excavate additional	downslope boreholes. Excavate additional	
borenoies where deemed necessary, purify the pumped water accordingly, and release back to the	borenoies where deemed necessary, purify	
environment.	the pumped water accordingly, and release	
Conduct a Contominated Land According to and an that the Soil Contamination (llastice)	Dack to the environment-refer to	
conduct a contaminated Land Assessment in order that the soil contamination (pollution)	Groundwater Specialist ReportJ.	
status of the property may be determined. The soil/waste / non-waste samples for the		
alorementioned process were confected during the course of the soli survey and are		
currency stored in a deep freeze at JMA.		
Mascuras 2: Soil Distribution: Avoid unnecessary disturbance of any underlying (currounding in-		
situ soils that may already he present at the site. One of the rehabilitation objectives are to restore		
Soil Distribution to some measure by the process of 'topsoiling' the footprints of removed features		
(e.g. re-graded slimes or tailings dams)		
(e.g. re-graded sinies of tanings dains). Measures 3: Soil Frosion: The slimes/dewatering dam side-slopes will have ideally been re-		
graded (re-sloped) to < 5.7 degrees / 10.0 % percentage grade due to the compacted 'remoulded'		
vertic seal that underlies the vertic 'tonsoil' material [based on soil erodibility nomograph] Slope		
cannot easily be reduced to this extent for the side-slopes of a permanent TSF Thus the TSF side-		
slones must be re-sloned to approximately 16.0 degrees and thereafter re-vegetated using		
ecological restoration principles and phytoremediation. However, the flat crest of the TSF may		
easily be 'topsoiled' and re-vegetated. The recommended maximum gradient (Chamber of Mines)		
for material dumped on level to gently sloping terrain (therefore also 'rehabilitated' 'tonsoiled'		
tailings/slimes dams, pollution control/return water/process water dams, evaporation ponds, and		
potentially polluting dumps) is at least 1y: 3h (18.4 degrees or 33.0 % percentage grade), the least		
erosion occurring if the slope angle reduces in the direction of the toe of the nediment (i.e.		
concave). One of the key findings of extensive surveys and experimental work carried out by the		
University of the Witwatersrand between 1996 and 2009 was as follows: grass persistence and		
erosion control were increased, and irrigation decreased, by TSF slope reduction to < 16.0		
degrees.		



							1	I
Measures 4: Soil Quality (compa	iction and f	ertility): Machin	ery - utilize tra	acked vehicles during				
the dry season in order to minimis	se compactio	n. 'Topsoil' the r	e-graded TSF	(slimes dams already				
'topsoiled' during the construction	n phase for	the 'New' activit	ies/Aspects) v	with 'topsoil' sourced				
from the adjacent 'topsoil' berms	(where pre	sent), or alternat	tively source s	soil from the 'topsoil'				
stockpiles. Utilise live topsoil (an	d compost i	f available) to re	nicro-flora before re-					
vegetation. Sewerage sludge deriv	red from the	sludge drying be	ds of the two s	sewage plants may be				
spread out on the TSF as 'compost	/mulch. Sar	nple and analyse	the 'topsoil'. H	Fertilize (slow release				
ameliorants) the 'topsoil' immedia	ately after 'te	opsoiling' and on						
not fertilise the soils in areas disp	laying health	y existing (befor						
'grass' cover. Utilise vertic 'topsoil'	material in	the majority of an	eas given that	this broad soil group				
occurs extensively.		, ,	0	0 1				
Measures 5: Land Use: The state	d End Land	Use for the area i	in general is E	xtensive Grazing. The				
End Land Use of the re-graded S	limes Dams	and the TSF tha	t will remain	in perpetuity will be				
Industrial due to potential Soil Co	ontamination	the quantification	ion of the afor	rementioned nending				
the completion of a Contaminated	Land Asses	sment (refer to 9	Soil Contamin	ation) The grazing of				
'grasses' from contaminated areas	may be detr	imental to livest	ock due to bot	h the possible untake				
of contaminants by the grass roots	s as well as	settled dust on th	ie 'grass' (hot	h of which need to be				
determined by an independent n	arty) Furth	armore in the c	ase of the TSI	the probably steep				
(unlikely to be loss than 184 doe	roos aftar r	o-grading) sido-s	long will cor	soquently be poorly				
(unitely to be less than 10.4 deg	al surface co	wor (basal cano	ny) to be achi	avod by both natural				
moons as well as by intervention	al Sullace Co	Soudod (Crass'	pyj to be acm	even by both hatural				
inealis as well as by intervention.	aut on the 4	e seeded Glass I	liust ill st be li	Iowii ii oili eisewiiere				
on the property and then spread	out on the t	opsolieu aleas c	luring the ran	iy season. Thereafter				
manually/mechanically re-veget	ate (with	sen-sustaining	locally indig	enous grasses j in				
problematic areas, as well as	in those a	reas where the	e spread see	ded grass ald not				
germinate/create cover. No grazin	ig or fire allo	owed. It may be c	letermined ne	cessary to implement				
Phytoremediation in contaminated	i areas (e.g. a	areas with high h	netal or sulpha	ite loads, or other) as				
identified during the course of a po	otential Cont	aminated Land A	ssessment.					
Measures 6: Land Capability:	the stated E	nd Land Capabi	lity for the a	rea in general is the				
Chamber of Mines Grazing Capabi	lity Class. Th	ius "Topsoiling' c	lepth >= 25 cm	n (Chamber of Mines				
Grazing Capability Class depth sta	ndard), but j	preferably more	(>= 60 cm – A	rable Capability Class				
depth standard). The End Land Ca	pability of t	he TSF side-slope	es that remains	s in perpetuity will be				
Industrial (non-grazing capability	y class), du	e to potential c	ontamination	and probably steep				
(unlikely to be less than 18.4 deg	rees after re	-grading) side-sl	opes that are	consequently non- or				
poorly- 'topsoiled'/vegetated. The	End Land Ca	pability of the T	SF crest, as we	II as the Slimes Dams				
that remain in perpetuity will	be Industria	l (non-grazing o						
contamination.								
					Possible (TSF)	Medium (TSF)		
Impact AFTER Management	R Management Moderate Long Term Site Medi		Medium	Unlikely (Slimes	Law (Climes Dame)		High	
					Dams)	Low (Slimes Dams)		



ACTIVITIES (AND ASPECTS): Development of the Morula PCD, Expansion of Storm Water PCD No. 1, Development of Storm Water PCD No. 2, Development of Storm Water PCD No. 3, Development of Storm Water PCD No. 4, Expansion of the OB Plant Process Water Dam, Expansion of the Plant Process Water Dam, Expansion of the CRP Process Water Dam (Clearance of Vegetation, Storage of Process Water), Morula Mining Shaft Complex (Water Storage Dams), Morula Dewatering Dam (Storage of Process Water), H:H Slimes Dam and Return Water Dam [RWD] (RWD Dam), HERNIC Tailings Storage Facility [TSF] and Return Water Dam [RWD] (RWD Dam), Plant Process Water Dam and Silt Traps (Storage of Process Water/Silt, Dam Liner), OB Plant Return Water Dam (Storage of Process Water), Chrome Recovery Plant Process Water Dam (Storage of Process Water), Plant Storm Water Pollution Control Dam [PCD] (Storage of Process Water), Emergency Dam (Expansion of the Storm Water Process Water Dam. Currently not Operational), Groundwater Treatment Plant (Settling Pond A & B, Dosing Pump), Plant Drinking Water Dam (Dam Footprint), Plant Drinking Water Dam Treatment Plant (Sand Filters, Chlorination Pump), Mine Sewage Plant (Sludge Drying Beds), Sewage Plant (Sludge Drying Beds) IMPACT CATEGORY: Soil Contamination, Soil Erosion, Soil Distribution, Soil Ouality, Land Use, Land Capability - IMPACT DESCRIPTION: 1a, Soil Contamination in the form of settled dust (on downwind/surrounding soils) derived from potentially contaminated residual 'wastes'/'non-wastes'/in-situ soil horizons/'topsoil' material during mechanical and transport operations associated with Closure.1b. Soil Contamination of the underlying/surrounding in-situ soil horizons and water-tables due to the downward/lateral movement of leached potential pollutants (metals, salts and hydrocarbons) below the base of, and through walls of the pollution control/process water/return water/drinking water dams and the sewerage plant sludge drying beds; as a result of being either poorly sealed (impermeable membrane liner) or poorly compacted (compacted-'remoulded' soils) bases/walls. 1c. Soils Contamination of the overlying uncontaminated rehabilitation 'topsoil' material (applied during rehabilitation) due to the upward capillary movement of potential pollutants from potentially contaminated underlying in-situ soil horizons and residual waste layers, 2. Soil Distribution loss (loss of horizons/depth) during re-grading. 3. Soil Erosion increase due to possible excessive slopes and poor vegetative ('grass') basal cover. 4. Soil Quality reduction (increased compaction, reduced organic carbon % and decreased nutrient levels) during rehabilitation 'topsoiling' exercise; due to further machinery handling of previously stockpiled 'topsoil' material.5. Land Use: Achieved/Maintenance of stated End-Land-Use of Extensive Grazing. 6. Land Capability: Achieved/Maintenance of stated End-Land Capability of the Chamber of Mines Grazing Capability class standard

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Long Term	Local	High	Possible	High	-	High
Management Measures			Time Period for	Implementation	Complian	Compliance with Standards		
For the purposes of the current of Return Water Dams, Drinking V collectively be referred to as 'Dat	discussion, the Vater Dam, an m Features'.	e Pollution Co d the Sewera	Decommissioning (and T	Closure) Supervision 'iming:				
Measures 1: Soil Contamination will be removed/'rehabilitated as and if necessary pumping and pur Features', and dispose of in the TSI the opencast pit if potentially non- the 'Dam Features' into the void approximates the surrounding land working with machinery. Haul true	Immediately during Decommissioning (conduct a Contaminated Land Assessment of the entire property, if not already completed during Operational phase),Chamber of Mines Guide and Soil ScientistDaily where necessary (spraying of water when operating machinery and haul trucks), Continuously (speed limits and tarpaulinChamber of Mines Guide and Soil Scientist							
the amount of blown dust; Tarpaul the necessity for the placement impermeable membrane; and removed/'rehabilitated' 'Dam Fea graded features (refer to relevant moulded' soil layer) directly overly	in cover over h t of a compa underlying th tures' will be Specialist Stud ing potentially	aul truck bins t cted-'remoulde ne vertic 'top determined by ly Report). Cor highly-pollutin	haul truck bin cover), Daily-Weekly supervision during Decommissioning phase ('Dam Features': de-water, scrape up sediments, remove imported concrete/stone/rock, push the					



Furthermore, the base of the 'Dam Features' should also have been well sealed with an impermeable membrane and a compacted-'re-moulded' soil layer, during construction. Thus the infiltration of rainwater is not likely to be an issue. Finally 'topsoil' the Removed 'Dam Features' (refer to Measures 4). **Permanent 'Dam Features':** A number of the 'Dam Features' (Pollution Control Dams) may remain in use in perpetuity, in order to intercept storm water and infiltration from contaminated areas: These must be operated as per the Mitigation Measures indicated in the relevant Operational phase Tables.

General:

Maintain optimum functioning (attend to leaks, clear blockages, remove vegetation and remove siltation) of those of the 'clean' (re-directs 'clean' water around potential pollution sources) and 'dirty' (intercepts 'dirty' water from polluted areas) storm water intercept canals/drains/berms, that will remain in perpetuity upslope/downslope (respectively) of potentially polluting Permanent features (e.g. permanent Pollution Control Dams) or Removed features (e.g. previous 'Dam Features' footprints). The aforementioned will limit 'clean' water run-off from entering these potentially polluting Removed or Permanent features areas, as well as intercept potential 'dirty' water seepage and run-off derived from all of these potentially polluting 'rehabilitated' and permanent feature areas respectively. Monitor leached contamination on an ongoing basis via interpolation of the data from the downslope boreholes. Excavate additional boreholes where deemed necessary, purify the pumped water accordingly, and release back to the environment.

Conduct a Contaminated Land Assessment in order that the Soil Contamination (pollution) status of the property may be determined. The soil/'waste'/'non-waste' samples for the aforementioned process were collected during the course of the soil survey and are currently stored in a deep freeze at JMA.

Measures 2: Soil Distribution: Removed 'Dam Features': Avoid unnecessary disturbance of any underlying/surrounding *in-situ* soils that may already be present at the site. One of the rehabilitation objectives is to restore Soil Distribution to some measure by the process of 'topsoiling' the footprints of removed features (e.g. Removed 'Dam Features').

Measures 3: Soil Erosion: Removed 'Dam Features': Re-grade (re-slope) Removed 'Dam Features' footprints to approximate undisturbed surrounding slopes of 1-4 degrees, but importantly < 5.7 degrees / 10.0 % percentage grade for vertic 'topsoil' material [based on soil erodibility nomograph, for features with a compacted-'re-moulded vertic soil seal layer]. Match surface level of undisturbed surrounds where possible. Establish a freely draining final landscape (without ridges/hollows). Permanent 'Dam Features': Soil Erosion may be reduced by reducing side-slopes to < 5.7 degrees / 10.0 % percentage grade where necessary.

Measures 4: Soil Quality (compaction and fertility): Removed 'Dam Features': Machinery - utilize tracked vehicles during the dry season in order to minimise compaction. 'Topsoil' the re-graded (re-sloped) Removed 'Dam Features' with 'topsoil' sourced from the adjacent 'topsoil' berms (where present), or alternatively source soil from the 'topsoil' stockpiles. Utilise vertic 'topsoil' material for the topsoiling' exercise; given firstly that the material has natural sealing properties (important

eable	walls into the dam void, re-grade, rip	
on of	compacted surfaces only, pick up loose	
ures	rocks, establishment of a compacted-'re-	
may	moulded' vertic soil seal overlying	
ated	potentially polluting features only,	
ional	'topsoiling', soil sampling,	
	ameliorate/fertilise soils, mow/spread	
	mature 'seeded' grass, thereafter re-	
	vegetation where necessary),	
nove		
and	Quarterly (drainage features-'dirty'/'clean'	
erms,	drains/canals/berms-monitor and	
nent	maintain-repair leaks, clear blockages,	
ures'	remove vegetation, remove siltation),	
tially		
page	Periodically (monitor leached	
ature	contamination via interpolation of the data	
data	from the downslope boreholes. Excavate	
y the	additional boreholes where deemed	
	necessary, purify the pumped water	
	accordingly, and release back to the	
lonj	environment-refer to Groundwater	
the	Specialist ReportJ.	
entiy		
any tho		
iling'		
iiiig		
uros'		
. 57		
s J.7 canh		
apii, rhed		
ws)		
tilize		
l (re-		
here		
al for		
rtant		



given the potentially polluting nature of the Removed 'Dam Features'), and secondly that this broad				
soil group occurs extensively. Removed and Permanent 'Dam Features': Utilise live topsoil (and				
compost if available) to replenish soil micro-flora before re-vegetation. Sample and analyse the				
topsoil. Fertilize (slow release ameliorants) the topsoil immediately after topsoiling and once				
rebabilitation) locally indigenous 'grass' cover				
Mascures 5: Land Use: The stated End Land Use for the area in general is Extensive Grazing				
Removed 'Dam Features': The End Land Use of the Removed 'Dam Features' may be Industrial due				
to notential Soil Contamination, the quantification of the aforementioned pending the completion of				
a Contaminated Land Assessment (refer to Soil Contamination). The grazing of 'grasses' from				
contaminated areas may be detrimental to livestock due to both the possible uptake of contaminants				
by the grass roots, as well as settled dust on the 'grass' (both of which need to be determined by an				
independent party). However, should all of the contaminated soils/'wastes' have been effectively				
removed from the various sites, then the End Land Use of Extensive Grazing may be attained.				
Functional surface cover (basal, canopy) to be achieved by both natural means as well as by				
intervention. Thus, Mature Seeded 'Grass' must first be mown from elsewhere on the property and				
then spread out on the 'topsoiled' areas during the rainy season. Thereafter manually/mechanically				
re-vegetate (with self-sustaining locally indigenous 'grasses') in problematic areas, as well as in				
those areas where the spread seeded 'grass' did not germinate/create cover. No grazing or fire				
allowed. It may be determined necessary to implement Phytoremediation in contaminated areas				
(e.g. areas with high metal or sulphate loads, or other) as identified during the course of a potential				
Contaminated Land Assessment. Permanent Dam Features': The End Land Use of the Permanent				
'Dam Features' that will remain in perpetuity will be Industrial due to potential Soil Contamination,				
the quantification of the aforementioned pending the completion of a Contaminated Land				
Assessment (refer to Soil Contamination).				
Furthermore, probable side-slopes of > 5.7 degrees/ 10.0 % percentage grade will consequently be				
poorly- topsoiled /re-vegetated.				
Measures 6: Land Capability: The stated End Land Capability for the area in general is the				
Chamber of Mines Grazing Capability Class. Thus Topsoling depth >= 25 cm (Chamber of Mines Crazing Capability Class depth standard) but preferably more (>= 60 cm Arable Capability Class				
donth standard) – Remeyed (Dam Features), but preferably hole (>= 00 cm = Alable Capability Class				
Eastures' will be Grazing or Arable in terms of tonsoiling denth; but may be downgraded to				
Industrial due to notential Soil Contamination, the quantification of the quantification of the				
aforementioned pending the completion of a Contaminated Land Assessment (refer to Soil				
Contamination). Permanent 'Dam Features': The End Land Canability of the Permanent 'Dam				
Features' side-slopes that remain in perpetuity will be Industrial (non-grazing capability class), due				
to potential Soil Contamination and probably side-slopes of > 5.7 degrees / 10.0 % percentage grade				
that will consequently be poorly- or non-'topsoiled'/vegetated.				
Site (Removed)				
Impact AFTER Management Moderate Long Local Medium	Possible	Medium	-	High
Term (Permanent)				5



ACTIVITIES (AND ASPECTS): Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps (Reduction of Run-off to Natural Resources), Storm Water Berms and Canals (Reduction of Run-off to Natural Resources), Water Supply (Canal and Pump Station), Morula Mining Opencast Operation (Water Abstraction and Pipelines) - IMPACT CATEGORY: Soil Contamination, Soil Erosion, Soil Quality, Land Use, Land Capability - IMPACT DESCRIPTION: 1a. Soil Contamination of the underlying/surrounding in-situ soil horizons and water-tables due to the downward/lateral movement of leached potential pollutants (metals, salts and hydrocarbons) below the base of, and through the side-walls of the canals/drains; as a result of possibly either being poorly compacted/sealed, or due to possible siltation/vegetative growth [Permanent]. 1b. Soils Contamination of the overlying uncontaminated rehabilitation 'topsoil' material (applied during rehabilitation of the drains/canals), due to the upward capillary movement of pollutants from the potentially contaminated residual sediment layer on the base/walls of the drains/canals, as well as the underlying in-situ soil horizons [Removed]. 2. Soil Distribution loss (loss of horizons/depth) during re-grading of the side-slopes. 3. Soil Erosion due to possible excessive side-slopes and possible por vegetative ('grass') basal cover on the adjacent (to canals/drains) 'topsoil' berms [Permanent]. 4. Soil Quality reduction (increased compaction, reduced organic carbon % and decreased nutrient levels) during rehabilitation 'topsoilig' exercise; due to further machinery handling of previously stockpiled 'topsoil' material [Removed]. 5. Land Use: Achieved/Maintenance of stated End-Land Capability of the Chamber of Mines Grazing Capability class standard [Removed].

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Major	Long Term	Local	High	Possible	High	-	Medium		
Management Measures	-			Time Period for	Implementation	Complian	ce with Standards			
In the case of water abstract aforementioned, and then level o placement applies. Thereafter, s	ion pipelines r remove the e ample, fertilise	and pump sta earth bund walls e and re-vegeta	Decommissioning (and T	Closure) Supervision 'iming:						
procedure recommended for the discussion, the canals, drains ar Features'. These will either be R	'Drain Feature ad associated l emoved [close	es' hereafter. Fo berms will colle ed and 'rehabilit	Immediately durin (conduct a Contamin of the entire prop	g Decommissioning ated Land Assessment perty, if not already						
remain in perpetuity]. The	vast majorit	y of these w	rill be Remov	ed during the	completed during	Operational phase),				
Decommissioning phase. Measures 1: Soil Contamination Features' will be removed/'rehabi the 'Drain Features' (including tho	1: Removed 'I litated as follow se dredged and	Drain Features': ws: Scrape up th l incorrectly dep	The vast major e sediments on osited on the ber	rity of the 'Drain the base/walls of rms), and dispose	Daily where necessa when operating mach	nry (spraying of water ninery and haul trucks),				
of in the TSF. Remove imported of opencast pit if potentially non-po 'topsoil' berms (if any) into the	concrete/stone lluting, or in t void of the dra	/rock walls in so he TSF if potent ains/canals, or a	ome canals and ially polluting. F lternatively sour	dispose of in the Push the adjacent rce soil from the	Continuously (spee haul truck	d limits and tarpaulin bin cover),	Chamber o and	f Mines Guidelines Soil Scientist		
'topsoil' stockpiles, thereby achiev	ring a relatively	v level surface th	at approximates	s the surrounding	Daily-Weekly supervision during					
landscape. Spray water for dust su	ppression whe	re necessary wh	en working with	n machinery. Haul	Decommissioning pl	nase ('Drain Features':				
trucks and vehicle traffic must of	bey speed limit	ts in order to re	educe the amour Drain Features':	nt of blown dust;	scrape up sedimen	ts, remove imported				
'Drain Features' may remain in use	e in perpetuity,	in order to inter	rcept storm wate	er and infiltration	berms into the drain	/canal void, re-grade,				
from contaminated areas: These n	nust be operate	ed as per the Mit	igation Measure	s indicated in the	rip compacted surfa	ces only, pick up loose				
relevant Operational phase Tables	. Maintain opti	mum functioning	rocks, establishmer	it of a compacted-'re-						
remove vegetation and remove s	moulded' vertic	soil seal overlying								
potential pollution sources) and '	reas) storm water	potentially pollu	ting features only,							
potentially polluting Permanent	features (e.g. p	ermanent Pollu	tion Control Da	ms) or Removed	ameliorate/fertilis	e soils, mow/spread				



features (e.g. previous 'Dam Features' footprints). The aforementioned will limit 'clean' water runoff from entering potentially polluting Removed or Permanent features areas, as well as intercept potential 'dirty' water seepage and run-off derived from all of the potentially polluting Removed and Permanent feature areas respectively. Monitor leached contamination on an ongoing basis via interpolation of the data from the downslope boreholes. Excavate additional boreholes where deemed necessary, purify the pumped water accordingly, and release back to the environment. **Conduct a Contaminated Land Assessment in order that the Soil Contamination (pollution) status of the property may be determined. The soil/waste'/'non-waste' samples for the aforementioned process were collected during the course of the soil survey and are currently stored in a deep freeze at JMA.**

Measures 2: Soil Distribution: Removed 'Drain Features': Avoid unnecessary disturbance of any underlying/surrounding *in-situ* soils that may already be present at the site. One of the rehabilitation objectives is to restore Soil Distribution to some measure by the process of 'topsoiling' the footprints of removed features (e.g. Removed 'Drain Features').

Measures 3: Soil Erosion: Removed 'Drain Features': Re-grade (re-slope) Removed 'Drain Features' footprints to approximate undisturbed surrounding slopes of 1-4 degrees, but importantly < 6.4 degrees/ 11.2 % percentage grade for vertic 'topsoil' material [based on soil erodibility nomograph]. Match surface level of undisturbed surrounds where possible. Establish a freely draining final landscape (without ridges/hollows). Permanent 'Drain Features': Soil Erosion may be reduced by reducing soil berm side-slopes to < 6.4 degrees / 11.2 % percentage grade where necessary.

Measures 4: Soil Quality (compaction and fertility): Removed 'Drain Features': Machinery - utilize tracked vehicles during the dry season in order to minimise compaction. 'Topsoil' the regraded (re-sloped) Removed 'Drain Features' with 'topsoil' sourced from the adjacent 'topsoil' berms (where present), or alternatively source soil from the 'topsoil' stockpiles. Utilise vertic 'topsoil' material for the topsoiling' exercise; given firstly that the material has natural sealing properties (important given the potentially polluting nature of the Removed 'Drain Features'), and secondly that this broad soil group occurs extensively. Removed and Permanent 'Drain Features':

Utilise live topsoil (and compost if available) to replenish soil micro-flora before re-vegetation. Sample and analyse the 'topsoil'. Fertilize (slow release ameliorants) the 'topsoil' immediately after 'topsoiling' and once every 3 - 4 years thereafter. Do not fertilise the soils in areas displaying healthy existing (before rehabilitation) locally indigenous 'grass' cover.

Measures 5: Land Use: The stated End Land Use for the area in general is Extensive Grazing. Removed 'Drain Features': The End Land Use of the Removed 'dirty' 'Drain Features' may be Industrial due to potential Soil Contamination, the quantification of the aforementioned pending the completion of a Contaminated Land Assessment (refer to Soil Contamination). The grazing of 'grasses' from contaminated areas may be detrimental to livestock due to both the possible uptake of contaminants by the grass roots, as well as settled dust on the 'grass' (both of which need to be determined by an independent party). However, should all of the contaminated soils/sediments/'wastes' have been effectively removed from the various sites, then the End Land Use of Extensive Grazing may be attained. The End Land Use of the Removed 'clean' 'Drain Features' will naturally be Extensive Grazing. Functional surface cover (basal, canopy) to be achieved by both Quarterly (Permanent drainage features-'dirty'/'clean' drains/canals/berms-monitor and maintain-repair leaks, clear blockages, remove vegetation, remove siltation), Periodically (monitor leached contamination via interpolation of the data from the downslope boreholes. Excavate additional boreholes where deemed necessary, purify the pumped water

mature 'seeded' grass, thereafter re-

vegetation where necessary),

accordingly, and release back to the environment-refer to Groundwater Specialist Report).



natural means as well as by interver	ntion. Thus, Mat	ture Seed	ed 'Grass' must firs	st be mown from				
elsewhere on the property and then	spread out on	the 'topso						
Thereafter manually/mechanically re	e-vegetate (with	self-susta						
problematic areas, as well as in	those areas	where th	ne spread seeded	'grass' did not				
germinate/create cover. No grazing o	or fire allowed.	t may be	determined necess	ary to implement				
Phytoremediation in contaminated a	areas (e.g. areas	with high	n metal or sulphate l	oads, or other) as				
identified during the course of a p	otential Contan	ninated L	and Assessment. F	Permanent 'Drain				
Features': The End Land Use of the P	Permanent 'dirty	' and 'cle	an' drains/canals th	nat will remain in				
perpetuity will be Industrial. The En	d Land Use of t	he Perma	nent 'topsoil' berm	s (adjacent to the				
drains/canals) that will remain in per	petuity will be E	xtensive	Grazing, provided tł	nat the berm side-				
slopes are < 6.4 degrees / 11.2 %	percentage gra	de, in or	der to be adequate	ely 'topsoiled'/re-				
vegetated.								
Measures 6: Land Capability: The	stated End La	nd Capab	in general is the					
Chamber of Mines Grazing Capability	7 Class. Thus 'To	opsoiling'	depth >= 25 cm (0	Chamber of Mines				
Grazing Capability Class depth standa	ard), but prefera	bly more	e (>= 60 cm – Arabl	e Capability Class				
depth standard). Removed 'Drain	Features': The	End Land	d Capability of the	Removed 'Drain				
Features' will be Grazing or Arable	e in terms of to	psoiling	depth; but may be	e downgraded to				
Industrial due to potential Soil Contan	nination in the c	ase of the	e 'dirty' Removed 'Di	rain Features', the				
quantification of the aforementioned	pending the co	mpletion	of a Contaminated	Land Assessment				
(refer to Soil Contamination). Perr	manent 'Drain	Features'	: The End Land (Capability of the				
Permanent 'clean' and 'dirty' drains/c	anals that will re	emain in p	perpetuity will be In	dustrial. The End				
Land Capability of the Permanent 'top	osoil' berms (adj	acent to t	the drains/canals) t	hat will remain in				
perpetuity will be Extensive Grazing,	provided that th	ie berm si	ide-slopes are < 6.4	degrees / 11.2 %				
percentage grade, in order to be adequ	uately 'topsoiled	'/re-vege						
		Long	Site (Removed)					
Impact AFTER Management	Minor	Term	Site (Permanent)	Medium	Unlikely	Low	-	Medium



ACTIVITIES (AND ASPECTS): Morula Mining Opencast Operation (Steep Slopes / Uneven Surfaces, Existence of the Void), Morula Mining Shaft Complex (Emergency ROM Stockpile), Mine Waste Rock Dump (Storage of Waste Rock on Un-lined Footprint), Re-Use of Mine Waste Rock at the Mine Waste Rock Stockpile (Crushing and Screening Plant, Stockpiling of Waste Rock Product), Ore Beneficiation Plant-Crushing and Screening (Transport of Ore, Crushing and Screening, Storage of Mixed Materials), Mixed Material Stockpiling and Screening (Storage of Mixed Materials), Returns Materials Stockpiles (Storage of Returns Materials), Ore Beneficiation Plant -Lumpy Section HMS Plant (HMS Waste Material), Primary Chrome Recovery Plant (Stockpiling of Waste), OB Plant Fines in Open Pit-Slurry (Disposal of OB Plant Fines in Open Pit), OB Plant Coarse Waste in Open Pit-Trucks (Disposal of OB Plant Coarse Waste in Open Pit), Morula Mining Opencast Operation Rehabilitated area (Uneven Surfaces), Morula Shaft Complex Rehabilitated area (Uneven Surfaces), Rehabilitated Quarry Area (Uneven Surfaces) - IMPACT CATEGORY: Soil Contamination, Soil Erosion. Soil Ouality, Land Use, Land Capability - IMPACT DESCRIPTION: 1a. Dust; Soil Contamination in the form of settled dust on the downwind/surrounding soils due to mechanical and transport operations associated with Closure in the Opencast area. 1b. Run-off: Soil Contamination of the downslope in-situ soil areas as a result of 'dirty' rainwater run-off from the Opencast area, 1c, Leaching: Contamination of underlying layers/water-table due to the infiltration/leaching of water through historical potentially polluting contaminated 'waste' layers. 1d. Order of Horizons: Soils Contamination of the overlying uncontaminated rehabilitation 'topsoil' material (applied during rehabilitation) due to an inappropriate 'Order of Horizons Placement' in the Opencast voids; and the resultant upward capillary movement of potential pollutants from potentially contaminated underlying mixed 'waste'/rock layers 1e.1. 'Wastes': 'Topsoil' Contamination (Opencast area) due to 'dirty' machinery or 'wastes' previously mixed with the 'topsoil'. 1e.2. 'Wastes': Soil Contamination (Infrastructure areas) of the underlying/surrounding in-situ soil horizons and watertables due to the downward/lateral movement of leached potential pollutants from the footprints of the removed (to the Opencast area) rock/mixed 'waste' dumps and stockpiles in the Infrastructure area. 2. Soil Distribution. Sub-standard 'Topsoiling' of the Opencast area, or no 'topsoiling' possible in limited steep to very steep areas. 3. Soil Erosion due to possible excessive slopes, uneven terrain, narrow 'topsoiling' depths, and poor vegetative ('grass') basal cover in the 'rehabilitated' Opencast area. 4. Soil Quality reduction (increased compaction, reduced organic carbon % and decreased nutrient levels) during rehabilitation 'topsoiling' exercise in the Opencast area; due to further machinery handling of previously stockpiled 'topsoil' material. 5. Land Use: Achieved/Maintenance of stated End-Land-Use of Extensive Grazing. 6. Land Capability: Achieved/Maintenance of stated End-Land Capability of the Chamber of Mines Grazing Capability class standard

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Major	Long Term	Local	High	Definite	High	-	High
Management Measures	Time Period for Imp	lementation	Compliance with Standards					
Measures 1: Soil Contamination necessary when working with ma order to reduce the amount of blo vegetate the entire 'rehabilitated Measures 5-Land Use). Measures that exists around the outer boun aforementioned functioning to in area. In areas where a 'soft's (wea berm, the former must be ren 'rehabilitated' Opencast area in of Measures 1b. Leaching: Establis ridges/hollows (i.e. even surface) off, and the subsequent cont infiltration/leaching of water t layers. Measures 1d. Order of Ho	on: Measures achinery. Haul lown dust; Tar ed' Opencast a 5 1b. Run-off: I ndary of the o ntercept 'dirty athering rock a moved and re order to limit sh a freely di), in order to p tamination of through histo prizons: Ideally	1a. Dust: Spray trucks and vehi paulin cover over area in order to Maintain/establi pencast (rock du v' water rainfall and fines) berm eplaced with th run-off and du raining positive prevent soil eros of underlying prical potentiall v from the surfac	Decommissioning (C and Timing: Immediately during D (conduct a Contamina of the entire property completed during Ope Daily-Weekly supery Decommissioning pha Immediately (scrape u rock/mixed materials stockpiles, as well as t underlying layers in t Infrastructure areas; a	closure) Supervision ecommissioning ted Land Assessment , if not already erational phase), vision during use – commencing up and remove /waste dumps and he historical he various and sell or dispose of in	Chamber o and Soil Scie	f Mines Guidelines entist		



('breaker' layer to the upward capillary movement of polluted/acid water; lime will neutralize Acid	appropriate depending on pollution	
Rock/Mine Drainage to certain extent); and	potential),	
- Potentially polluting residual historical 'wastes' (smelter related) / spoil material (mining		
related). The latter materials must never directly underlie the 'topsoil', since this may lead to	Daily where necessary (spraying of water	
pollution / ARD contaminating the overlying 'topsoil' layers by capillary action.	when operating machinery and haul trucks).	
Measures 1e. 'Waste': Do not dispose of potentially polluting 'waste' materials from the	1 0 9 9	
'Infrastructure' area in the Opencast void, because such materials will impact the groundwater-	Continuously (speed limits and tarpaulin	
table. Such materials must be disposed of in an appropriate facility (e.g. TSF or Slimes Dumps). Only	haul truck bin cover),	
materials determined to be relatively potentially non-polluting (low pollution potential)	<i></i>	
may currently be disposed of in the void of the Opencast pit. Unfortunately, it is probable	Weekly supervision during	
that potentially polluting materials were historically buried in this area. However, the	Decommissioning phase – commencing	
location/volume of such materials is unknown. Do not utilise 'dirty' 'tonsoil' that was	Immediately (backfill the opencast pit voids.	
historically (during stockniling) mixed with potentially polluting 'waste' materials. Bock	establish a freely draining positive [convex]	
dumps/stockpiles (Opencast area, Morula Mining). Mixed Materials stockpiles (Allovs Smelting	final landscape without ridges/hollows, re-	
Plant Facilities), and Waste (HMS and CRP waste, OB Plant fines waste, OB Plant coarse waste):	grade, rip compacted surfaces only, pick up	
Remove rock/mixed materials dumns/stockniles: and Scrane un and remove the generally thick (>	loose rocks 'tonsoiling' soil sampling	
40cm - > 100 cm) historical underlying layer that is spread extensively throughout these processing	ameliorate/fertilise soils_mow/spread	
and stocknilling areas, exposing the underlying <i>in-situ</i> soils (when present). Sell off those materials	mature 'seeded' grass, thereafter re-	
for which there is a market. Transport (haul truck) and dispose of the remaining aforementioned	vegetation where necessary).	
materials in the void of the Opencast nit provided that they are notentially non-nolluting. The same	· · · · · · · · · · · · · · · · · · ·	
annies to the HMS and CRP waste OB Plant fines waste and OB Plant coarse waste	Quarterly (drainage features-'dirty'/'clean'	
materials/areas. Re-grade. 'topsoil', sample, fertilise, and re-vegetate the footprints of the	drains/canals/berms-monitor and maintain-	
aforementioned areas in the various Infrastructure areas. Wash residual 'wastes' from elsewhere	renair leaks, clear blockages, remove	
off the machinery before utilising the machinery for transportation of 'topsoil' or rehabilitation	vegetation, remove siltation, dredging).	
'topsoiling' purposes. General: Maintain optimum functioning (attend to leaks, clear blockages,		
remove vegetation and remove siltation) of those of the 'clean' (re-directs 'clean' water around	Periodically (monitor leached contamination	
potential pollution sources) and 'dirty' (intercepts 'dirty' water from polluted areas) storm water	via interpolation of the data from the	
intercept canals/drains/berms, that may remain in perpetuity downslope of the Opencast area. The	downslope boreholes. Excavate additional	
aforementioned will limit 'clean' and 'dirty' water run-off and seepage derived from elsewhere from	boreholes where deemed necessary, purify	
entering the filled (buried) Opencast pit voids. Monitor leached contamination on an ongoing basis	the pumped water accordingly, and release	
via interpolation of the data from the downslope boreholes. Excavate additional boreholes where	back to the environment-refer to	
deemed necessary, purify the pumped water accordingly, and release back to the environment.	Groundwater Specialist Report).	
Conduct a Contaminated Land Assessment in order that the Soil Contamination (pollution)		
status of the property may be determined. The soil/'waste'/'non-waste' samples for the		
aforementioned process were collected during the course of the soil survey and are		
currently stored in a deep freeze at JMA.		
Measures 2: Soil Distribution: Topsoil' the entire re-graded (re-sloped) opencast footprint, as per		
the depths indicated in Measures 6. Vegetated 'topsoil' stockpile berms should already exist (as they		
do in some sections) adjacent (downslope) of the 'soft's berms. These 'topsoil' 'stockpile' berms are		
comprised of soil that was previously stripped during the construction phase, and that will be		
utilised for rehabilitation 'topsoiling' purposes during the closure phase. Alternatively source soil		
'topsoil' from the 'topsoil' stockpiles. Utilise vertic 'topsoil' material for 'topsoiling' purposes given		



that this broad soil group occurs extensively; and furthermore in order to maintain soil/vegetative continuity with the surrounding areas.

Measures 3: Soil Erosion: Fill the Opencast voids with the discarded rock/soft's that have remained on site in the Opencast footprint; as well as with potentially non-polluting materials from the Infrastructure/processing/stockpiling areas. Establish a freely draining positive (convex) final landscape without ridges/hollows (i.e. even surface), in order to prevent soil erosion and the ponding of rainfall run-off, and the subsequent contamination of underlying layers/water-table due to the infiltration/leaching of water through historical potentially polluting contaminated 'waste' lavers. Re-grade (re-slope) the opencast footprint to < 6.4 degrees/ 11.2 % percentage grade (erosion slope calculated for vertic 'topsoil' material based on the soil erodibility nomograph) where possible. Match surface level of undisturbed surrounds where possible. Slope cannot practically be reduced to this extent for limited sections of the Opencast area. and these sections will thus not be able to be effectively 'topsoiled'/re-vegetated either (given soil erosion on steep slopes). Such areas must be re-sloped to approximately 16.0 degrees if possible, and thereafter re-vegetated using ecological restoration principles and phytoremediation. Surface rocks may be laid out along the contours in such areas, the aforementioned functioning to slow runoff, trap sediments, and thereby create suitable conditions/habitat for the germination of seeds. The recommended maximum gradient (Chamber of Mines) for material dumped on level to gently sloping terrain (therefore also TSF's, and sections of the Opencast area) is at least 1v: 3h (18.4 degrees or 33.0 % percentage grade), the least erosion occurring if the slope angle reduces in the direction of the toe of the pediment (i.e. concave). One of the key findings of extensive surveys and experimental work carried out by the University of the Witwatersrand between 1996 and 2009 was as follows: grass persistence and erosion control were increased, and irrigation decreased, by TSF slope reduction to < 16.0 degrees.

Measures 4: Soil Quality (compaction and fertility): Compaction: Machinery - utilize tracked vehicles for 'topsoil' handling during the dry season in order to minimise compaction. Do not spray water during the 'topsoiling' process as the raised moisture content will in this case lead to soil compaction. Rip final re-sloped surface to reduce compaction (before 'topsoiling'). Remove loose rocks and stony material. Fertility: Utilise live topsoil (and compost if available) to replenish soil micro-flora before re-vegetation. Sample and analyse the 'topsoil'. Fertilize (slow release ameliorants) the 'topsoil' immediately after 'topsoiling' and once every 3 - 4 years thereafter. Sewerage sludge derived from the sludge drying beds of the two sewage plants may be spread out in the Opencast area as 'compost'/mulch.

Measures 5: Land Use: The stated End Land Use for the rehabilitated HERNIC areas in general is Extensive Grazing. The End Land Use of the rehabilitated Opencast area will largely be Extensive Grazing. Functional surface cover (basal, canopy) to be achieved by both natural means as well as by intervention. Thus, Mature Seeded 'Grass' must first be mown from elsewhere on the property and then spread out on the 'topsoiled' areas during the rainy season. Thereafter manually/mechanically re-vegetate (with self-sustaining locally indigenous 'grasses') in problematic areas, as well as in those areas where the spread seeded 'grass' did not germinate/create cover. No grazing or burning allowed until vegetation is well established in the post-closure phase. However, certain sections will remain Mining due to steep to very steep slopes



that will consequently not be able to be re-sloped to approximately 16.0 d restoration principles and phytoreme currently or in the future. The End L the list) currently meets the standard use of Extensive Grazing. Measures 6: Land Capability: The s in general is the Chamber of Mines (Chamber of Mines Grazing Capabili	be effectively 'topsoiled'/r egrees if possible, and ther ediation. No grazing or bu and Use of the three rehab l (moderate-high basal cov stated End Land Capability Grazing Capability Class. ity Class depth standard),	e-vegetate reafter re- irning allo ilitated an er) requir for the re Thus 'Toj but prefe	uch areas must using ecological ch areas, either nree Aspects in stated end-land HERNIC areas epth >= 25 cm e (>= 60 cm -					
depth standard will easily be achieve	d by 'topsoiling' in the mai	ority of th	e Grazing C	apability class				
Land Capability of the limited steep t	to very steep sections of the	e Opencas	st area will	remain Mining				
(i.e. Non-Grazing capability class), g	iven that these slopes wil	ll consequ	ently be n	on- or poorly-				
'topsoiled'/vegetated. The End Land (Capability in the three reha	bilitated a	reas (last tl	hree Aspects in				
the list) currently meets the 'tops	soiling' depth standard (50-60cm,	30-50cm,	and 20-30cm				
respectively) required for the post-di	sturbance Grazing Capabili	ty class.	-					
'Topsoiled Gentle- Moderate Final Slopes: Moderate Long Term Site Medium						Medium	-	High
impact AFTER Management	Non-'Topsoiled' Steep- Very Steep Final Slopes: Major	Long Term	Site	High	Definite	High	-	High



ACTIVITIES (AND ASPECTS): Morula Mining Shaft Complex (Decline Shafts), Morula Mining Underground Operation (Underground Mining) - IMPACT CATEGORY: Soil Distribution (Subsidence) - IMPACT DESCRIPTION: 1. Soil Distribution: Loss of Soil Distribution due to possible Surface Subsidence in cases where the underground mining is either conducted relatively close to the soil surface, or alternatively where an insufficient density of un-mined underground pillars are left intact in order to support the 'roof' from collapse. Impacts of underground 'roof' collapse may include limited differential surface subsidence, localised soil erosion in areas of resultant increased slope, an interruption to the free-drainage of surface water, the artificial surface ponding of water in patches, and infiltration of water into the underground area via cracks in the rock sub-strata. 2. Land Use: Potential Change in Land Use due to Surface Subsidence. E.g. cultivated areas or grazing grasslands; may change to non-productive anthropogenic wetland in patches.3. Land Capability: Potential Change in natural Land Capability due to Surface Subsidence. E.g. arable, grazing, or non-grazing capability class; may change to the anthropogenic wetland capability class in patches.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Long Term	Site	Medium	Possible	Medium	-	High	
Management Measures					Time Period for Imp	lementation	Compliance	e with Standards	
Measures 1: Soil Distribution pillars) was built into the under subsided areas include the follo percentage grade) [for vertic bi- order to re-establish a free drain is to achieve the pre-subsidence pattern. Limited 'topsoiling' (ver necessary in order to promote t stockpiles should have been held and post-closure phases. Mainta vegetation and remove siltation pollution sources) and 'dirty' (in canals/drains/berms, that may 'dirty' water run-off and seepa Decline Shafts: Plug the surface necessary; establish a freely drai compacted surfaces only; pick up mow/spread mature 'seeded' graveners.	Decommissioning pha must remain intact, ar in order to optimise th operation at a later sta surface decommission Daily-Weekly super amelioration Immedia whether during the O Post-Closure phases o (operations include: r where necessary/re-w Quarterly (drainage fed drains/canals/berms- repair leaks, clear blov vegetation, remove sil	ise (un-mined pillars ad not become mined he underground age such as during hing), vision – Commencing hely after subsidence perational, Closure, or f the project e-grading/'topsoiling' regetation), eatures-'dirty'/'clean' monitor and maintain- ckages, remove tation, dredging).	Chamber of	Mines Guidelines					
Measures 2: Land Use: Subsided Areas: Re-grading and limited 'topsoiling' in order to re- establish a free draining final topography, as well as re-vegetation of 'topsoiled' or re-graded areas in order to limit soil erosion and re-establish the pre-disturbance land use. No grazing or burning allowed until re-vegetated areas are well established. Decline Shafts: The stated End Land Use for the rehabilitated HERNIC areas in general is Extensive Grazing. The aforementioned will be able to be attained in the Decline Shaft areas. No grazing or burning allowed until re-vegetated areas are well established. Measures 3: Land Capability: Subsided Areas: Re-grading and limited 'topsoiling' in order to re-					Ameliorate Immediately after subsidence whether during the Operational, Closure, or Post-Closure phases of the project (operations include: re-grading/'topsoiling' where necessary/re-vegetation)		Chamber of Mines Guidelines		
establish a free draining final to rehabilitated HERNIC areas in	pography. Dec general is the	cline Shafts: The Chamber of Mir	stated End La	and Capability for the Capability Class. Thus	whether during the O Post-Closure phases of	perational, Closure, or f the project	Chamber of Mines Guidelines		



'Topsoiling' depth >= 25 cm (Chamb	psoiling' depth >= 25 cm (Chamber of Mines Grazing Capability Class depth standard), but					e-grading/'topsoiling'		
preferably more (>= 60 cm – Arable	e Capability	y Class depth st	andard). The	End Land Capability	where necessary/re-v	egetation)		
class will be achieved by 'topsoiling' ap	ppropriate	ely.						
Subsided Areas - General Information	ion: Areas	s of underground	l mining (MG	1- and MG2-chromite				
layers may be relevant) could be unsta	table, and j	particularly so w	hen the mini	ing depth is relatively				
close to the surface. Underground mini	ning may al	so exist at the no	on-HERNIC ov	wned Crocodile Mine.	Ameliorate Immediate	ely after subsidence		
In the current area the probability is c	considered	l negligible that ı	underground	mining will affect the	whether during the Op	perational, Closure, or		
surface in the long term. Nevertheless	s, the meth	nod for rehabilita	ating subside	d areas was provided	Post-Closure phases of the project		Authors notes	
for information purposes.					(operations include: re-grading/'topsoiling'			
Mitigation Measures are equally a	applicable	to the Operati	onal, Closur	e, and Post-Closure	where necessary/re-vegetation)			
phases of the project, the aforem	mentioned	d since subside	ed areas m	ust be attended to				
immediately when they occur.								
Impact AFTER Management	Minor	Long Term	Site	Medium	Unlikely	Low	-	High



ACTIVITIES (AND ASPECTS): Morula Mining Shaft Complex ('Topsoil' Stockpile) - IMPACT CATEGORY: Soil Contamination, Soil Distribution, Soil Erosion, Soil Quality, Land Use, Land Capability - TYPE OF IMPACT: Direct and Indirect - IMPACT DESCRIPTION: 1. Soils Contamination due to infiltration of polluted water into the base of the stockpile, and wind deposition of contaminated dust settling on the stockpile [Remaining]. 2. Soil Distribution loss (loss of horizons/depth) during earthworks associated with machinery working at the stockpile [Remaining].3. Soil Erosion increase due to possible excessive slopes and the removal of the vegetative ('grass') basal cover on the stockpile [Remaining]. 4a. Soil Quality reduction (increased compaction, reduced organic carbon % and decreased nutrient levels, and reduction of reproductive seed-bank in the pile) due to excessive stockpile heights (>2.5m) and long periods of reserve 'topsoil' stockpiling for use in repair work [Remaining]. 4b. Soil Quality reduction (increased compaction, reduced organic carbon %) during rehabilitation 'topsoiling' exercise; due to further machinery handling of previously stockpiled 'topsoil' material [Removed]. 5. Land Use: Temporary Land-Use vegetative cover of 'topsoil' stockpile removed [Remaining]. 6. Land Capability: Temporary Land Capability of 'topsoil' stockpile unchanged [Remaining].

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High	
Management Measures				Time Period for Imp	olementation	Complianc	Compliance with Standards		
For the purposes of the current	discussion, the	e 'Topsoil' Stockp	e discussed from the	Decommissioning (Closure) Supervision				
perspectives of Removed (utili	ised during D	ecommissioning	nd Remaining (not	and Timing:					
Measures 1: Soil Contamination:	Remaining. Th	e Remaining exces	s 'tonsoil' s	will provide provision	Daily when necessary	(wash machinery			
for use in repair work during the	ost-closure ph	ase. The 'topsoil' s	tockpile m	ust not be allowed to	utilised for transporta	ation and spreading of			
become contaminated; by means	of the continu	ation of the follow	wing meas	ures: Do not deposit	'topsoil' material),	8			
contaminated 'waste' materials on	the 'clean' 'tops	soil' stockpile. A s	eparate 'di	rty' 'topsoil' stockpile					
may be developed for soils that we	ere previously (before stripping)	contamina	ted with 'dirty' water	Daily where necessar	y (spraying of water			
(or 'waste'). 'Waste' must be ident	ified/removed	from the stockpile	before uti	lising the material for	when operating mach	inery and haul trucks),			
topsolling purposes. Spray water	er for dust sup	pression where	necessary	when working with	Continuously (cnood)	limits and tarnaulin			
will limit dust pollution of the 'tops	soil' stocknile T	'he spraving of wa	ter for dus	t suppression will not	haul truck hin cover)	innits and tai paulin			
be required on the pile since the st	ockpiled vertic	topsoils are not su	isceptible t	to wind erosion. Haul	naar er aen bin eoverj,				
trucks and vehicle traffic must of	bey speed limit	s in order to red	uce the an	nount of blown dust;	Daily-Weekly super	vision during	Chamber o	f Mines Guidelines	
Tarpaulin cover over haul truck b	ins to limit dus	t. Maintain optimu	um functio	ning (attend to leaks,	Decommissioning pha	ase – commencing	and Soil Sci	entist	
clear blockages, remove vegetation	n and remove s	siltation) of those	of the 'cle	an' (re-directs 'clean'	Immediately after ren	noving required			
water around potential pollution s	ources) and 'di	rty' (intercepts 'di	irty' water	from polluted areas)	'topsoil' from 'topsoil				
storm water intercept canals/dra	uns/berms, that	it will remain in	perpetuity	upslope/downslope	sampling, ameliorate	(fertilise soils,			
(respectively) of potentially polluti	ng Permanent	leatures. The afore	ontoring	the stocknile areas	mow/spread mature	seeded grassj,			
Removed: Wash residual 'wastes'	from elsewhere	off the machiner	v before ut	ilising the machinery	Biannually (erosion a	nd vegetative			
for transportation of 'tonsoil' or rehabilitation 'tonsoiling' nurposes.				inising the machinery	monitoring: spring be	efore- and autumn			
Measures 2: Soil Distribution: Remaining: Avoid unnecessary disturbance of an					after- the rains),				
underlying/surrounding in-situ soi	il' stockpile sites. One								
of the rehabilitation objectives is	to restore Soil	Distribution to so	ome measu	are by the process of	Quarterly (drainage f	eatures-'dirty'/'clean'			
'topsoiling' the footprints of Remov	ved or Permane	nt features.			drains/canals/berms-monitor and				
Measures 3: Soil Erosion: Remai	ning: The previ	ously established	slope of th	ne stockpile will have	maintain-repair leaks	, clear blockages,			
been altered, while the vegetative	e cover will ha	ve been removed	due to the	e removal of 'topsoil'	remove vegetation, re	emove siltation,			



material for rehabilitation 'topsoiling' purposes elsewhere. Thus, re-establishing reduced slopes (<=	dredging).	
6.4 degrees, 11.2 % percentage grade) and a high grass basal cover (refer to Measures 4) will limit		
soil erosion on the side-slopes of the material remaining in the stockpiles. The maintenance of the		
soil berm (grassed) on the downslope boundaries of the stockpiles will intercept run-off/eroded soil		
derived from the stockpile, and thereby preventing siltation of the surrounds.		
Measures 4: Soil Quality (compaction and fertility): Remaining: 'Topsoil' stockpiles should		
ideally not exceed a maximum depth of $1.5 - 2.5m$, as greater depths than this can lead to the		
following: anaerobic conditions developing in the pile; a reduction in soil fertility; the accelerated		
loss of the reproductive seed-bank; and compaction. Sample/Fertilize the Remaining 'topsoil'		
stockpile immediately after re-grading, and once every 3 -4 years in spring in order to maintain soil		
fertility and vegetative ('grass') basal cover, thereby limiting soil erosion and continually refreshing		
the reproductive seed-bank. Utilise live topsoil (and compost if available) to replenish soil micro-		
flora before re-vegetation. Sample and analyse the 'topsoil'. Fertilize (slow release ameliorants) the		
'topsoil' immediately after 'topsoiling' and once every 3 - 4 years thereafter. Do not fertilise the soils		
in areas displaying healthy existing (before rehabilitation) locally indigenous 'grass' cover.		
Machinery - in order to limit compaction, machinery for stripping/stockpiling/rehabilitation		
purposes should ideally be tracked (not wheeled), and should operate during the dry winter months		
only.		
Measures 5: Land Use: The stated End Land Use for the rehabilitated HERNIC areas in general is		
Extensive Grazing. Remaining: The temporary Land Use will be Remaining 'Topsoil' Stockpile, until		
such time as the 'topsoil' is required for rehabilitation 'topsoiling' repair work in the Post-Closure		
phase, after which the removed stockpile footprint may be re-vegetated and the various sites may		
once again become Extensive Grazing areas. Functional surface cover (basal, canopy) to be achieved		
by both natural means as well as by intervention. Thus, Mature Seeded 'Grass' must first be mown		
from elsewhere on the property and then spread out on the bare 'topsoil' stockpiles during the		
rainy season. Thereafter manually/mechanically re-vegetate (with self-sustaining locally indigenous		
'grasses') in problematic areas, as well as in those areas where the spread seeded 'grass' did not		
germinate/create cover. No grazing or burning allowed.		
Measures 6: Land Capability: The stated End Land Capability for the rehabilitated HERNIC areas in		
general is the Chamber of Mines Grazing Capability Class. The temporary Land Capability of the		
Remaining 'Topsoil' Stockpile will be Non-Grazing (i.e. 'Wilderness'), until such time as the 'topsoil'		
is required for rehabilitation 'topsoiling' repair work in the Post-Closure phase, after which the in-		
situ soils (if any) underlying the removed stockpile footprint may be exposed, and the pre-		
disturbance Land Capability of the sites will in this case be regained. Should the footprint overlie		
'wastes'/'non-wastes', then these materials must be removed and the footprint must be		
rehabilitated accordingly. In this case, the Grazing Capability class depth standard will easily be		
achieved by 'topsoiling'.		
General Information: Based on the area of Man-Made Features (299.94ha) reflected on Map 6 (Soil		
Utilization [Stripping] Guide) and in Table 8.2.11 (Summary of Soil Utilization [Stripping] Guide),		
then the following volumes of suitable 'topsoil' material would be required to reinstate the Man-		Authors notes
Made Features Areas to the following land capability classes (<i>albeit</i> to a lower production potential):		
- Wilderness ('topsoiling' depth: 0.15m) = 449 910m ³ ,		



- Grazing ('topsoiling' depth: 0.25 m) = 749 850m ³ , or						
- Arable ('topsoiling' depth: $0.60m$) = 1 799 640m ³ .						
Given that 16.87 ha of 'topsoil' 'stockpiles' (23 dumps: 11.1	ha; 16 piles: 2	.40 ha; and 11 banks:				
3.29 ha) exist in the survey area, and assuming an average s	ckpile height o	f 2.5m (estimate since				
height was not measured), then approximately 421 750n	of previously	y stockpiled 'topsoil'				
material is available for rehabilitation purposes.						
This volume represents approximately 93.7 %, 56.2	and 23.4 %	of that required to				
rehabilitate to the wilderness, grazing and arable	capability clas	ss depth standards				
respectively.						
The stated End Land Capability for HERNIC is planned	be the Cham	ber of Mines Grazing				
Capability class. Thus stockpiled 'topsoil' is in critically sh	t supply and r	nust thus be stripped				
elsewhere on the property and transported to where it is red	ired. For furthe	r details regarding the				
aforementioned refer to the strinning method discussed in t	last naragranh	of Section 8.2.11 (Soil				
Itilisation [Strinning] Guide)	last paragraph					
ounsation [ourpping] duide].	<u> </u>					
Impact AFTER Management Minor Short T	m Site	Low	Possible	Low	-	High



Table 9.3(g): Geology Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Pelletizing and Sintering Plants 1 & 2 – ASPECT: Structure/Complex – IMPACT DESCRIPTION: Sterilization of mineral resources due to the existence of infrastructure at the surface on potential future mining areas.											
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confider										
Impact BEFORE Management	Minor	Short Term	Site	Low	Unlikely Low - High						
Management Measures				Time Period for Implementation Compliance v			nce with Standards				
Measure 1: Relevant engineers to decommissioned and removed from	Decommissioning Phase		No								
Impact AFTER Management	Minor Short Term Site Low Unlikely Low - Hi							High			

ACTIVITY: Furnaces 1, 2, 3 and 4 – ASPECT: Structure/Complex – IMPACT DESCRIPTION: Sterilization of mineral resources due to the existence of infrastructure at the surface on potential future mining areas.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Short Term	Site	Low	Unlikely	Low	-	High			
Management Measures					Time Period for Implementation Compliance with Standa						
Measure 1: Relevant engineers to and removed from site as planned	Decommi	issioning Phase	No								
Impact AFTER Management	Minor	Short Term	Site	Low	Unlikely	Low	- High				



Table 9.3(h): Groundwater Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Fuel Supply- ASPECT: Diesel Fuel Tanks- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to spillages and infiltration of fuel (hydrocarbons) from the fuel tanks.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Period f	or Implementation	Compliance with Standards					
Measure 1: Responsible person evidence of potential spillages / l	nel to inspect th eaks. (Source Co	ne Diesel Fuel Tar ntrol Measure)	iks and Co	llection Sumps for	Con	tinuously	No				
Measure 2: Any leaks and spillag area is to be cleaned up according	Immediately. Within 1 day of recorded leak / spillage.		No								
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Internal Roads- As contaminated water used for du	ACTIVITY: Internal Roads- ASPECT: Dust Suppression- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of contaminated water used for dust suppression on internal road surface.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High				
Management Measures					Time Period f	or Implementation	Compliance with Standards					
Measure 1: No process water she from the underground workings abstraction boreholes (once treat (Source Control Measure)	Continuously		Yes (Water Use Licence)									
Measure 2: Monitor & report th dust suppression. (Source Control	e quality (quart Measure)	erly) and quantity	of water used for	Quarterly and Monthly		Yes (Water Use Licence)						
Measure 3: Continue monitoring	the groundwate	r resource quality.	Quarterly		Yes (Water Use Licence)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High				



ACTIVITY: Morula Mining Opencast Operation- ASPECT: Backfilling of Open Void with Waste Rock- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of leachable contaminants from the waste rock which is backfilled in the open voids into the adjacent aquifers.												
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Definite	Medium	-	High				
Management Measures					Time Period f	or Implementation	Complia	nce with Standards				
Measure 1: Drill and construc opencast pits once backfilled with the water in the rehabilitated pit.	Immediately after rehabilitation		No									
Measure 2: Monitor groundwa boreholes adjacent to the rehability	ter resource qu itated opencast p	ality at dedicated its. (Resource Dire	weathered cted Measu	d zone monitoring 1re)	Quarterly (or as s	pecified in the amended WUL).	Yes (Water Use Licence)					
Measure 3: Any adverse trend monitoring boreholes are to be specific groundwater remediation	ds in the grour reported and as plan. (Resource	ndwater quality r ssessed, followed Directed Measure	Immediately if/when identified.		Yes (National Water Act)							
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High				

ACTIVITY: OB Plant Fines in Open Pit (Slurry)- ASPECT: Disposal of OB plant Fines in Open Pit- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of leachable contaminants from the OB Plant Fines which is backfilled in the open voids into the adjacent aquifers.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High			
Management Measures					Time Period f	or Implementation	Compliance with Standards				
Measure 1: Drill and construct opencast pits once backfilled wi rehabilitated pit. (Source Control	t groundwater 1 th OB Plant Fin Measure)	nonitoring boreho es, to monitor the	Immediately	after rehabilitation	No						
Measure 2: Monitor groundwat boreholes adjacent to the rehabilities of the rehabilit	ter resource qua tated opencast p	ality at dedicated its. (Resource Dire	l zone monitoring re)	Quarterly (or as s	pecified in the amended WUL).	Yes (Water Use Licence)					
Measure 3: Any adverse trend monitoring boreholes are to be specific groundwater remediation	ls in the groun reported and as plan. (Resource	dwater quality r sessed, followed l Directed Measure	Immediately	if/when identified.	Yes (National Water Act)						
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			



ACTIVITY: OB Plant Coarse Waste in Open Pit (Trucks)- ASPECT: Disposal of OB Plant Coarse Waste in Open Pit- IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of leachable contaminants from the OB Plant Coarse Waste which is backfilled in the open voids into the adjacent aquifers.

	Magnitude	Duration	Scale	Consequence	Probability	ty SIGNIFICANCE		Confidence
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High
Management Measures	•	-	Time Period f	or Implementation	Compliance with Standards			
Measure 1: Drill and construct opencast pits once backfilled wire rehabilitated pit. (Source Control	groundwater n ith OB Plant Fin Measure)	nonitoring boreho es, to monitor the	Immediately	after rehabilitation	No			
Measure 2: Maintain the water within the adjacent aquifers. (Sou	level in the pit a arce Control Mea	at depths below th sure)	Con	tinuously	No			
Measure 3: Monitor groundwat boreholes adjacent to the rehabil	zone monitoring ıre)	Quarterly (or as s	pecified in the amended WUL).	Yes (Water Use Licence)				
Measure 4: Any adverse trend monitoring boreholes are to be specific groundwater remediation	ls in the groun reported and as n plan. (Resource	dwater quality re sessed, followed b Directed Measure	Immediately	if/when identified.	Yes (National Water Act)			
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High

ACTIVITY: Abstraction Boreholes- ASPECT: Cone of Depression- IMPACT DESCRIPTION: Depletion in the quantity of groundwater and the formation of a groundwater cone of depression in the aquifer(s) adjacent to the groundwater abstraction boreholes.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Short Term	Local	Low	Definite	Medium	-	High		
Management Measures				Time Period	for Implementation	Compliance with Standards				
Measure 1: Only abstract the au abstraction boreholes. (Resource	thorised volume Directed Measur	e of groundwater e)	Со	ntinuously	Yes (Water Use Licence)					
Measure 2: Optimise the abstract abstraction volumes remain consi	Со	ntinuously	No							
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High		



ACTIVITY: Abstraction Boreholes- ASPECT: Removal of Contaminants from Aquifer – IMPACT DESCRIPTION: Improvement to the groundwater resource quality due to the removal of contaminants from the weathered zone aquifers by pumping groundwater from selected groundwater remediation abstraction boreholes.										
	Magnitude	Duration	Scale	Consequence	Probability	Confidence				
Impact BEFORE Management	Moderate +	Long Term	Local	Medium	Definite	Medium	+	High		
Management Measures				Time Period fo	nce with Standards					
Measure 1: Optimise the abstra daily abstraction volumes remain	ction of ground consistent and c	water from each o lo not fluctuate. (F	Cont	inuously	No					
Measure 2: Abstract the author abstraction boreholes. (Resource	Cont	inuously	Yes (Water Use Licence)							
Impact AFTER Management	Minor +	Long Term	Local	Medium	Definite	Medium	+	High		



Table 9.3(i): Surface Water Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Decommissioning of two Historic Slimes Dams – ASPECT: Excavate Historic Slimes – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to capturing of direct rainfall and polluted water within the bunded area around the slimes dam.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High		
Management Measures				Time Period	for Implementation	Compliance with Standards				
Measure 1: Minimising interception of surface water by isolating slimes dams area and diverting water around the slimes dams.						Construction Phase None applie				
Measure 2: Operate excavation with sufficient bund walls to prevent spillages.					Construction Phase		None applicable.			
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	+	High		

ACTIVITY: Decommissioning of two Historic Slimes Dams – ASPECT: Transport Historic Slimes to H:H Slimes Dam – IMPACT DESCRIPTION: Contamination of the surface water resource due to contaminated run-off from spillages of slimes on access roads during decommissioning of slimes dams.										
	Magnitude	Duration	Scale	Consequence Probability SIGNIFICANCE +/- Confidence						
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High		
Management Measures						l for Implementation	Compliance with Standards			
Measure 1: Close transport truck	ks with tarpauli	in sheet during tra	ansport.		Construction Phase			None applicable.		
Measure 2: Clean road surfaces and storm water ditches on regular basis.					Construction Phase		None applicable.			
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	+	High		

ACTIVITY: Decommissioning of Phase 1 of the H:H Slimes Dams – ASPECT: Capping of H:H Slimes Dam – IMPACT DESCRIPTION: Increase in quantity of clean surface water due to capturing of direct rainfall from capped portion of slimes dam.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High		
Management Measures				Time Period for Implementation			Compliance with Standards			
Measure 1: Divert surface run-or into HH PCD.	a stormwa	Constr	uction Phase	HDPE supplier specification.						
Impact AFTER Management	Moderate+	Long Term	Local	Low	Definite	Medium	+	High		


ACTIVITY: Decommissioning of Phase 1 of the H:H Slimes Dams – ASPECT: Capping of H:H Slimes Dam – IMPACT DESCRIPTION: Increase in quality of water run-off to natural environment as capping of slimes dam progress.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High		
Management Measures					Time Period f	or Implementation	Compliance with Standards			
Measure 1: Divert surface run-of into HH PCD.	portion of dam via	a stormwa	Construction Phase HDPE supplier specifica		HDPE supplier specification.					
Impact AFTER Management	Moderate+	Long Term	Local	Low	Definite	Medium	+	High		

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT: Re-vegetate – IMPACT DESCRIPTION: Increase in quantity of clean surface water due to releasing of direct rainfall from rehabilitated dam.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Definite	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Divert surface run-of environment.	ated portion of da	am into na	Construction Phase None applicable.		None applicable.					
Impact AFTER Management	Minor+	Short Term	Local	Low	Possible	Low	+	High		

ACTIVITY: Internal Roads – ASPECT: Gravel Hard Surfaces – IMAPCT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on internal roads, as well as the capture of contaminated storm water run-off in Pollution Control Dams.											
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period f	or Implementation		Compliance with Standards			
Measure 1: Remove all dirty was	dispose in oper	ı cast.		Decommi	ssioning Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 2: Ripping to minimum abandoned surfaces.	150mm depth o	f all hard surface	es and dise	cing of	Decommissioning Phase			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: Monitor surface rund	y.		Annually durin	g Decommissioning Phase	Water Use Licence water quality						
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely	Low	-	High			



ACTIVITY: Internal Roads – ASI areas" directly into the surface	ACTIVITY: Internal Roads – ASPECT: Gravel Hard Surfaces – IMPACT DESCRIPTION: Contamination of the surface water resource due to contaminated run-off from "dirty areas" directly into the surface water resources and/or spillages of contaminated water from tanks, sumps, pipes and dams.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High				
Management Measures					Time Period fo	or Implementation		Compliance with Standards				
Measure 1: Remove all slag wast	d polluted soil &	a dispose	in open cast.	Decommi	ssioning Phase	e DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Measure 2: All sumps, CRP PCD, demolished, dismantled and remo	pressure pipe lin oved.	es, tanks & infra	structure	to be	Decommissioning Phase A		Approved Rehabilitation Objectives					
Measure 3: Ripping to minimum abandoned surfaces.	150mm depth of	f all hard surface	es and dise	cing of	Decommi	ssioning Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 4: Concrete SW Drains	PCD2s to rema	in & main	Up to Ult decom	imate stage of missioning	Water Use Licence water quality							
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely	Low	-	High				

ACTIVITY: Primary CRP – ASPECT: Current Arising Slag Loading/Crushing and Screening Plant/Stockpiling of Product/Stockpiling of Waste – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the new PCD2.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures				Time Period	for Implementation		Compliance with Standards	
Measure 1: Remove all stockpile	s (slag & waste sl	ag) sell and/or	dispose in	open cast.	Decomm	issioning Phase	E	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives
Measure 2: Dismantle Demolish	and removed Pla	nt/Process infra	astructure	!	Decommissioning Phase Approved Rehabilitation Objective			Approved Rehabilitation Objectives
Measure 3: Ripping to minimum discing of abandoned surfaces.	150mm depth of	f all hard surface	es and leve	elling with	Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Concrete SW Drains	PCD2s to rema	in & main	tained	Up to Ultimate stage of decommissioning		Water Use Licence water quality		
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely	Low	-	High



ACTIVITY: Primary CRP – ASPE from the new PCD2 located in o	ACTIVITY: Primary CRP – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the new PCD2 located in drainage area A3.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High				
Management Measures					Time Period for	Implementation	Com	Confidence High DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives eg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998) Water Use Licence water quality				
Measure 1: Clean-up of all dirty a material stockpiles.	of coarse and fi	ne slag an	d waste slag	Decommissioning Phase DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives								
Measure 2: Re-instate free drain hard surfaces and discing.	pping to minim	um 150m	m depth of all	Decommis	ssioning Phase	Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)					
Measure 3: Monitor runoff water	r quality in SW P	CD2			Decommis	ssioning Phase		Water Use Licence water quality				
Measure 4: Remove dam liner ar		Up to Ultimate stage of decommissioning Water quality complies		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives								
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely	Low	-	High				

ACTVITY: Upgrading of the CRP Process Water Dam (RWD) – ASPECT: Storage of Process Water - IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the new PCD2.										
	Magnitude	Duration	Scale	Consequence	Consequence Probability SIGNIFICANCE +/- Confid					
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures				Time Period	for Implementation		Compliance with Standards			
Measure 1: Recycle process wate	er to TSF or allow	v to evaporate.			Decomn	nissioning Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Remove all sediment	ts and silts from t	he CRP RWD wh	nen dry an	ıd dispose at	Decomn	Decommissioning Phase DME Mine Rehabilitat Approved Rehabilita				
Measure 3: Demolish concrete d n.g.l.	.l. and dispose a	t open cas	Decomn	nissioning Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: SW Canal System – A direct rainfall generated in dra	ACTIVITY: SW Canal System – ASPECT: Reduction of Run-off to Natural Resource – IMAPCT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated in drainage area A1, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation		Compliance with Standards			
Measure 1: Clean-up of all dirty a material stockpiles.	of coarse and fin	ne slag an	d waste slag	Decomr	nissioning Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 2: Re-instate free drain hard surfaces and discing. Follow	pping to minimu s. Vegetate area	ım 150mı s.	m depth of all	Decomr	nissioning Phase	I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)				
Measure 3: Demolish concrete S soil from berms.	surface a	Up to U decc	Up to Ultimate stage of decommissioningDME Mine Rehabilitation Requirem Approved Rehabilitation Objectiv								
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Coarse Slag at the CRP – ASPECT: Screening Plant/ Stockpiling of Coarse Slag – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at the screening plant, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High	
Management Measures					Time Period	for Implementation	Compliance with Standards		
Measure 1: Abandon all screening slag and waste slag materials and	ng activities. Clea l stockpiles.	n-up yard by rer	noval of c	oarse and fine	Decomn	nissioning Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Re-instate natural su	irfaces by dismar	tling & demolis	hing plant	infrastructure.	Decommissioning Phase DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 3: Re-instate free drain hard surfaces and discing. Follow >5% install contour berms 1m hi	ipping to minim rs. Vegetate area v gradient.	um 150m s. Local sı	Decomn	nissioning Phase	I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High	



ACTIVITY: Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Slag – ASPECT: Feed Material from CRP – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at the feed material process, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures	for Implementation		Compliance with Standards							
Measure 1: Abandon all screening slag and waste slag materials and	n-up yard by rer	noval of c	oarse and fine	Decommissioning Phase DME Mine Rehabilitation Requirement Approved Rehabilitation Objectives			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Re-instate natural su	irfaces by dismar	tling & demolis	hing plant	infrastructure.	Decomn	nissioning Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Re-instate free drain hard surfaces and discing. Follov >5% install contour berms 1m hi	ipping to minim rs. Vegetate area v gradient.	um 150m s. Local sı	Decomn	nissioning Phase	I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Fuel Supply/Offices/Finished Product Plant/Wash Bay – ASPECT: Tanks/Impermeable Areas/Storage of Final Product/Truck Wash – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated in these areas, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High	
Management Measures					Time Period for Implementation Compliance with Standards				
Measure 1: Dismantle, Recover r	naterials from pl	ant infrastructui	e & build	ings and	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements		
remove from site.									
Measure 2: Demolish and clear c	ivil services, infr	astructure and c	oncrete p	aved surfaces	Decommissioning Phase Approved Rehabilitation Objectives			Approved Rehabilitation Objectives	
and dispose at Open Cast.									
Measure 3: Re-instate free drain hard surfaces and discing. Follow >5% install contour berms 1m hi	ing surfaces by r v natural contour gh and 1-2% flov	ipping to minimu rs. Vegetate area v gradient.	um 150mı s. Local sı	Decomn	nissioning Phase	I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)		
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High	



ACTIVITY: Groundwater Treatment Plant - ASPECT: Settling Pond A & B - IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the ponds.										
	Magnitude	Duration	Scale	Consequence	Probability SIGNIFICANCE			Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation	- High Compliance with Standards DME Mine Rehabilitation Requirements WUL requirements			
Measure 1: Old Slimes Dams rem	noval and clearin	g to be complete	d first.		Prior to Dec	ommissioning Phase	DME Mine Rehabilitation Requirements			
Measure 2: Monitor groundwate	er quality to confi	rm water quality	y complyi	ng.	Prior to Dec	ommissioning Phase		WUL requirements		
Measure 3: Demolish treatment existing topsoil stockpiles.	dams 1m below s	surface and back	fill with s	oil from	Decommissioning Phase DME Mine Rehabilitation Requirem Approved Rehabilitation Objective			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 4: Reinstate surface to l	and vegetate.		Decomn	Decommissioning Phase DME Mine Rehabilitation Req Approved Rehabilitation Ob Reg No. GN 704 (National Water A No.36 Of 1998)		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTVITY: Sand at the Fine Slag Processing Plant – ASPECT: Screening and Separation Plant/Spiral Plant/Fine Chrome Bin/Slag Sand – IMAPCT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these processes, as well as the capture of contaminated storm water run-off in the water recovery sumps.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High	
Management Measures				Time Period	for Implementation	Compliance with Standards			
Magura 1. Clean up ward by ray	noval of fino clas	cand stockmiles			Decommissioning Phase DME Mine Rehabilitation Requirements				
Measure 1: Clean-up yard by ren	noval of fille stag	sand stockpries.			Decomin	lissioning Phase		Approved Rehabilitation Objectives	
Maasura 2. Bo instato patural su	urfaces by dismar	tling & domolia	hing plant	infractructure	Decommissioning Phase DME Mine Rehabilitation Requirements			OME Mine Rehabilitation Requirements	
Measure 2: Re-instate natural st	infaces by distilat		ning plain	innasti uctui e.	Decomin	lissioning Fliase		-/- Confidence - High Compliance with Standards DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Requirements Approved Rehabilitation Requirements Approved Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Objectives Reg No. GN 704 (NATIONAL WATER ACT, 1998 (ACT NO.36 OF 1998) - High	
							Ι	OME Mine Rehabilitation Requirements	
Measure 3: Re-instate free drain	ing surfaces by r	ipping to minim	um 150m	m depth of all	Decema	Approved Rehabilitation			
hard surfaces and discing. Follow	v natural contour	rs. Vegetate area	s.		Decomin	lissioning Phase	Reg	No. GN 704 (NATIONAL WATER ACT, 1998	
					(ACT NO.36 OF 1998)			(ACT NO.36 OF 1998)	
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High	



ACTIVITY: Sand at the Fine Slag Processing Plant – ASPECT: Water Recovery Sumps – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the water recovery sumps.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Remove plant, demo	lish concrete sı	imps and plinths 1	lm below	n.g.l.	Decomm	nissioning Phase	I	Confidence High Compliance with Standards DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives g No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998) Approved Rehabilitation Objectives High		
M easure 2: Re-instate free drain hard surfaces and discing. Follov	ing surfaces by v natural conto	ripping to minimu urs. Vegetate area	um 150mı s.	m depth of all	Decomm	nissioning Phase	I Reg	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)		
Measure 3: SW PCD 2 and canal	aintained until are	ea has bee	n rehabilitated.	Ultimate stage	e of decommissioning		Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Fuel Supply/Contractors Transport Yard/Raw Materials Stockpile Area 2 – ASPECTS: Tanks/Earth Surface Yard/Storage of Raw Materials – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.										
	Magnitude	SIGNIFICANCE	+/-	Confidence						
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Remove tanks and m	oveable transp	ort infrastructure	from area	a.	Decommissioning Phase DME Mine Rehabilitation Requirement Approved Rehabilitation Objectives			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Clear and remove all	raw materials	stockpiles.			Decommissioning Phase DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Measure 3: Demolish and clear s plinths and dispose at Open Cast.	services, infrast	ructure and concr	ete paved	surfaces with	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 4: Re-instate free drain minimum 150mm depth of all ha areas	grading level une discing. Follow n	venness, i iatural coi	Decomn	nissioning Phase	I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)				
Impact AFTER Management Minor Short Term Local Low Unlikely Low - High							High			



ACTIVTY: Development of Storm Water PCD No. 2 – ASPECT: Storage of Run-off Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from PCD2.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-							Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Allow intercepted wa vegetation to establish. Excess w	ater to evapora ater to be pum	te Use water for ped to TSF for eva	dust supp poration.	pression and	Decomm	nissioning Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Remove SW PCD 2 of Remove membrane liner and bac basin excavation stockpiles. Leve	chment area has t ession with soil fr ce and vegetate	oeen rehal om walls	bilitated. and adjacent	Up to U deco	ltimate stage of mmissioning	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Offices/General Plant Infrastructure/Redundant Historic Bag Plant/Old Salvage Yard – ASPECT: Impermeable areas/footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Dismantle, Recover r remove from site.	naterials from	plant infrastructu	re & build	ings sell and or	Decomn	nissioning Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Demolish and clear s dispose at Open Cast.	ervices, infrast	ructure and concr	ete paved	surfaces and	Decomn	nissioning Phase	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Re-instate free drain hard surfaces and discing. Follov >5% install contour berms 1m hi	ing surfaces by v natural conto gh and 1-2% flo	ripping to minim urs. Vegetate area ow gradient.	um 150m s. Local sı	m depth of all arface gradients	Decommissioning Phase		I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)		
Measure 4: Allow intercepted was dust suppression and vegetation evaporation.	ater from SW P to establish. Ex	CD 1A and 1B to e access water to be j	vaporate. pumped to	. Use water for o TSF for	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 5: Remove SW PCD 1A Remove membrane liner and bac clean material stockpiles. Level &	& 1B once upsl kfill basin depr & grade surface	ope catchment are ession with soil fr and vegetate	ea has bee om walls	n rehabilitated. and available	Up to Ultimate stage of decommissioning		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Pelletizing and Sinter	ring Plants 1	& 2/Furnaces 1, 2	2, 3 and 4	- ASPECT: Struc	ture/Complex	- IMPACT DESCRIPTIO	V: Dep	pletion in the quantity of surface water	
due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A									
and 1B.									

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Dismantle, Recover r remove from site.	naterials from j	plant infrastructu	re & build	ings sell and or	Decomn	nissioning Phase	Ι	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Demolish and clear s depth of 1m below n.g.l. and disp	ervices, infrast ose at Open Cas	ructure and concr st.	ete paved	surfaces to a	Decommissioning Phase DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Re-instate free drain hard surfaces and discing. Follov >5% install contour berms 1m hi	ing surfaces by v natural conto gh and 1-2% flo	ripping to minim urs. Vegetate area ow gradient.	um 150m s. Local su	m depth of all urface gradients	Decomn	nissioning Phase	I Reg	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)		
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Ferrochrome Break Floor Area – ASPECT: Ferrochrome Break Floor Area – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.

i di certainan generatea on the imperindane a cas, as wen as the captare of containnated storm water run on in the appraaca storm water r ob in and ib.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation	Compliance with Standards				
Measure 1: Demolish and clear s depth of 1m below n.g.l. and disp	ervices, infrast ose at Open Ca	ructure and concre st.	ete paved	surfaces to a	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 2: Re-instate free drain minimum 150mm depth of all ha areas. Local surface gradients >5	ressions a atural cor and 1-2%	nd ripping to itours. Vegetate flow gradient.	Du Decom	nmissioning Phase	I Reg	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)					
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			



ACTIVITY: Raw Materials Stockpile Area/Mixed Material Stockpiling and Screening 1/Returns Materials Stockpile 2 – ASPECT: Storage of Materials – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.										
	+/-	Confidence								
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standard										
Measure 1: Demolish and clear s depth of 1m below n.g.l. and disp	ervices, infrast ose at Open Cas	ructure and concr st.	ete paved	surfaces to a	Decommissioning Phase DME Mine Rehabilitation Requirement Approved Rehabilitation Objectives			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Remove and clear all	materials stoc	kpiles by selling o	r dispose	to open cast.	Decommissioning Phase DME Mine Rehabilitation Require Approved Rehabilitation Object			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Re-instate free drain minimum 150mm depth of all ha areas. Local surface gradients >5	ickfilling local dep discing. Follow n ur berms 1m high	pressions a natural con and 1-2%	Decomn	nissioning Phase	Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)				
Impact AFTER Management Minor Short Term Local Low Unlikely Low - High							High			

ACTIVITY: Ore Beneficiation Plant – ASPECT: Transport of Ore/Crushing and Screening/ HMS Waste Material – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B2.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures				Time Period for Implementation Compliance with Standards						
Measure 1: Remove plant infrast foundations to a depth of 1m below	tructure, demol ow n.g.l. and dis	ish services and c pose at Open Cas	oncrete p t.	linths &	Decomn	nissioning Phase	D	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Remove and clear all cast.	l materials, was	te and slag stock	oiles and c	lispose to open	Decommissioning Phase DME Mine Rehabilitation Requiremen Approved Rehabilitation Objectives			ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Re-instate free drain minimum 150mm depth of all ha areas. Local surface gradients >5	ing surfaces, ba rd surfaces and % install contou	ckfilling local dep discing. Follow r ır berms 1m high	oressions natural con and 1-2%	Decomn	nissioning Phase	D Reg N	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives o. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: PGM Plant – ASPECT these processes and plant, as w	ACTIVITY: PGM Plant – ASPECT: Pumping of PGM Feed Material – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B2.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	Confidence				
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation	tation Compliance with Standards				
Measure 1: Remove plant & proc plinths & foundations to a depth	cessing infrastr of 1m below n.g	ucture, demolish s g.l. and dispose at	ervices an Open Cast	nd concrete t.	Decomm	nissioning Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Remove and clear all	and dispose to op	en cast.		Decomm	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Measure 3: PGM Platform mater open cast rehabilitation.	ial should be us	sed to backfill PCD	basins ar	nd excess for	Decomm	nissioning Phase					
Measure 4: Re-instate free drain surfaces and discing. Follow nate	oping to minimum egetate areas.	150mm (Decomm	Decommissioning Phase Decommissioning Phase Decommissioning Phase No. GN 704 (National Water No. 36 Of 1998)		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)					
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Mixed Material Stockpiling and Screening/Slag Stockpiling Areas – ASPECT: Storage of Mixed Materials/Slag – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these materials, as well as the capture of contaminated storm water run-off in the new storm water PCD3.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures Time Period for Implementation Compliance											
Measure 1: Use stockpiles (Mixe backfilling.	d Material, Slag	& Arising's) to re	habilitate	d open cast by	Decomn	nissioning Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Remainder of stockp and minimised footprints.	iles to be conso	lidated and shape	ed to stabl	e side slopes	Decommissioning Phase DME Mine Rehabilitation Requirem Approved Rehabilitation Objective			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: SW PCD 3 to be main footprints.	tained to inter	cept runoff from t	he remain	der of stockpile	Decomn	nissioning Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 4: Install additional clearer containing these remnants of	an water divers of stockpiles.	sion berms and dra	ains to rec	luce affected	Decomn	Decommissioning Phase Decommissioning Phase Decommissioning Phase Decommissioning Phase Decommission Phase Decommis Phase Decommission Phase Decom		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management Minor Short Term Local Low Unlikely Low							-	High			



ACTIVITY: Development of Storm Water PCD No. 3 – ASPECT: Storage of Run-off Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from PCD3.										
	Magnitude	SIGNIFICANCE	+/-	Confidence						
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Allow intercepted way vegetation to establish. Excess w	ater to evapora ater to be pum	te Extract water ped to TSF for eva	for dust s poration.	uppression and	Decomm	nissioning Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Remove SW PCD 3 or intercepted runoff demonstrates backfill basin depression with so Level & grade surface and vegeta	chment area has h standards. Remo d adjacent basin e	been rehal ve membr excavation	bilitated and rane liner and a stockpiles.	Up to U deco	ltimate stage of mmissioning	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: H:H Slimes Dam and Return Water Dam – ASPECT: RWD (Return Water Dam) – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated in drainage area A6, as well as the capture of slimes dam leachate in the RWD.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures				Time Period	for Implementation		Compliance with Standards DME Mine Rehabilitation Requirements			
Measure 1: Maintain and monitor surrounding security fence.	or site including	access control an	d warning	g signage on	Decommissioning Phase DME Mine Rehabilitation Requiremen Approved Rehabilitation Objectives			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Monitor liner conditi	ion, water level	& water quality in	n RWD.		Decomm	Decommissioning Phase Class A liner performance		Class A liner performance		
Measure 3: Monitor groundwate	firm liner efficien	cy.		Decomm	Decommissioning Phase		WUL quality limits			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: H:H Slimes Dam and Return Water Dam – ASPECT: RWD (Return Water Dam) – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the RWD.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation		Compliance with Standards			
Measure 1: Monitor water level	& water quality	in RWD.			Decomn	nissioning Phase		/- Confidence - High Compliance with Standards Class A liner performance Effectiveness of Diversion to Reg No. GN 704 National Water Act, 1998 (Act No.36 Of 1998) National Norms & Standards for disposal of waste to land fill No. R.636 (NEMA: Waste Act No. 59 of 2008)			
Measure 2: Monitor & maintain RWD	clean runoff di	iversion drains di	recting ru	unoff away from	Decomn	nissioning Phase	Effe (Nat	ectiveness of Diversion to Reg No. GN 704 ional Water Act, 1998 (Act No.36 Of 1998)			
Measure 3: Only old seep drains	from capped H	H Slimes Dam to o	lischarge	to RWD.	Pre Decon	nmissioning Phase	Na was	tional Norms & Standards for disposal of te to land fill No. R.636 (NEMA: Waste Act No, 59 of 2008)			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Morula Mining Shaft Complex & Offices – ASPECT: Ore/Waste Rock Transfer House – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new Morula Storm Water PCD.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures				Time Period	for Implementation	Compliance with Standards				
Measure 1: Clear surrounding su	urfaces of all ore	e or rock material	s and disp	ose at opencast	Decomn	nissioning Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Dismantle, demolish clearing surfaces and remove.	all build infrast	tructure & founda	tions to 1	m below n.g.l.	Decommissioning Phase DME Mine Rehabilitation Requiremen Approved Rehabilitation Objectives			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Re-instate free drain hard surfaces and discing. Follow	ripping to minim urs. Vegetate area	um 150m s.	Decomn	nissioning Phase	Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Morula Mining Shaft Complex & Offices - ASPECT: Water Storage Dams - IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Water Storage Dams.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE							+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Demolish storage dat surfaces and remove.	ms with base fo	oundations to 1m b	oelow n.g.	l. clearing	Decomn	nissioning Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Re-instate free drain hard surfaces and discing. Follow	ripping to minimu urs. Vegetate area	um 150mi s	m depth of all	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Morula Mining Shaft Complex & Offices - ASPECT: Water Storage Dams - IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the Storage Dams. Magnitude Probability SIGNIFICANCE +/-Confidence Duration Scale Consequence Impact **BEFORE** Management Minor Long Term Local Medium Possible Low -High

impact Dir ond i hanagement		Long rorm	Boodi		1 0001010	2011		8		
Management Measures					Time Period	for Implementation		Compliance with Standards DME Mine Rehabilitation Requirements American Objections		
Measure 1: Complete water treat	tment process.	Empty treated wa	ater from S	Storage Dams	Decomm	issioning Phase	Γ	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
and use for dust suppression and	watering of ve	getation						Approved Rehabilitation Objectives		
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Morula Mining Opencast Operation – ASPECT: Water Abstraction and Pipelines – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the

capture of un ect rannan generated at these at eas.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High			
Management Measures					Time Period for Implementation Compliance with Standards						
Measure 1: Dismantle, uninstall and remove all pipe systems. Demolish and remove concrete plinth up to 1m below n.g.l.						nissioning Phase	E	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			



ACTIVITY: Morula Mining Accommodation – ASPECT: Impermeable Area – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE							Confidence		
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Dismantle, demolish clearing surfaces and remove.	all build infras	tructure & founda	tions to 1	m below n.g.l.	Decommissioning Phase DME Mine Rehabilitati Approved Rehabilitati			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Re-instate free drain hard surfaces and discing. Follov	ripping to minim urs. Vegetate area	um 150m s.	Decomn	nissioning Phase	I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Mine Sewage Plant – ASPECT: Sludge Drying Beds – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Sludge Drying Beds.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High	
Management Measures			Time Period	for Implementation		Compliance with Standards			
Measure 1: Clear sludge from be Cast.	ds and demolis	h concrete beds. I	Dispose co	ncrete at Open	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Re-instate free drain hard surfaces and discing. Follov	um 150m s.	m depth of all	Decomn	nissioning Phase	I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High	



ACTIVITY: Mine Waste Rock Dump – ASPECT: Storage of Waste Rock on un-lined footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new Morula Storm Water PCD.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE									
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High		
Management Measures		for Implementation		Compliance with Standards						
Measure 1: Complete crushing a	nd selling of wa	ste rock.			Decomn	nissioning Phase	Ι	DME Mine Rehabilitation Requirements		
Measure 2: Clear remainder of w	vaste rock and o	lispose at Open C	ast.		Decomn	nissioning Phase	DME Mine Rehabilitation Requirements			
Measure 3: Re-instate free drain hard surfaces and discing. Follow	ripping to minim urs. Vegetate area	um 150m s.	Decomn	nissioning Phase	I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Re-Use of Mine Waste Rock at the Mine Waste Rock Stockpile – ASPECT: Crushing and Screening Plant A7B Stockpiling of Waste Rock Product – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new Morula Storm Water PCD

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High
Management Measures				Time Period for ImplementationCompliance with Standards			Compliance with Standards	
Measure 1: Complete crushing a	iste rock.			Decomn	nissioning Phase	DME Mine Rehabilitation Requirements		
Measure 2: Clear remainder of w	lispose at Open Ca	ast.		Decomn	Decommissioning Phase DME Mine Rehabilitation Require			
Measure 3: Remove all crushing	plant from site	. Demolish all con	crete plint	ths and basis.	Decomn	nissioning Phase	Ι	OME Mine Rehabilitation Requirements
Measure 4: Level stockpile isolat	tion berms.				Decommissioning Phase DME Mine Rehabilitation Re			OME Mine Rehabilitation Requirements
Measure 5: Re-instate free drain hard surfaces and discing. Follow	ripping to minim urs. Vegetate area	um 150mı s.	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High



ACTIVITY: Morula SW PCD – ASPECT: Storage of U/G Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the Morula Dewatering Dam.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Medium	Possible	Low	-	High		
Management Measures			Time Period	for Implementation		Compliance with Standards				
Measure 1: First Water Storage I catchment and SW drains to be re	Dams to be dec ehabilitated as	ommissioned as ir indicated.	ndicated. I	Jpslope	Decomn	nissioning Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Allow intercepted way vegetation to establish. Excess w	ater to evapora vater to be pum	te Use water for ped to TSF for eva	dust supp poration.	pression and	Up to U deco	ltimate stage of mmissioning	te stage of DME Mine Rehabilitation Requirement ssioning Approved Rehabilitation Objectives			
Measure 3: Remove membrane l adjacent basin excavation stockp	n with soi egetate.	Up to U deco	ltimate stage of mmissioning	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Morula SW PCD - ASPECT: Storage of U/G Water - Depletion in the quantity of surface water due to the capture of direct rainfall in the Water Storage Dams.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE						+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Medium	Possible	Low	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Allow intercepted wave vegetation to establish. Excess w	te Use water for ped to TSF for eva	dust supp poration.	pression and	Up to U deco	ltimate stage of mmissioning	E	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Remove membrane l adjacent basin excavation stockp vegetate.	ll basin depression ade surface to be f	n with soi free drain	l from walls and ing and	Up to U deco	ltimate stage of mmissioning	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: OB Plant Fines in Open Pit (Slurry) – ASPECT: Disposal of OB plant Fines in Open Pit – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas

the cupture of an ever turned at these areas											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High			
Management Measures					Time Period	for Implementation		Confidence High Compliance with Standards ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives ME Mine Rehabilitation Objectives			
Measure 1: Remnants of fines to or small voids to exist during bac	back fill layers in uld cause eventua	Open Cas	st. No pockets depressions.	Decomn	nissioning Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 2: Open cast to be back indicated.	rofiled, topsoiled	and veget	ated as	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High			



ACTIVITY: OB Plant Coarse Waste in Open Pit (Trucks) – ASPECT: Disposal of OB Plant Coarse Waste in Open Pit – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas.											
	Confidence										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High			
Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Coarse waste to be w No pockets or small voids to exist depressions.	tom zone during b ling that would ca	ackfilling use event	of Open Cast. ual surface	Decomn	nissioning Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 2: Open cast to be back indicated.	rofiled, topsoiled	and veget	ated as	Decomn	nissioning Phase	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	- High				

ACTIVITY: Storage Facility (TSF) and Return Water Dam (RWD) - ASPECT: Disposal to TSF/A11 RWD - IMPACT DESCRIPTION: Depletion in the quantity of surface water										
due to the capture of direct rai	nfall generate	d at these areas,	as well as	s the capture of c	ontaminated st	torm water run-off in t	he RW	/D.		
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Shape crest towards freeboard. Penstocks to be used f	penstocks (Bea for crest draina	iching Profile) wit ge.	h day wal	ls to provide for	Decomn	nissioning Phase	Mini	mum Requirements for Waste Disposal by Landfill, DWA, 1998.		
Measure 2: Rehabilitate crest by 200mm topsoil (GLB+ Landfill ca	covering with pping standard	a turf layer of 450)	mm follov	wed with	Decomn	nissioning Phase	Mini	mum Requirements for Waste Disposal by Landfill, DWA, 1998.		
Measure 3: Side slopes of TSF to geocells) and vegetated.	be erosion pro	tected (soil saver	product a	nd soiled filled	Decomn	nissioning Phase	Mini	mum Requirements for Waste Disposal by Landfill, DWA, 1998.		
Measure 4: Monitor water quality norms. Rehabilitation of RWD to	emove dam when V PCD rehabilitati	quality con.	Decomn	nissioning Phase		WUL water quality limits				
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High		



ACTIVITY: Expansion of the Tai capture of direct rainfall gener	ACTIVITY: Expansion of the Tailings Storage Facility – ASPECT: New extended footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the RWD.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High				
Management Measures					Time Period	for Implementation		Compliance with Standards				
Measure 1: Shape crest towards freeboard. Penstocks to be used f	penstocks (Bea or crest drainag	iching Profile) wit ge.	h day wal	Decomn	nissioning Phase	Mini	Minimum Requirements for Waste Disposal by Landfill, DWA, 1998.					
Measure 2: Rehabilitate crest by 200mm topsoil (GLB+ Landfill ca	covering with a pping standard	a turf layer of 450)	mm follov	wed with	Decomn	nissioning Phase	Mini	imum Requirements for Waste Disposal by Landfill, DWA, 1998.				
Measure 3: Side slopes of TSF to geocells) and vegetated.	be erosion pro	tected (soil saver	product a	nd soiled filled	Decomn	nissioning Phase	Mini	imum Requirements for Waste Disposal by Landfill, DWA, 1998.				
Measure 4: Monitor water qualit norms. Rehabilitation of RWD to	emove dam when V PCD rehabilitati	ı quality c on.	Decomn	nissioning Phase		WUL water quality limits						
Impact AFTER Management	mpact AFTER Management Minor Long Term Local Medium Unlikely Low -					High						

ACTIVITY: Plant Process Water Dam & Silt Trap/OB Plant Return Water Dam/Plant Storm Water Pollution Control Dam (PCD) – ASPECT: Storage of Process Water/Silt – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the silt traps and various process water and pollution control dams.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High
Management Measures				Time Period	for Implementation		Compliance with Standards	
Measure 1: Water in PWDs and	OB Dam should	be isolated and le	ft to evap	orate.	Decomm	nissioning Phase		Approved Rehabilitation Objectives
Measure 2: PWD and OB Dam lin soils.	ners should be	removed and basin	is backfill	ed with wall	Decomm	nissioning Phase		Approved Rehabilitation Objectives
Measure 3: Plant SW PCD 1A & 1 has been cleared, rehabilitated an	LB and feeding nd stabilized	SW drains to be lef	ft until up	slope Area A4	Decommissioning Phase Approved Rehabilitation Objective		Approved Rehabilitation Objectives	
Measure 4: SW PCD 1A & 1B war upslope verges. Excess water lef	ter to be used f t to evaporate o	or dust suppressio or pumped to TSF f	n and irri for evapor	gation of the ration.	Decomn	nissioning Phase		Approved Rehabilitation Objectives
Measure 5: Demolish silt traps a	nd bury in dam	basin prior to bac	kfill.		Up to U deco	ltimate stage of mmissioning		Approved Rehabilitation Objectives
Measure 6: Remove SW PCD 1A Remove membrane liner and bac clean material stockpiles. Level &	ope catchment are ression with soil fro and vegetate	ea has bee om walls a	Up to U deco	ltimate stage of mmissioning	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High



ACTIVITY: Plant Process Water Contamination of the surface w	r Dam & Silt Tr vater resource	ap/OB Plant Ret due to spillages	urn Wate of contar	er Dam/Plant Sto ninated water fr	rm Water Pollu om the various	tion Control Dam (PCI dams listed here.	D) – AS	SPECT: Storage of Process Water
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High
Management Measures				Time Period	for Implementation		Compliance with Standards	
Measure 1: Isolate PWD and OB	Dams from any	runoff.						
Measure 2: Water in PWDs and	OB Dam should	be isolated and le	ft to evap	orate.	Decomm	iissioning Phase		Approved Rehabilitation Objectives
Measure 3: PWD and OB Dam lin soils.	iers should be i	emoved and basin	ıs backfill	ed with wall	Decomm	issioning Phase		Approved Rehabilitation Objectives
Measure 4: Plant SW PCD 1A & 1 has been cleared, rehabilitated an	B and feeding nd stabilized	SW drains to be le	ft until up	slope Area A4	Decomm	issioning Phase		Approved Rehabilitation Objectives
Measure 5: SW PCD 1A & 1B wat upslope verges. Excess water left	ter to be used fo t to evaporate o	or dust suppression or pumped to TSF	on and irri for evapo	gation of the ration.	Decomm	issioning Phase		Approved Rehabilitation Objectives
Measure 6: Demolish silt traps a	nd bury in dam	basin prior to bad	ckfill.		Up to U deco	Up to Ultimate stage of decommissioning Approved Rehabilitation Obj		
Measure 7: Remove SW PCD 1A Remove membrane liner and bac clean material stockpiles. Level &	& 1B once upsl kfill basin depr & grade surface	ope catchment are ession with soil fr and vegetate	ea has bee om walls	n rehabilitated. and available	Up to Ultimate stage of decommissioning DME Mine Rehabilitation Require Approved Rehabilitation Object		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High

ACTIVITY: Expansion of Storm Water PCD No. 1B- ASPECT: Storage of runoff Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the silt traps and various process water and pollution control dams.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High
Management Measures					Time Period	for Implementation		Compliance with Standards
Measure 1: Plant SW drains to be rehabilitated and stabilized	e maintained u	ntil upslope Area A	A4 has bee	en cleared,	Decomn	nissioning Phase		Approved Rehabilitation Objectives
Measure 2: Plant SW PCD 1A & 1 has been cleared, rehabilitated an	B and feeding nd stabilized.	SW drains to be le	ft until up	slope Area A4	Decomn	nissioning Phase		Approved Rehabilitation Objectives
Measure 3: SW PCD 1A & 1B wat upslope verges. Excess water left	ter to be used fo t to evaporate o	or dust suppression or pumped to TSF	on and irri for evapoi	gation of the ration.	Decomn	nissioning Phase		Approved Rehabilitation Objectives
Measure 4: Remove SW PCD 1B Remove membrane liner and bac clean material stockpiles. Level &	once upslope ca kfill basin depr & grade surface	atchment area has ession with soil fr and vegetate	been reh om walls	abilitated. and available	Up to U deco	Up to Ultimate stage of decommissioning DME Mine Rehabilitation Required Approved Rehabilitation Obj		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High



ACTIVITY: Expansion of Storm of contaminated water from PO	ACTIVITY: Expansion of Storm Water PCD No. 1B- ASPECT: Storage of runoff Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from PCD1.											
	Magnitude	Duration	Scale	Consequence	Probability SIGNIFICANCE			Confidence				
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High				
Management Measures					Time Period	for Implementation		Compliance with Standards				
Measure 1: Plant SW drains to be rehabilitated and stabilized.	e maintained ui	ntil upslope Area	A4 has bee	en cleared,	Decomn	nissioning Phase		Approved Rehabilitation Objectives				
Measure 2: Plant SW PCD 1A & 1 has been cleared, rehabilitated an	B and feeding S nd stabilized.	SW drains to be le	ft until up	slope Area A4	Decommissioning Phase Approved Rehabilitation Objectives							
Measure 3: SW PCD 1A & 1B wat upslope verges. Excess water left	ter to be used fo t to evaporate o	or dust suppression r pumped to TSF	on and irri for evapo	gation of the ration.	Decomn	nissioning Phase		Approved Rehabilitation Objectives				
Measure 4: Remove SW PCD 1B Remove membrane liner and bac clean material stockpiles. Level &	once upslope ca kfill basin depr & grade surface	atchment area has ession with soil fr and vegetate	been reh om walls	Up to U deco	ltimate stage of mmissioning	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High				

ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps – ASPECT: Reduction of run-off to Natural Resource – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the silt traps and various process water and pollution control dams.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High
Management Measures				Time Period	for Implementation		Compliance with Standards	
Measure 1: SW drains to be main rehabilitated and are stabilize in	ntained until all terms of erosio	upslope areas ha n vulnerability.	ve been cl	Up to U deco	Up to Ultimate stage of decommissioning DME Mine Rehabilitation Requirement Approved Rehabilitation Objectives			
Measure 2: Demolish concrete S soil from berms or borrow stock	W drains and si piles.	lt traps 1m below	surface a	nd backfill with	Up to Ultimate stage of decommissioningDME Mine Rehabilitation Requirement Approved Rehabilitation Objectives			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives
Measure 3: Re-instate free drain hard surfaces and discing. Follow	ing surfaces by v natural conto	ripping to minim urs. Vegetate area	um 150m s.	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)		
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High



ACTIVITY: Development and Ex DESCRIPTION: Contamination	ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps – ASPECT: Storage of Process Water - IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the canal system and silt traps.											
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE						+/ -	Confidence				
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High				
Management Measures					Time Period	for Implementation		Compliance with Standards				
Measure 1: SW drains to be main rehabilitated and are stabilize in	ntained until all terms of erosio	upslope areas ha n vulnerability.	ve been cl	eared,	Up to Ultimate stage of decommissioningDME Mine Rehabilitation RequirementsApproved Rehabilitation Objectives							
Measure 2: Demolish concrete S soil from berms or borrow stock	W drains and si piles.	lt traps 1m below	surface a	nd backfill with	Up to Ultimate stage of DME Mine Rehabilitation Requirem decommissioning Approved Rehabilitation Objectiv			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 3: Re-instate free drain hard surfaces and discing. Follow	ripping to minim urs. Vegetate area	um 150m s.	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)							
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High				

ACTIVITY: New Salvage Yard – ASPECT: Yard Footprint – IMAPCT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the new storm water PCD4.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High	
Management Measures					Time Period	ne Period for Implementation Compliance with Standards			
Measure 1: Demolish concrete si Open Cast or landfill site.	ilt trap, manholes	s, RC bays and R	C floors ar	nd dispose at	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Reclaim SW pipe sys	stem and remove	from site.			Decommissioning Phase DME Mine Rehabilitation Objectives Approved Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Objectives				
Measure 3: Backfill PCD 4 and le	vel surface.				Decommissioning Phase DME Mine Rehabilitation Requiremer Approved Rehabilitation Objectives			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Re-instate free drain hard surfaces and discing. Follow	ipping to minim s. Vegetate area	um 150m s.	Decomn	nissioning Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)				
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High	



ACTIVITY: Rehabilitated Quarry Area – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall by ponding.												
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	- High					
Management Measures Time Period for Implementation Compliance with Standards												
Management Measures					Time Period	for Implementation		Compliance with Standards				
Management Measures Measure 1: Monitor & maintain	surface cover soi	and vegetation.			Time Period Decomn	for Implementation	Ι	Compliance with Standards OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				

ACTIVITY: Sewage Plant – ASPECT: Sludge Drying Beds – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Sludge Drying Beds.											
	Magnitude	+/-	Confidence								
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High			
Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Clear sludge from be Dispose concrete at Open Cast.	ds and demolish	concrete beds a	nd Treatn	nent Plant.	Decommissioning Phase DME Mine Rehabilitation Require Approved Rehabilitation Object			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas.						nissioning Phase	I Reg	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	+	High			



Table 9.3(j): Plant Life Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT: Dewatering of Dam – IMPACT DESCRIPTION: Possible contamination of surrounding floral habitat due to discharge.												
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Moderate	Short Term	Local	Medium	Medium Possible Medium -							
Management Measures Time Period for Implementation Compliance with Standa												
Measure 1: Ensure that during de	watering of dan	n, no spillage or	discharge o	of dirty water into the			South African Nation	nal Standard (SANS)				
surrounding environment occurs a	and that all dirt	y water is conta	ined and t	reated to the relevant	Constructio	on Phase	241:2011 Drinking Water Standards and					
standards prior to discharge.				Water Use Licence								
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High				

ACTIVITY: Decommissioning of the Morula Dewatering Dam - ASPECT: Removal of contaminated sediment on basin - IMPACT DESCRIPTION: Possible contamination of											
surrounding floral habitat due to spillage of contaminated sediment.											
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible Medium - High						
Management Measures					Time Period for I	mplementation	Compliance with Standards				
Measure 1: Ensure that during re	emoval of cont	aminated sedim	ent, no sp	illage or discharge of							
sediment into the surrounding env	rironment occu	rs and that all co	ntaminate	d sediment is treated	Construction Phase Waste License			License			
at an appropriate and licensed was	te disposal site										
Impact AFTER ManagementMinorShort TermLocalLowUnlikelyLow-High								High			

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT: Re-vegetate – IMPACT DESCRIPTION: Proliferation of alien floral species if re-vegetation is performed incorrectly.											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/-											
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Ensure that re-vegeta and that indigenous and endemic s	tion is perforn pecies are used	ned according to for re-vegetatio	o a speciali n.	st rehabilitation plan	Construction Phase Rehabilitation Plan						
Measure 2: Monitor re-vegetation whether alien species are controlle	n efforts to en d.	sure efficiency o	Annually during O	perational Phase	NEMBA (Act 10 of 2004): Alien and Invasive Species Regulations, GN R598 of 2014						
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			



ACTIVITY: Decommissioning of two Historic Slimes Dams – ASPECT: Excavate Historic Slimes- Transport Historic Slimes to H:H Slimes Dam -Dispose Historic Slimes on H:H Slimes Dam– IMPACT DESCRIPTION: Possible discharge and spillages degrading floral habitat										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	i t Moderate Long Term Local Medium Possible Medium - High									
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Ensure that during removal of slimes, no spillage or discharge of slimes into the surrounding environment occurs.						Decommissioning Phase Waste License and Wa		Vaste License and Water Use License		
Impact AFTER Management Minor Medium Term Local Low Unlikely Low - High								High		

ACTIVITY: Decommissioning of Phase 1 of the H:H Slimes Dam - ASPECT: Capping of H:H Slimes Dam - IMPACT DESCRIPTION: Possible seepage and ineffective										
rehabilitation degrading floral habitat										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Ensure that the slime	es dam is adequ	ately rehabilitated	l and capp	ed to ensure	Decomr	nissioning Phase	Surfa	ace Water Balance Report, Waste License		
that no seepage or discharge occu	urs.				Decom	inssioning i nase	and Water Use License			
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Decommissioning of general facility infrastructure - ASPECT: Demolition and removal of infrastructure - IMPACT DESCRIPTION: Degradation of floral habitat, species diversity and possible sensitive floral species											
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation		Compliance with Standards			
Measure 1: Ensure that demolition and removal of infrastructure does not encroach upon remaining natural vegetation.						nissioning Phase	Rehat	pilitation Plan.			
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			



Table 9.3(k): Animal Life Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Decommissioning of two Historic Slimes Dams – ASPECT: Excavate Historic Slimes- Transport Historic Slimes to H:H Slimes Dam -Dispose Historic Slimes on H:H Slimes Dam – IMPACT DESCRIPTION: Possible discharge and spillages degrading faunal habitat										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confide									
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with Standards					
Measure 1: Ensure that during removal of slimes, no spillage or discharge of slimes into the surrounding environment occurs.						missioning Phase	Wa	ste License and Water Use License		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Decommissioning of Phase 1 of the H:H Slimes Dam – ASPECT: Capping of H:H Slimes Dam – IMPACT DESCRIPTION: Possible seepage and ineffective rehabilitation degrading faunal habitat										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period for Implementation Compliance with Standard					
Measure 1: Ensure that the slir that no seepage or discharge occur	ted and ca	apped to ensure	Decommissioning Phase Surf		Surface	Surface Water Balance Report, Waste License and Water Use License				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Decommissioning of general facility infrastructure - ASPECT: Demolition and removal of infrastructure - IMPACT DESCRIPTION: Degradation of faunal habitat, species diversity and possible sensitive faunal species

species arreisity and possible sensitive manual species										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/ -	Confidence		
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures				Time Period f	Fime Period for Implementation Compliance with Standards					
Measure 1: Ensure that demolition and removal of infrastructure does not encroach upon remaining natural vegetation.						issioning Phase	Reh	abilitation Plan.		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT: Dewatering of Dam – IMPACT DESCRIPTION: Possible contamination of surrounding faunal habitat due to discharge.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Short Term	Local	Medium	Possible	Medium	- High				
Management Measures					Time Period	for Implementation	Compliance with Standards				
Measure 1: Ensure that during de into the surrounding environment the relevant standards prior to disc	ım, no spillage o t all dirty water i	r discharg s containe	e of dirty water d and treated to	Const	ruction Phase	Sou 241:202	th African National Standard (SANS) 11 Drinking Water Standards and Water Use Licence				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT: Removal of contaminated sediment on basin – IMPACT DESCRIPTION: Possible contamination of surrounding faunal habitat due to spillage of contaminated sediment.											
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confid											
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation		RIPTION: Possible contamination of Confidence High Compliance with Standards Waste License High			
Measure 1: Ensure that during report of sediment into the surrounding entreated at an appropriate and licen	minated sedimer curs and that all osal site.	it, no spilla contamina	Const	ruction Phase		Waste License					
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT: Re-vegetate – IMPACT DESCRIPTION: Proliferation of alien floral species if re-vegetation is performed incorrectly, degrading remaining faunal habitat.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period	for Implementation	Compliance with Standards				
Measure 1: Ensure that re-vegeta plan and that indigenous and ende	tion is perform mic species are	ned according to used for re-vege	a speciali etation.	st rehabilitation	Const	ruction Phase		Rehabilitation Plan			
Measure 2: Monitor re-vegetat determine whether alien species at	ensure efficier	icy of rel	abilitation and	Const	Construction Phase Sp		EMBA (Act 10 of 2004): Alien and Invasive Species Regulations, GN R598 of 2014				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			



Table 9.3(l): Wetlands Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT: Dewatering of Dam – IMPACT DESCRIPTION: Possible contamination of surrounding freshwater habitat due to contaminated water spilling into the freshwater environment.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confiden									
Impact BEFORE Management	Moderate	Short Term	Local	Medium	Possible	Medium	- High			
Management Measures					Time Period	for Implementation		+/- Confidence - High Compliance with Standards South African National Standard (SANS) 41:2011 Drinking Water Standards and Water Use Licence		
Measure 1: Ensure that during devinto the surrounding environment the relevant standards prior to disc	m, no spillage o t all dirty water i	r discharg is containe	Const	ruction Phase	South 241:2011	African National Standard (SANS) Drinking Water Standards and Water Use Licence				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Decommissioning of the Morula Dewatering Dam - ASPECT: Removal of contaminated sediment on basin - IMPACT DESCRIPTION: Possible contamination of freshwater habitat due to spillage of contaminated sediment. Magnitude Duration Scale Consequence **Probability** SIGNIFICANCE Confidence +/-_ **Impact BEFORE Management** Minor Long Term Local Medium Possible Medium High **Management Measures Time Period for Implementation Compliance with Standards Measure 1:** Ensure that during removal of contaminated sediment, no spillage or discharge of sediment into the surrounding environment occurs and that all contaminated sediment is **Construction Phase** Waste License

 treated at an appropriate and licensed waste disposal site.

 Impact AFTER Management
 Minor
 Short Term
 Local
 Low
 Unlikely
 Low
 High

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT: Re-vegetate – IMPACT DESCRIPTION: Failure to rehabilitate may lead to Increase in erosion which will increase sediment load, affecting freshwater habitat and ecological structure, service provision capability and hydrological function.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation	(Compliance with Standards		
Measure 1: Ensure that rehabilita plan and that indigenous and ender	ed according to used for re-vege	a speciali tation.	st rehabilitation	Const	ruction Phase		Rehabilitation Plan			
Measure 2: Monitor re-vegetati determine whether erosion is cont	ensure efficien	cy of reł	Const	ruction Phase		Rehabilitation Plan				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Decommissioning of two Historic Slimes Dams – ASPECT: Excavate Historic Slimes- Transport Historic Slimes to H:H Slimes Dam - Dispose Historic Slimes on H:H Slimes Dam – IMPACT DESCRIPTION: Possible discharge and spillages degrading freshwater habitat										
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence									
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period for ImplementationCompliance with Standards					
Measure 1: Ensure that during removal of slimes, no spillage or discharge of slimes into the surrounding environment occurs.						nissioning Phase	V	Naste License and Water Use License		
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Decommissioning of Phase 1 of the H:H Slimes Dam – ASPECT: Capping of H:H Slimes Dam – IMPACT DESCRIPTION: Possible seepage and ineffective rehabilitation degrading freshwater habitat											
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence											
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures	Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Ensure that the slimes dam is adequately rehabilitated and capped to ensure that no seepage or discharge occurs.							Surface Water Balance Report, Waste License and Water Use License				
that no seepage or discharge occu	irs.	uatery renabilita	ted and ca	ipped to ensure	Decomn	nissioning Phase	Surfa	ace Water Balance Report, Waste License and Water Use License			

ACTIVITY: Decommissioning of general facility infrastructure - ASPECT: Demolition and removal of infrastructure - IMPACT DESCRIPTION: Degradation of freshwater habitat due to indiscriminate demolition and removal of infrastructure.												
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence												
Impact BEFORE Management Moderate Long Term Local Medium Possible Medium - High												
Management Measures	Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Ensure that demoliti or affect any freshwater features.	of infrastructure	does not e	Decomr	nissioning Phase	Reha	bilitation Plan.						
Impact AFTER Management	Minor	Long Term	Site	Medium	Unlikely	Low	-	High				



Table 9.3(m): Aquatic Ecosystems Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Groundwater treatment plant – ASPECT – Settling pond A and B; Dosing pump – IMPACT CATEGORY – Loss of habitat and biodiversity – IMPACT DESCRIPTION - Potentially poor maintenance/decommissioning leading to ongoing contamination of groundwater.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Moderate	Long term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period for ImplementationCompliance with Standards					
Measure 1: Ensure that ongoing m associated infrastructure takes place	naintenance of to prevent failu	the groundwa re.	ater trea	Decommissioning Phase Groundwater Treatment			Groundwater Treatment Plan			
Impact AFTER Management	Minor	Long term	Local	Medium	Unlikely	Low	-	High		

ACTIVITY: Decommissioning of two Historic Slimes Dams – ASPECT - Excavate Historic Slimes;- Transport Historic Slimes to H:H Slimes Dam; Dispose historic slimes on H:H slimes dam; Capping of H:H slimes dam – IMPACT CATEGORY – Loss of habitat and biodiversity – IMPACT DESCRIPTION - Risk of pollution of surface water resulting from excavation and transport of slimes. Risk of pollution of surface water as a result of surface water runoff from exposed slimes. Risk of further pollution of groundwater due to potentially inadequately decommissioned slimes, which may migrate downgradient of the pit, thus possibly affecting the freshwater systems in the vicinity. Increased risk of sediment transport in surface runoff from the remaining infrastructure to the riparian habitat, leading to altered water quality and sedimentation of freshwater system.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures				Time Period f	or Implementation		Compliance with Standards	
Measure 1: Ensure that during rem surrounding environment occurs.	oval of slimes,	no spillage or d	f slimes into the	Decommi	Decommissioning Phase Waste License and Water Use License			
Measure 2: Ensure that the slimes da seepage or discharge occurs.	rehabilitated a	Decommissioning Phase		Surface Water Balance Report, Waste License and Water Use License				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT - Dewatering of Dam – IMPACT DESCRIPTION: Possible contamination of surrounding aquatic resources due to discharge.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Short Term	Local	Medium	Possible	Medium	-	High			
Management Measures				Time Period for	riod for Implementation Compliance with Standards						
Measure 1: Ensure that during dewate the surrounding environment occurr relevant standards prior to discharge	atering of dam, s and that all d	no spillage or d irty water is co	Decommiss	sioning Phase	South 241:2	African National Standard (SANS) 2011 Drinking Water Standards & Water Use Licence					
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			



ACTIVITY: Decommissioning of the Morula Dewatering Dam -ASPECT - Removal of contaminated sediment on basin – IMPACT CATEGORY - Loss of habitat and biodiversity – IMPACT DESCRIPTION - Risk of pollution of surface water resulting from excavation and transport of contaminated sediment. Risk of pollution of surface water as a result of surface water runoff from exposed and poorly stored contaminated sediment. Risk of further pollution of groundwater due to potentially inadequately decommissioned dam, which may migrate downgradient of the pit, thus possibly affecting the freshwater systems in the vicinity. Increased risk of sediment transport in surface runoff from the remaining infrastructure to the riparian habitat, leading to altered water quality and sedimentation of aquatic systems.												
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence												
Impact BEFORE Management	Minor Long Term Local Medium Possible Medium - High											
Management Measures					Time Period for	Implementation	(Compliance with Standards				
Measure 1: Ensure that during re sediment into the surrounding e treated at an appropriate and licen	moval of contamin nvironment occur sed waste disposa	nated sediment rs and that all l site.	Decommiss	sioning Phase		Waste License						
Impact AFTER Management	Minor	Short Term	Site	Low	Unlikely	Low	-	High				

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT - Flatten and shape dam walls - Re-vegetate – IMPACT CATEGORY – Compaction of soils and inadequately rehabilitated topsoil profiles. IMPACT DESCRIPTION: Contamination of soils due to leaks and spills related to machinery. Failure to remove debris and rubble may result in alteration of flow patterns and result in the formation of preferential flow paths, which may lead to erosion and incision thus resulting in the sedimentation of the aquatic resources further downstream; Potentially inadequate re-vegetation may result in alien and invasive plant proliferation, which may result in impacts to the aquatic ecology as a result of altered surface water runoff and the creation of preferential flow paths. Alien vegetation proliferation could lead to loss of flow and flow connectivity as well as loss of refugia for aquatic communities present.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	•	High
Management Measures				Time Period f	or Implementation		Compliance with Standards	
Measure 1: Ensure that re-vegeta plan and that indigenous and ender	tion is performe mic species are u	ed according to sed for re-vege	a special tation.	ist rehabilitation	Decommissioning Phase Rehabilitation Plan			
Measure 2: Monitor re-vegetation efforts to ensure efficiency of rehabilitation and determine whether alien species are controlled.						ssioning Phase	NEMI Sp	BA (Act 10 of 2004): Alien and Invasive becies Regulations, GN R598 of 2014
Impact AFTER Management	Minor	Short Term	Site	Low	Unlikely	Low	-	High



Table 9.3(n): Air Quality Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Stockpiles/Materials - ASPECT: Increased Light Commercial Vehicle Movement - IMPACT DESCRIPTION: Fine Fugitive Dust											
	Magnitude	Duration	Scale	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High			
Management Measures				Time Period for I	mplementation	Compliance with Standards					
Measure 1: Manage site access a	nd control mov	ement on site			Decommissio	ning Phase	-				
Measure 2: Dust Suppression	Decommissio	ning Phase	-								
Impact AFTER Management	Low	Possible	Low	-	High						

ACTIVITY: Infrastructure/Stockpiles/Materials - ASPECT: Excavation Work - IMPACT DESCRIPTION: Fine Fugitive Dust											
	Magnitude	Duration	Probability	SIGNIFICANCE	+/-	Confidence					
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High			
Management Measures					Time Period for I	mplementation	Complianc	e with Standards			
Measure 1: Dust Suppression	Decommissio	ning Phase		-							
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	-	High			

ACTIVITY: Infrastructure/Stockpiles/Materials - ASPECT: Movement of Materials - IMPACT DESCRIPTION: Fine Fugitive Dust										
	Magnitude	Duration	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High		
Management Measures					Time Period for I	mplementation	Complianc	e with Standards		
Measure 1: Dust Suppression				Decommissio	ning Phase	-				
Impact AFTER Management	Minor	Medium Term	Low	Possible	Low	-	High			



ACTIVITY: Infrastructure/Stockpiles/Materials - ASPECT: Vehicle Movement - IMPACT DESCRIPTION: Excessive quantity of noxious vehicle exhaust fumes											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High			
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: Manage Vehicle fleet	and movemen	t of vehicles on site			Decommissio	ning Phase	-				
Measure 2: Limit the use of vehic	cles in poorly v	entilated areas			Decommissio	ning Phase		-			
Measure 3: Plan routes in such a not to affect air quality to the exte	manner as to a ent whereby ex	llow for exhaust fur ceedences of standa	mes to dispers ards could occi	e sufficiently and ur	Decommissio	ning Phase		-			
Measure 4: Consider alternative	options to vehi	cles with combustio	Decommissio	ning Phase	-						
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	- High				



Table 9.3(o): Noise Aspects Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Various activities taking place simultaneously at NIGHT IMPACT DESCRIPTION: Noise level exceeding acceptable noise level (45 dBA – outside) at surrounding environment													
Impact BEFORE Management (Potential noise impact of medium significance on receptors 11, 10, 9 and 5 – Receptor 5 represent community)													
Distance from activities	Noise Level (dBA)	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/ -	Confidence				
Closer than ± 550m for operation or closer than 200m from noise-generating activity.	55 +	Major	Medium	Local	Medium	Definite	Medium	-	High				
550 – 750 m from operation or within 400m from noise generating activity.	50 - 55	Major	Medium	Local	Medium	Probable	Medium	-	High				
750 – 1,100mfrom operation or within 600m from noise generating activity.	45 - 50	Moderate	Medium	Local	Medium	Probable	Low	-	High				
Further than 1,100m from operation or further that 600m from noise generating activity	45	Minor	Medium	Local	Low	Unlikely	Low	-	High				
Man	agement Meas	sures			Time Period fo	r Implementation	Compliance	with	Standards				
Measure 1: The implementation of a quart levels are a concern at receptors implemen Measure 2: A noise emission audit to dete Measure 3: Study to define potential mitig the potential effectiveness of the measures	terly noise mor at Measure 2 ar rmine the sour gation measure s.	nitoring program nd 3. rce of significant n s that could redu	me for 2 years, noises. ce noise levels	if noise as well as	Within a year, to 2 years after	be completed within implementation.	SANS 1010	3:200	8 (Urban)				
Impact AFTER I	Management (Effectiveness of	mitigation m	easures will	depend on the mi	itigation measures ir	nplemented)						
Distance from activities	Noise Level (dBA)	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/ -	Confidence				
Closer than ± 550m for operation or closer than 200m from noise-generating activity.	55 +	Major	Medium	Local	Medium	Definite	Medium	-	High				
550 – 750 m from operation or within 400m from noise generating activity.	50 - 55	Major	Medium	Local	Medium	Probable	Medium	-	High				
750 – 1,100mfrom operation or within 600m from noise generating activity.	45 - 50	Moderate	Medium	Local	Medium	Probable	Low	-	High				
Further than 1,100m from operation or further that 600m from noise generating activity	45	Minor	Medium	Local	Low	Unlikely	Low	-	High				



Table 9.3(p): Visual Aspects Decommissioning and Closure Phase Impact and Risk Significance Table

A: Infrastructure, elements or activities that generate dust or hosts activities that generate dust, visible from close, medium or long range views. A.2: Activities that generate dust from construction/decommissioning of site infrastructure and moving vehicles.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	ement Moderate Medium Term Site/Local Medium Definite Medium - High									
Management Measures	-				Time Period for	- Implementation	Complian	ce with Standards		
Measure 1: Dust Suppression.		Decommissioning Phase		Air Q	uality Report					
Impact AFTER Management	Minor	Medium Term	Site/Local	Low	Possible	Low	-	High		

A: Infrastructure, elements or activities that generate dust or hosts activities that generate dust, visible from close, medium or long range views. A.3: Activities that generate dust from moving vehicles on internal unpaved roads.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Moderate	Medium Term	Aedium TermSite/LocalMediumDefiniteMedium-High							
Management Measures					Time Period for	· Implementation	Complian	ce with Standards		
Measure 1: Dust Suppression.		Decommissioning Phase		Air Q	uality Report					
Impact AFTER Management	Minor	Medium Term	Possible	Low	-	High				

D: Mining Activities that are subject to shaping of landforms. These activities include for instance stockpiles and dumps that could potentially create a Visual Intrusion in										
the landscape by taking on contrasting shapes to the natural landscape topography of the area.										
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence										
Impact BEFORE Management	Moderate	Medium Term	Site/Local	Medium	Definite Medium - Hig					
Management Measures					Time Period for	r Implementation	Complian	ce with Standards		
Measure 1: Particulate Emission	Duration of Life Cycle Phase Relevant S		Specialist Reports							
Impact AFTER Management	Site/Local	Low	Possible	Low	_	High				



Table 9.4(a): Socio- Cultural/Economic Post Closure Phase Impact and Risk Significance Table

ACTIVITY: HERNIC Operations – ASPECT: Economic Efficiency – IMPACT DESCRIPTION: Permanent loss of agricultural land											
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management Moderate Long Term Site Medium Possible Medium - High											
Management Measures					Time Period for	Implementation	Complian	ce with Standards			
Measure 1: Formulate and imple	Mediu	m Term	MPRDA -Closure Plans								
Impact AFTER Management Minor Long Term Site Medium					Possible	Medium	-	Medium			

ACTIVITY: HERNIC Operations – ASPECT: Economic Efficiency – IMPACT DESCRIPTION: On-going external costs for the local community										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confide								Confidence		
Impact BEFORE Management	Minor	Long Term	Site	Medium	Possible	Medium	-	Medium		
Measure 1: As per surface and g	Lor	ng Term	Water q	uality standards						
Impact AFTER Management	Minor	Long Term	Site	Medium	Unlikely	Low	-	Medium		

ACTIVITY: HERNIC Operations – ASPECT: Social Institutional – IMPACT DESCRIPTION: Potential impact on community health and safety											
	Magnitude	Duration	Duration Scale Consequence Probability SIGNIFICANCE +/								
Impact BEFORE Management	Major	Long Term	Local	High	Possible	High	-	Medium			
Management Measures				Time Period for Implementation Complian			nce with Standards				
Measure 1: Fence in potentially of	dangerous area	s.			Mediu	ım Term	MPRDA -Closure Plans				
Measure 2: Raise awareness amo	ongst communi	ties regarding th	e dangers of	the closed site.	Medium Term Mi			MPRDA -Closure Plans			
Measure 3: Develop an alternativ	Medium Term		MPRDA -Closure Plans								
Impact AFTER Management Minor Long Term Local Medium					Possible	Medium	-	Medium			


Table 9.4(b): Heritage Post Closure Phase Impact and Risk Significance Table

ACTIVITY: HERNIC Operations - ASPECT: Post Closure Site Activities - IMPACT DESCRIPTION: Impact on Graveyards											
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence										
Impact BEFORE Management	ent Major Long Term Site High Unlikely Medium - Medium										
Management Measures					Time Period f	for Implementation	Comp	liance with Standards			
Measure 1: Heritage Managemen			Post C	losure Phase	None						
Impact AFTER Management	Major	Long Term	Site	High	Unlikely	Medium	- Medium				



Table 9.4(c): Blasting and Vibration Post Closure Phase Impact and Risk Significance Table

No Significant Blasting and Vibration Related Impacts identified/expected during the Post Closure Phase.



Table 9.4(d): Traffic Aspects Post Closure Phase Impact and Risk Significance Table

No Significant Traffic Related Impacts identified/expected during the Post Closure Phase.



Table 9.4(e): Topography Post Closure Phase Impact and Risk Significance Table

Minor

Short term

Site

ACTIVITY: Morula Mining Shaft Complex – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management Minor Long term Site Medium Possible Medium - High											
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: All decommissioning me	easures to be imp	elemented and	completed		2-5 years -			-			
Measure 2: Aftercare Maintenance a	and Monitoring	2-5 ye	2-5 years -		-						
Impact AFTER Management	Minor	Short term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Morula Mining Open Cast Operation - ASPECT: Uneven Surfaces - IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring SIGNIFICANCE +/-Magnitude **Duration** Scale Probability Confidence Consequence **Impact BEFORE Management** Minor Long term Site Medium Possible **Medium** -High **Time Period for Implementation Compliance with Standards Management Measures** Measure 1: All decommissioning measures to be implemented and completed 2-5 years -Measure 2: Aftercare Maintenance and Monitoring 2-5 years -

ACTIVITY: Mine Waste Rock Dump - ASPECT: Uneven Surfaces - IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring Magnitude Duration Scale Consequence **Probability** SIGNIFICANCE +/-Confidence Impact **BEFORE** Management Minor Long term Site Medium Possible **Medium** -High **Compliance with Standards Time Period for Implementation Management Measures** Measure 1: All decommissioning measures to be implemented and completed 2-5 years -Measure 2: Aftercare Maintenance and Monitoring 2-5 years -Short term Site Unlikely High Minor Low Low **Impact AFTER Management** -

Low

Unlikely

Low



Impact AFTER Management

High

ACTIVITY: Raw Material Stockpile Area – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management Minor Long term Site Medium Possible Medium - High											
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: All decommissioning me	easures to be imp	plemented and	completed		2-5 years -			-			
Measure 2: Aftercare Maintenance a	and Monitoring			2-5 ye	ars		-				
Impact AFTER Management	Minor	Short term	Low	Unlikely	Low	-	High				

ACTIVITY: Open Pit (OB Plant Fines and Coarse Waste in Open Pit) – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible	Medium	-	High			
Management Measures					Time Period for In	mplementation Compliance with Standards					
Measure 1: All decommissioning me	easures to be imp	elemented and	completed		2-5 years -			-			
Measure 2: Aftercare Maintenance a	2-5 years		-								
Impact AFTER Management	Minor	Short term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Ore Beneficiation Plant - ASPECT: Uneven Surfaces - IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible	Medium	-	High		
Management Measures				Time Period for In	mplementation	Compliance with Standards				
Measure 1: All decommissioning me	easures to be imp	lemented and	completed		2-5 years			-		
Measure 2: Aftercare Maintenance a	and Monitoring		2-5 ye	ars	-					
Impact AFTER Management	Minor	Short term	Site	Low	Unlikely	Low	-	High		



ACTIVITY: Returns Material Stockpiles – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management Minor Long term Site Medium Possible Medium - High											
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: All decommissioning me	easures to be imp	lemented and	completed		2-5 years -						
Measure 2: Aftercare Maintenance a	and Monitoring			2-5 ye	ars	-					
Impact AFTER Management	Minor	Short term	Low	Unlikely	Low	-	High				

ACTIVITY: Finished Product Plant – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring											
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence											
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible	Medium	-	High			
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: All decommissioning me	easures to be imp	plemented and	completed		2-5 ye		-				
Measure 2: Aftercare Maintenance a	2-5 ye	ars	-								
Impact AFTER Management	Minor	Short term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Slag Stockpiling Areas- ASPECT: Uneven Surfaces - IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring										
	Magnitude	+/-	Confidence							
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: All decommissioning me	easures to be imp	plemented and	completed		2-5 ye	ars		-		
Measure 2: Aftercare Maintenance a	and Monitoring			2-5 ye	ars	-				
Impact AFTER Management	Minor	Short term	Site	Low	Unlikely	Low	-	High		



ACTIVITY: Primary Chrome Recovery Plant– ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management Minor Long term Site Medium Possible Medium - High											
Management Measures					Time Period for I	mplementation	Complianc	e with Standards			
Measure 1: All decommissioning me	easures to be imp	lemented and	completed		2-5 ye	ars		-			
Measure 2: Aftercare Maintenance a	and Monitoring		2-5 years -		-						
Impact AFTER Management	Minor	Short term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Fine Slag Processing Plant - ASPECT: Uneven Surfaces - IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management Minor Long term Site Medium Possible Medium - High											
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: All decommissioning me	easures to be imp	lemented and	completed		2-5 ye	ars		-			
Measure 2: Aftercare Maintenance a	and Monitoring			2-5 ye	ars	-					
Impact AFTER Management	Minor	Short term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Product Rail Dispatch Area – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible	Medium	-	High			
Management Measures					Time Period for In	mplementation	Complianc	e with Standards			
Measure 1: All decommissioning me	easures to be imp	elemented and	completed		2-5 ye	ars	-				
Measure 2: Aftercare Maintenance a	2-5 years			-							
Impact AFTER Management	Minor	Short term	Site	Low	Unlikely	Low	-	High			



ACTIVITY: Platinum Group Minerals (PGM) Plant - ASPECT: Uneven Surfaces - IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible	Medium	-	High		
Management Measures					Time Period for I	mplementation	Complianc	e with Standards		
Measure 1: All decommissioning me	easures to be imp	lemented and	completed		2-5 years -			-		
Measure 2: Aftercare Maintenance a	and Monitoring			2-5 ye	ars	-				
Impact AFTER Management	Minor	Short term	Low	Unlikely	Low	-	High			

ACTIVITY: Rehabilitated Quarry Area – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring											
	Magnitude	Duration	Scale	Consequence	Probability	+/-	Confidence				
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible	Medium	-	High			
Management Measures					Time Period for In	mplementation	Compliance with Standards				
Measure 1: All decommissioning me	easures to be imp	olemented and	completed		2-5 ye	ars	-				
Measure 2: Aftercare Maintenance a	and Monitoring		2-5 ye	ars	-						
Impact AFTER Management	Short term	Unlikely	Low	-	High						

ACTIVITY: Two Historic Slimes Dams – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring												
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICAN								Confidence				
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible	Medium	-	High				
Management Measures					Time Period for I	mplementation	Compliance with Standards					
Measure 1: All decommissioning me	easures to be imp	plemented and	completed		2-5 ye	ars	-					
Measure 2: Aftercare Maintenance a	2-5 ye	ars	-									
Impact AFTER Management	Minor	Short term	Unlikely	Low	-	High						



ACTIVITY: Tailings Storage Facility (TSF) and Southern Expansion of the TSF – ASPECT: Steep Slopes and Uneven Surfaces – IMPACT DESCRIPTION: Presence of dangerous/ uneven surfaces											
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE								Confidence			
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible	Medium	-	High			
Management Measures					Time Period for I	mplementation	Compliance with Standards				
Measure 1: All decommissioning me	easures to be imp	lemented and	completed		2-5 ye	ars	-				
Measure 2: Aftercare Maintenance a	and Monitoring		2-5 ye	ars	-						
Impact AFTER Management	Minor	Short term	Site	Low	Unlikely	Low	-	High			

ACTIVITY: Decommissioning of the Morula Dewatering Dam – ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Presence of uneven surfaces due to past mining activities/ topographical scouring										
	Magnitude	Duration	Scale	Consequence	Probability	+/-	Confidence			
Impact BEFORE Management	Minor	Long term	Site	Medium	Possible Medium		-	High		
Management Measures					Time Period for In	mplementation	Compliance with Standards			
Measure 1: All decommissioning me	easures to be imp	elemented and	completed		2-5 ye	ars	-			
Measure 2: Aftercare Maintenance a		2-5 ye	ars	-						
Impact AFTER Management	Impact AFTER Management Minor Short term Site Low Unlikely Low -									



Table 9.4(f): Soils and Land Capability Post Closure Phase Impact and Risk Significance Table

ACTIVITIES (AND ASPECTS): Inclusive of all IMPACT CATEGORY: Soil Contamination, Soil Distribution, Soil Erosion, Soil Quality, Land Use, Land Capability							
Impacts and Management Measures	Time Period for Implementation	Compliance with Standards					
 Impact/Measures 1: Soil Contamination: Monitoring: Conduct a post-rehabilitation Contaminated Land Assessment (CLA) in order to quantify the soil contamination status of the HERNIC property as a whole. Such a study would identify any contaminated soil areas, and the client could then take 'Reasonable Measures' in order to remedy any outstanding issues. Such a study would satisfy the Authorities, assure the public, and in the long run hasten closure. The sampling for the aforementioned study should be conducted in conjunction with the post-rehabilitation soil survey (refer to Measures 6-Land Capability). Furthermore, few issues are likely to be identified during the post-rehabilitation CLA study, provided that an Operational Phase CLA study is completed in the near future, in order to identify and remedy any potential issues. The soil/'waste'/'non-waste' samples for the aforementioned process were collected during the course of the current soil survey and are stored in a deep freeze by the EAP (JMA). Mitigation Measures: Remove the 'waste' residues, or repair the leakage (e.g. TSF or PCD) that lead to the identified soil contamination (if any). Increase the 'topsoiling' depth overlying the contaminated area footprint. Maintain optimum functioning (attend to leaks, clear blockages, remove vegetation and remove siltation) of those of the 'clean' (re-directs 'clean' water around potential pollution sources) and 'dirty' (intercepts 'dirty' water from polluted areas) storm water intercept canals/drains/berms, that may remain in perpetuity upslope/downslope (respectively) of potentially polluting rehabilitated areas. The aforementioned will limit 'clean' and 'dirty' water run-off and seepage derived from elsewhere from entering the various areas. Machinery for use in repair work. Spray water, obey speed limits, and tarpaulin cover over haul truck bins to limit dust. Repair oil or fuel leaks. Wash residual 'wastes' from elsewhere off the machinery before utilising the machinery for transportat	Post-Closure Supervision and Timing: Immediately after completion of rehabilitation operations in the Closure to Post-Closure phase (conduct a post- rehabilitation Contaminated Land Assessment). Immediately (rectify the cause of the contamination, and increase 'topsoiling' depth overlying the contaminated footprint). Biannually-spring before/autumn after the rains (drainage features that may remain in perpetuity-'dirty'/'clean' drains/canals/berms-monitor and maintain- repair leaks, clear blockages, remove vegetation, remove siltation, dredging). Continuously (when operating machinery for use in repair work).	Chamber of Mines Guidelines and Authors opinion					
Impact/Measures 2: Soil Distribution: Monitoring: Conduct a post-rehabilitation soil survey (refer to Measures 6: Land Capability). Mitigation Measures: Conduct remedial 'topsoiling' where 'topsoil' depth was found to be limited during the course of the soil survey.	Immediately after rehabilitation in the Closure to Post-Closure phase (post- rehabilitation soil survey to determine post- disturbance land capability as indicated by 'topsoiling' depth, slope and soil type; and thereafter remedial 'topsoil' application).	Chamber of Mines Guidelines and Authors opinion					



Impact/Measures 3: Soil Erosion: Monitoring: Monitor soil erosion periodically utilising using Landscape Function Analysis, visual observations, and a photographic record.Mitigation Measures: Eroded areas: Soil erosion is likely to be identified in over-steep (> 6.4 degrees/ 11.2 % percentage grade) rehabilitated areas only. Thus, such areas must be re-graded (re-sloped) accordingly, and thereafter the following procedures must be followed: 'topsoiling', soil sampling, ameliorate/fertilise soils, mow/spread mature 'seeded' grass over the area, and thereafter re-vegetation where necessary.Subsided areas in the Underground and back-filled Opencast void areas: Re-grade (re-slope) to < 6.4 degrees/ 11.2 % percentage grade, the aforementioned being the critical erosion slope calculated for vertic 'topsoil' material based on the soil erodibility nomograph. Alternatively fill with 'topsoil' material from the reserve (for use in repair work) 'topsoil' stockpiles.Subsided and Eroded areas: Establish a freely draining final landscape without ridges/hollows (i.e. even surface), in order to prevent soil erosion and the ponding of rainfall run-off and the subsequent infiltration/leaching of this water through potentially polluting 'waste' layers (if any) in certain areas. Match the surface level of undisturbed surrounds where possible.	Annually-autumn after the rains (soil erosion and vegetative monitoring and amelioration). Immediately (repair work in Eroded or Subsided areas).	Chamber of Mines Guidelines and Authors opinion
 Impact/Measures 4: Soil Quality (fertility and compaction): Monitoring: Collect representative previously fertilised (during Closure) soil samples once every 3 - 4 years, and analyse for agricultural fertility purposes. Mitigation Measures: Fertility: Utilise live topsoil (and compost if available) to replenish soil micro-flora before re-vegetation in eroded or subsided areas. Utilise vertic 'topsoil' material for repair work given that this broad soil group occurs extensively (except in a band to the west of the study area – refer to soil map); and furthermore in order to maintain soil/vegetative continuity with the surrounding areas. Fertilize (slow release ameliorants) the 'topsoil' immediately after 'topsoiling' and once every 3 - 4 years thereafter, as per the findings of the soil analysis. For the vertic soils, levels of potassium are highly to moderately deficient, while phosphorus levels are seriously deficient. Compaction: Machinery for repair work - utilize tracked vehicles for 'topsoil' handling during the dry season in order to minimise compaction. 	Once every 3 – 4 years (agricultural soil fertility monitoring and maintenance).	Chamber of Mines Guidelines and Authors opinion



Impact/Measures 5: Land Use: The stated End Land Use for the rehabilitated HERNIC areas in general is Extensive Grazing. Monitoring: Monitor and maintain vegetative ('grass') basal cover periodically utilising Standard measures of vegetative cover, visual observations and a photographic record. Remove alien species.			
Mitigation Measures: Functional surface cover (basal, canopy) to be achieved by both natural means as well as by intervention. Thus, Mature Seeded 'Grass' must first be mown from elsewhere on the property and then spread out on the 'topsoiled' areas during the rainy season. Thereafter manually/mechanically re-vegetate (with self-sustaining locally indigenous 'grasses') in problematic areas, as well as in those areas where the spread seeded 'grass' did not germinate/create cover. However, certain sections will remain Mining due to steep to very steep slopes that were consequently not be able to be effectively 'topsoiled'/re-vegetated either. Re-vegetation using ecological restoration principles and phytoremediation must be maintained in such areas.	Annually-autumn after the rains (soil erosion and vegetative monitoring and amelioration).	Chamber of Mines Guidelines and Authors opinion	
The End Land Use of a number of areas may remain Industrial due to residual Soil Contamination, the quantification of the aforementioned pending the completion of a Contaminated Land Assessment (refer to Soil Contamination). The grazing of 'grasses' from contaminated areas may be detrimental to livestock due to both the possible uptake of contaminants by the grass roots, as well as settled dust on the 'grass' (both of which need to be determined by an independent party). No grazing or burning allowed until the contamination status (if any) of the vegetation in impacted areas (e.g. rehabilitated Infrastructure areas, and slag areas) has been determined, and furthermore the vegetation is well established in the post-closure phase. Grazing must never be allowed on the TSF's and Slimes Dams due to contamination issues. Phytoremediation must continue in contaminated areas (e.g. areas with high metal or sulphate loads, or other) as identified during the course of a potential Contaminated Land Assessment.			
Impact/Measures 6: Land Capability: Monitoring: Conduct a post-rehabilitation soil survey in order to quantify 'topsoiling' depth/slope/soil type, as the aforementioned relate to the post-disturbance Land Capability class. Soil Fertility and Soil Contamination may also be quantified by the sampling/analysis of the collected samples.Mitigation Measures: The stated End Land Capability Class. Thus 'Topsoiling' depth >= 25 cm (Chamber of Mines Grazing Capability Class. Thus 'Topsoiling' depth >= 25 cm (Chamber of Mines Grazing Capability Class depth standard), but preferably more (>= 60 cm - Arable Capability Class depth standard) where possible. Conduct remedial 'topsoiling' where the rehabilitation 'topsoiling' depth was found to be limited.	Immediately after rehabilitation in the Closure to Post-Closure phase (post- rehabilitation soil survey to determine post- disturbance land capability as indicated by 'topsoiling' depth, slope and soil type; and thereafter remedial 'topsoil' application).	Chamber of Mines Guidelines and Authors opinion	



Table 9.4(g): Geology Post Closure Phase Impact and Risk Significance Table

No Significant Geological Related Impacts identified/expected during the Post Closure Phase.



Table 9.4(h): Groundwater Post Closure Phase Impact and Risk Significance Table

ACTIVITY: OB Plant Fines in Op quality due to the infiltration of	ACTIVITY: OB Plant Fines in Open Pit (Slurry) – ASPECT: Disposal of OB plant Fines in Open Pit – IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of leachable contaminants from the OB Plant Fines which is backfilled in the open voids into the adjacent aquifers.												
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence					
Impact BEFORE Management	Moderate	Medium	Local	Medium	Definite	Definite Medium		High					
Management Measures			Time Period f	Time Period for Implementation Cor									
Measure 1: Monitor the quality o	f the water in	the rehabilitated	l pit. (Source	Control Measure)	Immediately	after rehabilitation		No					
Measure 2: Monitor groundw weathered zone monitoring bor Directed Measure)	ater resource eholes adjace	quality and nt to the reha	Quarterly (or as s	pecified in the amended WUL).	Yes (Water Use Licence)								
Measure 3: Abstract water from elevation below that of the nature resource quality objectives. The a into the environment if the pit wat Control Measure)	m the rehabil al groundwate bstracted pit ter quality doo	itated pit to m er levels if the p water will need es not meet the s	Immediately	Yes (N	ational Water Act)								
Measure 4: Any adverse trend monitoring boreholes adjacent development of a site specific gro	ls in the gro to the pit are undwater rem	oundwater qual e to be reporte ediation plan. (I	Immediately	if/when identified.	Yes (National Water Act)								
Impact AFTER Management	Minor	Medium	Local	Low	Possible	Low	-	High					



ACTIVITY: OB Plant Coarse Waste in Open Pit (Trucks) – ASPECT: Disposal of OB Plant Coarse Waste in Open Pit – IMPACT DESCRIPTION: Deterioration of the groundwater resource quality due to the infiltration of leachable contaminants from the OB Plant Coarse Waste which is backfilled in the open voids into the adjacent aquifers.

	Magnitude	Duration	Scale	Consequence	Probability SIGNIFICANCE		+/-	Confidence
Impact BEFORE Management	Minor	Medium	Local	Low	Possible Low		-	High
Management Measures		•	Time Period f	or Implementation	Compliance with Standards			
Measure 1: Monitor the quality o	f the water in tl	ne rehabilitateo	Control Measure)	Immediately	after rehabilitation		No	
Measure 2: Monitor groundw weathered zone monitoring bo Directed Measure)	ater resource reholes adjace	quality and nt to the reha	Quarterly (or as s	pecified in the amended WUL).	Yes (Water Use Licence)			
Measure 3: Abstract water fro elevation below that of the natur resource quality objectives. The a into the environment if the pit (Source Control Measure)	m the rehabili ral groundwate abstracted pit w water quality	tated pit to n r levels if the p vater will need does not mee	Immediately	if/when identified.	Yes (National Water Act)			
Measure 4: Any adverse trend monitoring boreholes adjacent development of a site specific gro	ds in the grou to the pit are oundwater remo	indwater qua to be report ediation plan. (Immediately	if/when identified.	Yes (National Water Act)			
Impact AFTER Management	Minor	Medium	Local	Low	Possible	Low	-	High

ACTIVITY: Abstraction Boreholes – ASPECT: Cone of Depression– IMPACT DESCRIPTION: Depletion in the quantity of groundwater and the formation of a groundwater cone of depression in the aquifer(s) adjacent to the abstraction boreholes.												
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Short	Local	Low	Possible	Low	-	High				
Measure 1: Use the groundwate remediation is required and in v closure. (Resource Directed Meas	er monitoring vhich groundw ure)	data to identif ater abstractio	At	Closure	No							
Measure 2: Only abstract the a abstraction boreholes as part of the stage). (Resource Directed Measu	uthorised volu he post closure re)	me of ground groundwater i	water from e remediation p	each of the authorised Alan (if required at that	Con	tinuously	Yes (Water Use Licence)					
Measure 3: Optimise the abstra boreholes so that the daily abstra Directed Measure)	ction of ground action volumes	dwater from e remain consist	Con	tinuously	No							
Impact AFTER Management	Minor	Short	Local	Low	Possible	Low	-	High				



ACTIVITY: Abstraction Boreholes – ASPECT: Removal of Contaminants from Aquifer – IMPACT DESCRIPTION: Improvement to the groundwater resource quality due to the removal of contaminants from the weathered zone aquifers by pumping groundwater from selected groundwater remediation abstraction boreholes.												
	Magnitude	Duration	Scale	Consequence	Probability SIGNIFICANCE		+/-	Confidence				
Impact BEFORE Management	Moderate +	Long	Local	Medium	Definite	Medium	+	High				
Management Measures			Time Period f	or Implementation	Compliance with Standards							
Measure 1: Use the groundwate remediation is required and in v closure. (Resource Directed Meas	er monitoring which groundw sure)	data to identif rater abstractio	y the areas i on for remedi	n which groundwater iation is required post	At	Closure	No					
Measure 2: Optimise the abstra boreholes so that the daily abstra Directed Measure)	Con	tinuously	No									
Impact AFTER Management	Minor +	Long	Local	Medium	Definite	Medium	+	High				

ACTIVITY: Residual Impact – ASPECT: Excavate Historic Slimes – IMPACT DESCRIPTION: Residual impact on the groundwater resource quality due to the previous infiltration of soluble contaminants into the subsurface through the footprints of the material and waste stockpiles / disposal facilities and dirty water containment facilities. Magnitude **Probability** SIGNIFICANCE +/-Confidence Duration Scale Consequence Moderate Medium Possible **Impact BEFORE Management** Local Medium Medium -High **Management Measures Time Period for Implementation Compliance with Standards** Measure 1: Use the groundwater monitoring data to identify the areas in which groundwater remediation is required and in which groundwater abstraction for remediation is required post At Closure No closure (if required). (Resource Directed Measure) Measure 2: Monitor the groundwater quality in selected areas, to assess the efficiency of the proposed post closure groundwater remediation plan (if required) and to verify whether any Continuously after Closure Yes (National Water Act) trends in the groundwater quality exist. (Resource Directed Measure) **Impact AFTER Management** Minor Short Local Low Possible Low -High



Table 9.4(i): Surface Water Post Closure Phase Impact and Risk Significance Table

ACTIVITY: Internal Roads – ASPECT: Gravel Hard Surfaces – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on internal roads, as well as the capture of contaminated storm water run-off in Pollution Control Dams.												
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High				
Management Measures					Time Period fo	or Implementation		Compliance with Standards				
Measure 1: Monitor decommissi	phase measures &	k confirm	Post Closure Phase		Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Measure 2: Only selected interna	al roads to exist	for access and m	aintenanc	e.	Post Closure Phase		I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 3: Monitor restored sur Soil surfaces to be stable no depr	lleys. Rep	air & maintain.	Post Clo	osure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely Low		-	High				

ACTIVITY: Internal Roads – ASPECT: Gravel Hard Surfaces – IMPACT DESCRIPTION: Contamination of the surface water resource due to contaminated run-off from "dirty areas" directly into the surface water resources and/or spillages of contaminated water from tanks, sumps, pipes and dams.

и то со									
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High	
Management Measures				Time Period fo	or Implementation		Compliance with Standards		
Measure 1: Monitor decommissi	phase measures &	k confirm	completion	Post Closure Phase		E	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Only selected interna	al roads to exist	for access and ma	aintenanc	e.	Post Closure Phase			Approved Rehabilitation Objectives	
Measure 3: Monitor restored sur Soil surfaces to be stable no depr	tern & erosion gul	lleys. Rep	air & maintain.	Post Closure Phase		E	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely	Low	-	High	



ACTIVITY: Primary CRP – ASPECT: Current Arising Slag Loading/Crushing and Screening Plant/Stockpiling of Product/Stockpiling of Waste – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the new PCD2.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures					Time Period fo	or Implementation		Compliance with Standards
Measure 1: Monitor decommissi	on and closure	phase measures &	k confirm	completion	Post Cl	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives
Measure 2: Monitor restored sum maintain.	tern. Check for Er	osion gull	eys. Repair &	Post Cl	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely	Low	-	High

ACTIVITY: Primary CRP - ASPECT: Storage of Process Water - IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water											
from the new PCD2 located in drainage area A3.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period fo	or Implementation		Compliance with Standards			
Measure 1: Monitor decommissi	on and closure	phase measures &	k confirm	completion	Post Clo	osure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor restored sur maintain.	face runoff pat	tern. Check for Er	osion gull	eys. Repair &	Post Clo	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: No ponding of surfac	. Soil surfaces to l	oe stable r	10 depressions	Post Clo	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely	Low	-	High			



ACTIVITY: Upgrading of the CRP Process Water Dam (RWD) – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated in drainage area A1, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Monitor decommissi	ion and closure	phase measures &	& confirm	completion	Post C	losure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Monitor restored sum maintain.	rface runoff pat	tern. Check for Er	osion gull	eys. Repair &	Post C	Post Closure Phase DME Mine Rehabilitation Approved Rehabilitati				
Measure 3: No ponding of surface	. Soil surfaces to l	oe stable r	Post C	losure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Short term	Local	Low	Unlikely	Low	-	High		

SW Canal System – Reduction of Run-off to Natural Resource - Depletion in the quantity of surface water due to the capture of direct rainfall generated in drainage area											
A1, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.											
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-										
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period fo	or Implementation		Compliance with Standards			
Measure 1: Monitor decommissi	ion and closure	phase measures &	& confirm	completion	Post Clo	osure Phase	Ι	Compliance with Standards DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Requirements			
Measure 2: Monitor restored sur	rfaces. Check fo	r Erosion gulleys.	Repair &	maintain.	Post Clo	Post Closure Phase DME Mine Rehabilitation Require Approved Rehabilitation Objec					
Measure 3: Confirm that concret with soil from berms has been co	d silt traps 1m be rfaces are stable.	low surfac	Post Clo	Post Closure Phase DME Mine Rehabilitation Requ Approved Rehabilitation Obj		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			



ACTIVITY: Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Coarse Slag at the CRP – ASPECT: Screening Plant/ Stockpiling of Coarse Slag – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at the screening plant, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period fo	or Implementation		Compliance with Standards			
Measure 1: Confirm all coarse sla	ag stockpiles ar	e removed			Pre Post Closure Phase DME Mine Rehabilitation Requireme Approved Rehabilitation Objective			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: PCD2 water quality r	neets WUL star	ndard.			Pre Post Closure Phase						
Measure 3: Monitor decommissi PCD 2 rehabilitated.	on and closure	phase measures &	k confirm	completion.	Post Clo	osure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 4: Monitor restored sur surface and vegetation.	r Erosion gulleys.	Repair &	Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Fuel Supply/Offices/Finished Product Plant/Wash Bay – ASPECT: Tanks/Impermeable Areas/Storage of Final Product/Truck Wash – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated in these areas, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period fo	or Implementation		Compliance with Standards		
Measure 1: Monitor decommissi Remnants to be all removed.	phase measures &	k confirm	completion.	Post Closure Phase DME Mine Rehabilitation Requiremer Approved Rehabilitation Objectives			ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor restored sur Repair & maintain.	ded and clean. Che	eck for Ero	osion gulleys.	Post Closure Phase DME Mine Rehabilitation Approved Rehabilitation		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Groundwater Treatment Plant – ASPECT: Settling Pond A & B – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the ponds.											
	Magnitude	SIGNIFICANCE	+/-	Confidence							
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period fo	or Implementation		Compliance with Standards			
Measure 1: Confirm that ground water pollution plume has diminished and groundwater extraction can be stopped. Prior to Post Closure Phase DME Mine Rehabilitation Requirement											
Measure 2: Monitor groundwate	r quality to con	firm water quality	/ is compl	iant.	Prior to Pos	t Closure Phase		WUL requirements			
Measure 3: If Measure 1 & 2 pro- and backfill with soil from existin	ofs positive. De Ig topsoil stock	molish treatment piles.	dams 1m	below surface	Pre Post (Closure Phase	E	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 4: Monitor decommissi	on and closure	phase measures &	a confirm	completion	Post Clo	osure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 5: Monitor restored sur	r stable soil surfac	e. Repair	& maintain.	Post Closure Phase		Γ	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Sand at the Fine Slag Processing Plant – ASPECT: Screening and Separation Plant/Spiral Plant/Fine Chrome Bin/Slag Sand – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these processes, as well as the capture of contaminated storm water run-off in the water recovery sumps. +/-Confidence Magnitude Duration Scale Consequence Probability SIGNIFICANCE Impact **BEFORE** Management -Minor Long Term Local Medium Possible Medium High **Compliance with Standards Management Measures Time Period for Implementation** DME Mine Rehabilitation Requirements Measure 1: Monitor decommission and closure phase measures & confirm completion Post Closure Phase Approved Rehabilitation Objectives Measure 2: Monitor restored surfaces. Check for Erosion gulleys. Repair & maintain. Soil DME Mine Rehabilitation Requirements Post Closure Phase Approved Rehabilitation Objectives surfaces to be stable no depressions **Impact AFTER Management** Short Term Minor Local Low Unlikely Low High -



ACTIVITY: Sand at the Fine Slag Processing Plant – ASPECT: Water Recovery Sumps – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the water recovery sumps.										
	+/-	Confidence								
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Monitor decommissi	on and closure	phase measures &	confirm	completion	Post Clo	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Monitor restored sur surfaces to be stable no depression	rfaces. Check fo ons.	r Erosion gulleys.	Repair &	maintain. Soil	Post Clo	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Fuel Supply/Contractors Transport Yard/Raw Materials Stockpile Area 2 – ASPECT: Tanks/Earth Surface Yard/Storage of Raw Materials – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new PCD2 in A3.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures					Time Period fo	or Implementation		Compliance with Standards
Measure 1: Monitor decommissi	on and closure	phase measures &	k confirm	completion	Post Closure Phase DME Mine Rehabilitation Requirement Approved Rehabilitation Objectives			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives
Measure 2: Monitor restored sur surfaces to be stable no depression	rfaces. Check fo ons.	r Erosion gulleys.	Repair &	maintain. Soil	Post Closure Phase DME Mine Rehabilitation Requirem Approved Rehabilitation Objective			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives
Measure 3: Monitor all surfaces	olluted soils.			Post Clo	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High



ACTIVITY: Development of Storm Water PCD No. 2 – ASPECT: Storage of Run-off Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from PCD2.										
	Magnitude	+/-	Confidence							
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period fo	or Implementation		Compliance with Standards		
Measure 1: PCD2 and feeding SV proven to comply with WUL limit	V canals to be ro ts.	ehabilitated if wat	ter quality	has been	Pre Post (Closure Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Monitor decommissi	on and closure	phase measures &	& confirm	completion	Post Clo	Post Closure Phase DME Mine Rehabilitation Require Approved Rehabilitation Obje		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces	draining pattern. (depressions.	Check for	Post Clo	osure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Offices/General Plant Infrastructure/Redundant Historic Bag Plant/Old Salvage Yard – ASPECT: Impermeable areas/footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures			Time Period fo	or Implementation		Compliance with Standards		
Measure 1: PCD1A &1B and feed proven to comply with WUL limit	to be rehabilitated	if water o	quality has been	Pre Post Closure Phase DME Mine Rehabilitation Requiren Approved Rehabilitation Objectiv			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor decommissi	on and closure	phase measures &	confirm	completion	Post Closure Phase DME Mine Rehabilitation Requ Approved Rehabilitation Obj		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces	draining pattern. (depressions.	Check for 1	Erosion gulleys.	Post Clo	Post Closure Phase DME Mine Rehabilitation Requ Approved Rehabilitation Ob		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High



ACTIVITY: Pelletizing and Sintering Plants 1 & 2/Furnaces 1, 2, 3 and 4 – ASPECT: Structure/Complex – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period fo	or Implementation		Compliance with Standards		
Measure 1: Monitor decommissi	phase measures &	& confirm	completion	Post Clo	osure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor restored sur Repair & maintain. Soil surfaces	draining pattern. (depressions.	Check for	Post Clo	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Ferrochrome Break Floor Area – ASPECT: Ferrochrome Break Floor Area – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE						+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period fo	or Implementation		pgraded storm water PCD1A and 1B. Confidence High Compliance with Standards OME Mine Rehabilitation Requirements Approved Rehabilitation Requirements OME Mine Rehabilitation Requirements		
Measure 1: PCD1A &1B and feed proven to comply with WUL limit	to be rehabilitated	if water o	quality has been	Pre Post (Closure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor decommissi	on and closure	phase measures &	confirm	completion	Post Clo	Post Closure Phase DME Mine Rehabilitation Requ Approved Rehabilitation Ob		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces	draining pattern. (h no depressions.	Check for	Post Clo	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Raw Materials Stockpile Area/Mixed Material Stockpiling and Screening 1/Returns Materials Stockpile 2 – ASPECT: Storage of Materials – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B.										
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE									
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period fo	or Implementation		Compliance with Standards		
Measure 1: PCD1A &1B and feed proven to comply with WUL limit	ling SW canals t ts.	to be rehabilitated	l if water o	quality has been	Pre Post	Pre Post Closure Phase DME Mine Rehabilitation Requiremen Approved Rehabilitation Objectives				
Measure 2: Monitor decommissi	on and closure	phase measures &	& confirm	completion	Post Closure Phase DMI		ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces	Check for	Erosion gulleys.	Post Cle	osure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Ore Beneficiation Plant – ASPECT: Transport of Ore/Crushing and Screening/ HMS Waste Material – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B2.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High
Management Measures				Time Period fo	or Implementation		Compliance with Standards	
Measure 1: PCD1A &1B and feed proven to comply with WUL limit	ling SW canals t ts.	o be rehabilitated	l if water o	quality has been	Pre Post	Closure Phase	E	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives
Measure 2: Monitor decommissi	on and closure	phase measures &	k confirm	completion	Post Clo	osure Phase	E	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces	rfaces and free of the stable wit	draining pattern. (h no depressions.	Check for I	Erosion gulleys.	Post Clo	Post Closure Phase DME Mine Rehabilitation Require Approved Rehabilitation Object		ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High



ACTIVITY: PGM Plant – ASPECT: Pumping of PGM Feed Material – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these processes and plant, as well as the capture of contaminated storm water run-off in the upgraded storm water PCD1A and 1B2.										
	Magnitude	+/-	Confidence							
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures		or Implementation		Compliance with Standards						
Measure 1: PCD1A &1B and feed proven to comply with WUL limit	to be rehabilitated	l if water o	quality has been	Pre Post (Closure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor decommissi	on and closure	phase measures &	k confirm	completion	Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces	Check for	Post Clo	osure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Mixed Material Stockpiling and Screening/Slag Stockpiling Areas – ASPECT: Storage of Mixed Materials/Slag – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall on these materials, as well as the capture of contaminated storm water run-off in the new storm water PCD3.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period fo	or Implementation		Compliance with Standards			
Measure 1: Surplus stockpiles to minimised footprints. Confirm op	be consolidate encast void ba	d and shaped to st ckfilled.	table side	slopes and	Post Clo	osure Phase	E	Off in the new storm water PCD3. Confidence High Compliance with Standards DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Requirements Approved Rehabilitation Requirements Approved Rehabilitation Objectives DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: SW PCD 3 to be main footprints. Monitor water quality	tained to inter to comply with	cept runoff from tl 1 WUL standards.	ne remain	der of stockpile	Post Closure Phase		E	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: Monitor decommissi	on and closure	phase measures &	confirm	completion	Post Clo	osure Phase	E	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 4: Monitor restored sur Repair & maintain. Soil surfaces	draining pattern. (h no depressions.	Check for 1	Post Clo	osure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			



ACTIVITY: Development of Storm Water PCD No. 3 – ASPECT: Storage of Run-off Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from PCD3.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period fo	or Implementation		Compliance with Standards			
Measure 1: PCD3 and feeding SV proven to comply with WUL limit	ehabilitated if wat	ter quality	has been	Pre Post Closure Phase		Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 2: Monitor decommissi	on and closure	phase measures &	& confirm	completion	Post Closure Phase		Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces established.	faces and free to be stable wit	draining pattern. h no depressions.	Check for Vegetatio	Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: H:H Slimes Dam and Return Water Dam – ASPECT: RWD (Return Water Dam) – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated in drainage area A6, as well as the capture of slimes dam leachate in the RWD.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High	
Management Measures				Time Period fo	or Implementation		Compliance with Standards		
Measure 1: Monitor water qualit once the water quality has compl	ty in RWD. RW ying with WUL	D can be rehabilita water standards f	ated simila for 5 cons	ar to all PCDs ecutive years.	Post Clo	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor water level : previous subsurface decant and s water to discharge into RWD.	in RWD and the seepage drains	re should be no si should discharge i	gns of spi nto the R	lling. Only WD. No surface	Post Closure Phase DME Mine Rehabilitation Requireme Approved Rehabilitation Objective			OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces	rfaces and free of the stable and	draining pattern. (l vegetated.	Check for	Erosion gulleys.	Post Clo	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: All side slopes and fi	e Slimes Dam sho	uld be inta	Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High	



ACTIVITY: H:H Slimes Dam and spillages of contaminated wate	ACTIVITY: H:H Slimes Dam and Return Water Dam – ASPECT: RWD (Return Water Dam) – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the RWD.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High				
Management Measures					Time Period fo	or Implementation		Compliance with Standards				
Measure 1: Monitor water qualit once the water quality has compl	y in RWD. RWI ying with WUL) can be rehabilita water standards f	ted simila or 5 cons	ar to all PCDs ecutive years.	Post Clo	osure Phase	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 2: Monitor water level is previous subsurface decant and s water to discharge into RWD.	re should be no si should discharge i	gns of spi nto the R	lling. Only WD. No surface	Post Clo	osure Phase	Γ	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces	faces and free to be stable and	draining pattern. (l vegetated.	Check for	Erosion gulleys.	Post Clo	osure Phase	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 4: All side slopes and fil	e Slimes Dam sho	uld be inta	Post Closure Phase		Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High				

ACTIVITY: Decommissioning of Phase 1 of the H:H Slimes Dam – ASPECT: Capping of H:H Slimes Dam – IMPACT DESCRIPTION: Increase in the quantity of surface water due to the capture of direct rainfall run-off from the capped slimes dam in drainage area A6.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High	
Management Measures				Time Period fo	or Implementation		Compliance with Standards		
Measure 1: Monitor water qualit once the water quality has compl	ty in RWD. RWI lying with WUL) can be rehabilita water standards f	ited simila for 5 cons	Post Cl	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Monitor water level : previous subsurface decant and s water to discharge into RWD.	in RWD and the seepage drains s	re should be no si should discharge i	igns of spi into the R'	illing. Only WD. No surface	Post Cl	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored sur Repair & maintain. Soil surfaces	rfaces and free of the stable and	draining pattern. (l vegetated.	Check for	Erosion gulleys.	Post Cl	osure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: All side slopes and fi	mes Dam :	Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High	



ACTIVITY: Morula Mining Shaft the capture of direct rainfall ge	ACTIVITY: Morula Mining Shaft Complex & Offices – ASPECT: Ore/Waste Rock Transfer House – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new Morula Storm Water PCD.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period fo	or Implementation		Compliance with Standards			
Measure 1: Monitor decommissi	on and closure	phase measures &	& confirm	completion	Post Cl	osure Phase	E	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor restored sur Repair & maintain. Soil surfaces established.	draining pattern. h no depressions.	Check for Vegetatio	Erosion gulleys. on should have	Post Cl	osure Phase	E	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Morula Mining Shaft Complex & Offices – ASPECT: Water Storage Dams – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Water Storage Dams.										
of uncertrainian in the water s	Magnitude Duration Scale Consequence Probability SIGNIFICANCE									
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Monitor decommissi	on and closure	phase measures &	a confirm	completion	Post Clo	osure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor restored sur Repair & maintain. Soil surfaces established.	draining pattern. (h no depressions.	Check for Vegetatio	Post Clo	osure Phase	Ι	ME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Morula Mining Shaft Complex & Offices – ASPECT: Water Storage Dams – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the Storage Dams.										
	Confidence									
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Monitor decommissi	on and closure	phase measures &	& confirm	completion	Post	Closure Phase	1	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Monitor restored sur Repair & maintain. Soil surfaces established.	draining pattern. h no depressions.	Check for Vegetatic	Erosion gulleys. on should have	Post	Closure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Mine Sewage Plant - ASPECT: Sludge Drying Beds - IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Sludge Drying Beds.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High			
Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Monitor decommissi	on and closure	phase measures &	a confirm	completion	Post	Closure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor restored sur Repair & maintain. Soil surfaces established.	draining pattern. (h no depressions.	Check for Vegetatio	Erosion gulleys. n should have	Post	Closure Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			



ACTIVITY: Mine Waste Rock Dump – ASPECT: Storage of Waste Rock on un-lined footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new Morula Storm Water PCD.										
	Magnitude Duration Scale Consequence Probability SIGNIFICANCE						+/-	Confidence		
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Confirm all waste rock cleared and or processed.Post Closure PhaseDME Mine Rehabilitation Requirements										
Measure 2: Surplus waste rock t consolidated and shaped with sta	hat can't be use Ible side slopes	ed at the open cast	rehabilita	ation must be	Post	Post Closure Phase DME Mine Rehabilitation Requiremen				
Measure 3: Monitor decommissi	on and closure	phase measures &	confirm	completion	Post	Post Closure Phase DME Mine Rehabilitation Requi				
Measure 4: Monitor restored sur Repair & maintain. Soil surfaces established.	draining pattern. (h no depressions.	Check for Vegetatio	Post	Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management Minor Short Term Local Low Unlikely Low -					High					

ACTIVITY: Re-Use of Mine Waste Rock at the Mine Waste Rock Stockpile – ASPECT: Crushing and Screening Plant A7B Stockpiling of Waste Rock Product – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these facilities, as well as the capture of contaminated storm water run-off in the new Morula Storm Water PCD

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High		
Management Measures					Time Period	Time Period for Implementation Compliance with Standards				
Measure 1: Confirm all waste ro	ck cleared and	or processed.			Post	Closure Phase	Ι	DME Mine Rehabilitation Requirements		
Measure 2: Surplus waste rock t consolidated and shaped with sta	hat can't be use able side slopes	ed at the open cast	rehabilita	ation must be	Post Closure Phase DME Mine Rehabilitation Requiremen			DME Mine Rehabilitation Requirements		
Measure 3: Stockpile yard to be	rehabilitated ar	nd berms spread a	s topsoil a	and backfill.	Post	Closure Phase	Ι	OME Mine Rehabilitation Requirements		
Measure 4: Monitor decommissi	on and closure	phase measures &	& confirm	completion	Post	Closure Phase	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 5: Monitor restored sur Repair & maintain. Soil surfaces established.	rfaces and free to be stable wit	draining pattern. h no depressions.	Check for Vegetatio	Erosion gulleys. on should have	Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Morula SW PCD – ASPECT: Storage of U/G Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the Morula Dewatering Dam.										
	Magnitude	+/-	Confidence							
Impact BEFORE Management	Minor	Medium Term	Local	Medium	Possible	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Monitor decommissi	on and closure	phase measures &	confirm	completion	Post (Closure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Monitor restored sur Repair & maintain. Soil surfaces established.	draining pattern. (h no depressions.	Check for Vegetatio	Erosion gulleys. on should have	Post (Closure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Morula SW PCD – ASPECT: Storage of U/G Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Water Storage Dams.										
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Medium Term	Local	Medium	Possible	Low	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Monitor decommissi	on and closure	phase measures &	confirm	completion	Post (Closure Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Monitor restored sur Repair & maintain. Soil surfaces established.	draining pattern. (h no depressions.	Check for Vegetatio	Erosion gulleys. n should have	Post (Closure Phase	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High		



ACTIVITY: Opencast Operations – ASPECT: Water Abstraction and Pipelines – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High			
Management Measures				Time Period	for Implementation		Compliance with Standards				
Measure 1: Monitor decommissi	on and closure	phase measures &	k confirm	completion	Pre Post Closure Phase DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Measure 2: Open Cast to be com	pletely backfille	ed and shaped wit	h a 150mi	n topsoil cover.	Pre Pos	Pre Post Closure Phase DME Mine Rehabilitation Require Approved Rehabilitation Object		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: Monitor Vegetation t	to have establis	hed with climax sj	pecies.		Post	Post Closure Phase DME Mine Rehabilitation Requ Approved Rehabilitation Ob		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 4: Surfaces to be erosio to be demonstrated.	d stable. Sheet flo	w free dra	Post	Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Opencast Operations – ASPECT: Steep Slopes/Uneven Surfaces/Existence of the Void – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence				
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High				
Management Measures					Time Period	for Implementation		Compliance with Standards				
Measure 1: Monitor decommissi	on and closure	phase measures &	k confirm	completion	Pre Pos	t Closure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 2: Open Cast to be com	pletely backfille	ed and shaped wit	h a 150m	n topsoil cover.	Pre Pos	t Closure Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 3: Monitor Vegetation t	to have establis	hed with climax sj	pecies.		Post (Closure Phase	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 4: Surfaces to be erosio to be demonstrated.	d stable. Sheet flo	w free dra	aining pattern	Post (Closure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High				



ACTIVITY: OB Plant Fines in Open Pit (Slurry) – ASPECT: Disposal of OB plant Fines in Open Pit – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas											
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE						+/-	Confidence			
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High			
Management Measures		for Implementation		Compliance with Standards							
Measure 1: Monitor decommissi	on and closure	phase measures &	& confirm	completion	Possible Low - High Time Period for Implementation Compliance with Standards Pre Post Closure Phase DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Pre Post Closure Phase DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Post Closure Phase DME Mine Rehabilitation Objectives Post Closure Phase DME Mine Rehabilitation Requirements						
Measure 2: Open Cast to be com	pletely backfille	ed and shaped wit	h a 150m	m topsoil cover.	Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 3: Monitor Vegetation t	to have establis	hed with climax s	pecies.		Post (Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 4: Surfaces to be erosio to be demonstrated.	on gulley free ar	d stable. Sheet flo	ow free dra	Post (Closure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management Minor Long Term Local Medium Unlikely Low						-	High				

ACTIVITY: OB Plant Coarse Waste in Open Pit (Trucks) – ASPECT: Disposal of OB Plant Coarse Waste in Open Pit – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High		
Management Measures					Time Period	for Implementation		Compliance with Standards		
Measure 1: Monitor decommissi	ion and closure	phase measures &	k confirm	completion	Pre Pos	t Closure Phase	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Open Cast to be com	pletely backfille	ed and shaped wit	h a 150m	n topsoil cover.	Pre Pos	t Closure Phase	I	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Monitor Vegetation t	to have establis	hed with climax sj	pecies.		Post (Post Closure Phase DME Mine Rehabilitation Requ Approved Rehabilitation Obj		OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 4: Surfaces to be erosion to be demonstrated.	d stable. Sheet flo	w free dra	aining pattern	Post (Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High		



ACTIVITY: Storage Facility (TSI due to the capture of direct rais	ACTIVITY: Storage Facility (TSF) and Return Water Dam (RWD) – ASPECT: Disposal to TSF/A11 RWD – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the RWD.											
	Magnitude	Duration	Scale	Consequence	Probability	Confidence						
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High				
Management Measures				Time Period	for Implementation		Compliance with Standards					
Measure 1: Monitor water qualit norms. Rehabilitation of RWD to	y in RWD and 1 be similar to SV	emove dam when V PCD rehabilitati	quality c on.	omplies with	Pre Pos	t Closure Phase		WUL water quality limits				
Measure 2: Monitor crest area so	oil cover and dr	ainage conditions	towards	penstocks.	Post (Closure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 3: Monitor grass cover	at crest and su	rounding site.			Post (Closure Phase	Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 4: Side slopes of TSF to established. Soil cover to be stabl	be erosion gull e.	ey free. Vegetation	n on side :	slopes to be	Post (Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Measure 5: Upslope diversion ea obstructions.	d be in good cond	ition with	out	Post Closure Phase		Ι	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High				

ACTIVITY: Expansion of the Tailings Storage Facility – ASPECT: New extended footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the RWD.

captule of unect lannan gener	apture of un etclamman generated at these areas, as wen as the capture of contaminated storm water run-on in the KwD.												
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence					
Impact BEFORE Management	Minor	Long Term	Local	Medium	Possible	Low	-	High					
Management Measures				Time Period	for Implementation		Compliance with Standards						
Measure 1: Monitor water quality norms. Rehabilitation of RWD to	ty in RWD and 1 be similar to SV	remove dam when V PCD rehabilitati	ı quality c on.	omplies with	Pre Pos	t Closure Phase	WUL	water quality limits					
Measure 2: Monitor crest area so	ainage conditions	towards	penstocks.	Post Closure Phase DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			Mine Rehabilitation Requirements oved Rehabilitation Objectives						
Measure 3: Monitor grass cover	at crest and su	rrounding site.			Post Closure Phase DME Mine Rehabilitation Requirement Approved Rehabilitation Objectives			Mine Rehabilitation Requirements oved Rehabilitation Objectives					
Measure 4: Side slopes of TSF to established. Soil cover to be stabl	n on side :	slopes to be	Post (Post Closure Phase DME Mine Rehabilitation Require Approved Rehabilitation Objective									
Measure 5: Upslope diversion ear obstructions.	d be in good cond	ition with	Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives								
Impact AFTER Management	Minor	Long Term	Local	Medium	Unlikely	Low	-	High					



ACTIVITY: Plant Process Water Dam & Silt Trap/OB Plant Return Water Dam/Plant Storm Water Pollution Control Dam (PCD) - ASPECT: Storage of Process Water/Silt – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the silt traps and various process water and pollution control dams.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High			
Management Measures						Time Period for Implementation		Compliance with Standards			
Measure 1: All upslope areas should be cleared, all surfaces free draining and rehabilitated.						Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor decommission and closure phase measures for Area A12 & confirm completion						Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: Monitor restored surfaces. Check for Erosion gulleys. Check soil and grass cover. Repair & maintain. Soil surfaces to be stable no depressions.						Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 4: Area should have free draining flow pattern without concentration of runoff.						Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High			

ACTIVITY: Plant Process Water Dam & Silt Trap/OB Plant Return Water Dam/Plant Storm Water Pollution Control Dam (PCD) - ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the various dams listed here.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Medium Term	Local	Low	Possible	Low	-	High	
Management Measures			Time Period for Implementation		Compliance with Standards				
Measure 1: All upslope areas should be cleared, all surfaces free draining and rehabilitated.						Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 2: Monitor decommission and closure phase measures for Area A12 & confirm completion						Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored sur cover. Repair & maintain. Soil su	Check so s.	Post Closure Phase		Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 4: Area should have free draining flow pattern without concentration of runoff.						Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High	


ACTIVITY: Expansion of Storm Water PCD No. 1B- ASPECT: Storage of runoff Water – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated at these areas, as well as the capture of contaminated storm water run-off in the silt traps and various process water and pollution control dams. +/-Magnitude Duration Scale Consequence **Probability** SIGNIFICANCE Confidence **Impact BEFORE Management** Local Minor Short Term Low Possible Low -High **Time Period for Implementation Compliance with Standards Management Measures** Measure 1: All upslope areas should be cleared, all surfaces free draining and DME Mine Rehabilitation Requirements Post Closure Phase rehabilitated. Approved Rehabilitation Objectives Measure 2: Monitor decommission and closure phase measures for Area A12 & confirm DME Mine Rehabilitation Requirements Post Closure Phase completion Approved Rehabilitation Objectives Measure 3: Monitor restored surfaces. Check for Erosion gulleys. Check soil and grass DME Mine Rehabilitation Requirements Post Closure Phase Approved Rehabilitation Objectives cover. Repair & maintain. Soil surfaces to be stable no depressions. Measure 4: Area should have free draining flow pattern without concentration or DME Mine Rehabilitation Requirements Post Closure Phase Approved Rehabilitation Objectives interception of runoff.

ACTIVITY: Expansion of Storm Water PCD No. 1B- ASPECT: Storage of runoff Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from PCD1.

Possible

Low

-

Low

Short Term

Local

Minor

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence		
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High		
Management Measures			Time Period	for Implementation		Compliance with Standards				
Measure 1: All upslope areas sho rehabilitated.	ould be cleared,	all surfaces free o	lraining a	nd	Post	Closure Phase	DME Mine Rehabilitation Requirement Approved Rehabilitation Objectives			
Measure 2: Monitor decommissi completion	on and closure	phase measures f	or Area A	12 & confirm	Post	Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 3: Monitor restored sur cover. Repair & maintain. Soil sur	faces. Check fo rfaces to be sta	r Erosion gulleys. ble no depression	Check so s.	il and grass	Post	Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 4: Area should have fre interception of runoff.	pattern without o	concentra	tion or	Post	Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High		



Impact AFTER Management

High

ACTIVITY: Development and Exp DESCRIPTION: Contamination of	ACTIVITY: Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps – ASPECT: Storage of Process Water – IMPACT DESCRIPTION: Contamination of the surface water resource due to spillages of contaminated water from the canal system and silt traps.											
	MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE							- Confidence				
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High				
Management Measures					Time Period	for Implementation	- High tion Compliance with Standards DME Mine Rehabilitation Requirements					
Measure 1: All upslope areas shou rehabilitated.	ll surfaces free o	lraining a	nd	Post	Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Measure 2: Monitor decommission completion	n and closure pl	nase measures f	or Area A	12 & confirm	Post Closure Phase			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 3: Monitor restored surfa cover. Repair & maintain. Soil surfa	Check so s.	il and grass	Post	Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives							
Measure 4: Area should have free interception of runoff.	concentra	Post	Closure Phase	Ι	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives							
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High				

ACTIVITY: New Salvage Yard – ASPECT: Yard Footprint – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall generated on the impermeable areas, as well as the capture of contaminated storm water run-off in the new storm water PCD4.

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence	
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High	
Management Measures			Time Period	for Implementation		Compliance with Standards			
Measure 1: Site should be cleared,	bilitated.		Post (Closure Phase	I	OME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor decommission	n and closure pl	nase measures &	k confirm	completion	Post (Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives		
Measure 3: Monitor restored surfa cover. Repair & maintain. Soil surfa	Check so s.	il and grass	Post (Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 4: Area should have free interception of runoff.	concentra	Post (Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives					
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High	



ACTIVITY: Rehabilitated Quarry Area - ASPECT: Uneven Surfaces – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall by ponding.

by ponung.											
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence			
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High			
Management Measures					Time Period	for Implementation		Compliance with Standards			
Measure 1: Monitor decommission and closure phase measures & confirm completion						Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives				
Measure 2: Monitor restored surfa cover. Repair & maintain. Soil surf	Check soil s.	Post (Closure Phase	DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives							
Impact AFTER Management	Minor	Short Term	Local	Low	Possible	Low	-	High			

ACTIVITY: Sewage Plant – ASPECT: Sludge Drying Beds – IMPACT DESCRIPTION: Depletion in the quantity of surface water due to the capture of direct rainfall in the Sludge Drying Beds.											
	Magnitude	Duration	+/-	Confidence							
Impact BEFORE Management	Minor	Short Term	Local	Low	Possible	Low	-	High			
Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Monitor decommission	n and closure p	hase measures &	& confirm	completion	Post Closure Phase			DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives			
Measure 2: Monitor restored surfa cover. Repair & maintain. Soil surf	rosion gulleys. , stable & no dep	Check soil pressions.	Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives						
Impact AFTER Management	Minor	Short Term	Local	Low	Unlikely	Low	-	High			



Table 9.4(j): Plant Life Post Closure Phase Impact and Risk Significance Table

ACTIVITY: Decommissioning of infrastructure – ASPECT: Failure to effectively decommission infrastructure and treat and contain sources of pollution – IMPACT DESCRIPTION: Possible discharge and seepage degrading floral habitat post-closure										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence										
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures					Time Period	for Implementation	Compliance with Standards			
Measure 1 : Monitor the decommutation waste license and water use license and water use license licen	structure as per t age which may aff	he conditi ect floral h	Post	Closure Phase	Waste License and Water Use License					
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		

ACTIVITY: Rehabilitation of disturbed areas – ASPECT: Failure to implement an alien and invasive plant monitoring and management plan – IMPACT DESCRIPTION:												
Proliferation of alien and invasive species post-closure.												
Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence												
Impact BEFORE Management Moderate Long Term Local Medium Possible Medium - High												
Management Measures	Management Measures Time Period for Implementation Compliance with Standards											
Measure 1: Monitor alien and in	vasive species	proliferation and e	radicate a	nd manage alien	Appually for	E voare Doct Closuro	NEMBA	(Act 10 of 2004): Alien and Invasive				
species as per the alien and invas	ive plant mana	gement plan.			Annually 101	5 years rost closure	Species Regulations, GN R598 of 2014					
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High				



Table 9.4(k): Animal Life Post Closure Phase Impact and Risk Significance Table

ACTIVITY: Decommissioning of infrastructure – ASPECT: Failure to effectively decommission infrastructure and treat and contain sources of pollution – IMPACT DESCRIPTION: Possible discharge and seepage degrading faunal habitat post-closure											
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence											
Impact BEFORE Management	E Management Moderate Long Term Local Medium Possible Medium - High										
Management Measures					Time Period for Implementation Compliance with Standards						
Measure 1: Monitor the decomm waste license and water use license	tructure as per th ge which may affec	ne conditi t faunal h	Post Closure Phase		Waste License and Water Use License						
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Rehabilitation of disturbed areas – ASPECT: Failure to implement an alien and invasive plant monitoring and management plan – IMPACT DESCRIPTION: Proliferation of alien and invasive species post-closure.										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence										
Impact BEFORE Management Moderate Long Term Local Medium Possible Medium - High										
Management Measures					Time Period for ImplementationCompliance with Standards					
Measure 1: Monitor alien and invasive species proliferation and eradicate and manage alien species as per the alien and invasive plant management plan.						r 5 years Post Closure	NEMBA (Act 10 of 2004): Alien and Invasiv Species Regulations, GN R598 of 2014			
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		



Table 9.4(l): Wetlands Post Closure Phase Impact and Risk Significance Table

ACTIVITY: Decommissioning of infrastructure – ASPECT: Failure to effectively decommission infrastructure and treat and contain sources of pollution – IMPACT DESCRIPTION: Possible discharge and seepage degrading freshwater habitat post-closure											
c Magnitude Duration Scale Consequence Probability SIGNIFICANCE +/- Confidence											
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period for Implementation Compliance with Standards						
Measure 1: Monitor the decommi waste license and water use license	ructure as per the ge which may affec	e conditio t freshwa	Post	Closure Phase	Waste License, Water Use License and Closure Plan						
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High			

ACTIVITY: Rehabilitation of disturbed areas – ASPECT: Failure to effectively rehabilitate disturbed areas – IMPACT DESCRIPTION: Continued erosion leading to sedimentation of freshwater resources.										
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Confidence										
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High		
Management Measures Time Period for Implementation Compliance with Standards										
Measure 1: Monitor rehabilitation manage any erosion which may ari	period of 5 years	post-clos	Annually for	5 years Post Closure	Re	ehabilitation Plan and Closure Plan				
Impact AFTER Management	Minor	Medium Term	Local	Low	Unlikely	Low	-	High		



Table 9.4(m): Aquatic Ecosystems Post Closure Phase Impact and Risk Significance Table

ACTIVITY: Decommissioning of infrastructure – ASPECT - Failure to effectively decommission infrastructure and treat and contain sources of pollution – IMPACT CATEGORY – Loss of habitat and biodiversity – IMPACT DESCRIPTION - Possible discharge and seepage degrading surface and groundwater resources post-closure											
MagnitudeDurationScaleConsequenceProbabilitySIGNIFICANCE+/-Consequence											
Impact BEFORE Management	Moderate	Long Term	Local	Medium	Possible	Medium	-	High			
Management Measures					Time Period f	Compliance with Standards					
Measure 1: Monitor the decommiss license and water use license for any	ioned infrastru seepage which	icture as per the contract may affect aquatic	Post Cl	osure Phase	Waste License and Water Use License						
Impact AFTER Management	Minor	Medium Term	Site	Low	Unlikely	Low	-	High			



Table 9.4(n): Air Quality Post Closure Phase Impact and Risk Significance Table

ACTIVITY: Stockpiles/Materials - ASPECT: Failure to effectively Rehabilitate Disturbed Areas - IMPACT DESCRIPTION: Fine Fugitive Dust								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Definite	Medium	-	High
Management Measures			Time Period for Implementation		Compliance with Standards			
Measure 1: Dust Suppression					Post Closure Phase			-
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	-	High



Table 9.4(o): Noise Aspects Post Closure Phase Impact and Risk Significance Table

No Significant Noise Related Impacts identified/expected during the Post Closure Phase.



Table 9.4(p): Visual Aspects Post Closure Phase Impact and Risk Significance Table

No Significant Visual Related Impacts identified/expected during the Post Closure Phase.



APPENDIX 11(A)

Large Scale Final Site Map



APPENDIX 19(A)

HERNIC Ferrochrome Environmental Management OPEX Budget for 2016/2017

Description	Annual OPEX Budget	Purpose	
Water Control	R2 040 000 per annum	Water monitoring and water use license requirements, operation of water treatment plant etc.	
Environmental Control	R 360 000 per annum	Any environmental related project not budgeted on the list	
Road Maintenance	R7 560 000 per annum	Maintenance of haul roads for dust suppression	
Dust Fall Out Monitoring	R 540 000 per annum	Dust fall monitoring	
Legal Compliance Audits	R 840 000 per annum	Legal compliance audits	
Alien Plants Eradication	R 720 000 per annum	Alien plants eradication and grass cutting	
Stack Monitoring	R 720 000 per annum	Isokinetic stack sampling as part of AEL requirement	
Waste Management R3 600 000 per annum		Waste management services- Salvage Yard Operation	
Promotion of OHS/Environment	R 960 000 per annum	Awareness Campaign	

APPENDIX 19(B)

HERNIC Ferrochrome Updated Closure Cost Report – June 2017

CLOSURE COST REPORT

HERNIC FERROCHROME (PTY) LTD



DATE

February 2017 DMR Reference: NW 30/5/1/2/3/2/1/(308) EM & NW 30/5/1/2/3/2/1/(396) EM



Purpose of Report

JMA Consulting (Pty) Ltd was appointed by Hernic Ferrochrome (Pty) Ltd, to revise the closure cost calculation for financial provision for closure. This closure cost assessment is based on updated detailed surveys conducted by Hernic Ferrochrome.

Hernic Ferrochrome (Pty) Ltd has been in operation since May 1996. The Operations, which expanded over the years, comprise both mining of Chromite Ore (initially opencast and then later from underground), ore beneficiation to yield feedstock chromite concentrate and lumpy ore, followed by pelletizing and sintering of the fine ore and finally Ferrochrome Smelting in four closed Furnaces, with an annual production capacity of 420 000 tonnes of ferrochrome. Several chrome recovery operations from chromite containing slag are also active on the site.

Report Reference Numbers

JMA Project: JMA/10473 JMA Report: Prj6013 Date: February 2017

DMR Reference: NW 30/5/1/2/3/2/1/(308) EM & NW 30/5/1/2/3/2/1/(396) EM

Report Status

Final Version – 01 Volume 1 of 1

Compiled by

JMA Consulting (Pty) Ltd 15 Vickers Street Delmas 2210 (t): 013 665 1788 (f): 013 665 2364

Mr Riaan Grobbelaar (Pr.Sci.Nat.) riaan@jmaconsult.co.za

Mrs Rene Rademeyer (Pr. Sci.Nat.) rene@jmaconsult.co.za

Compiled for



Hernic Ferrochrome (Pty) Ltd

TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	LEGAL FRAMEWORK FOR CLOSURE	1
3.	SCOPE OF WORK	4
4.	SITE INFORMATION	5
4.1	SITE HISTORY	5
4.2	PROCESS DESCRIPTION	6
4.3	SITE LAYOUT	6
5.	APPROACH AND METHODOLOGY	14
6.	DETERMINE OUANTUM PARAMETERS	19
6.1	INPUT PARAMETERS FOR QUANTUM PROVISION	19
7.	CALCULATION FOR CLOSURE COST PROVISION	23
8.	SUMMARY	24
9.	REFERENCES	24

LIST OF ACRONYMS

DMR	:	Department of Mineral Resources
EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Programme
EMPR	:	Environmental Management Programme Report
MPRDA	:	Mineral and Petroleum Resources Development Act
NEMA	:	National Environmental Management Act
NEMWA	:	National Environmental Management: Waste Act
NWA	:	National Water Act
ТРМ	:	Tons Per Month
S&EIR	:	Scoping and Environmental Impact Reporting

1. INTRODUCTION

JMA Consulting (Pty) Ltd. was appointed by Hernic Ferrochrome (Pty) Ltd to compile a revised quantum for financial provision for closure based on the quantum assessments completed in 2015.

This document was compiled according to the requirements provided by the Official guideline (*Guideline Document for the Evaluation of the Quantum of Closure-related Financial Provision provided by a Mine, January 2005*) together with the relevant Regulation of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002) as prescribed by the Department of Minerals and Resources (DMR).

2. LEGAL FRAMEWORK FOR CLOSURE

The South African legal system is dynamic. Significant changes relating to mined land rehabilitation have occurred in the recent past.

The abbreviated summary of key legal aspects affecting rehabilitation activities given below is not in any way comprehensive, but is intended to provide a basic outline for mine management of the rehabilitation-related issues they may have to face during the life of the operation. We advise that a full interpretation of the legal framework is only possible through the reading of the complete Acts themselves.

South African legislation imposes a clear obligation on companies to prevent environmental damage and defines clear obligations/responsibilities associated with mine rehabilitation and closure. Rehabilitation activities should be guided/controlled by legal requirements contained in many South African Acts and Regulations. However, the essence of these requirements is summarized below.

Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA)

Section 37 of the MPRDA provides that the principles set out in section 2 of National Environmental Management Act (NEMA) apply to all prospecting and mining operations. Section 89 provides that no exploration or production operations may commence unless financial provision has been made that is "acceptable to the designated agency guaranteeing the availability of sufficient funds for the due fulfilment of all exploration and production work programmes by the holder".

National Water Act 36 of 1998 (NWA)

This act finds application to the present context in that section 40 et seq. provides for certain categories of water users to apply for a water use license, section 19 imposes obligations on certain categories of persons (owners of land or person occupying land) to undertake reasonable measures to prevent pollution of a water resource from occurring, recurring or continuing. In addition, section 30 of the act allows the responsible authority; Department of Water and Sanitation (DWS) to require an applicant or holder of a water use license to furnish security in respect of any obligation or potential obligations arising from a license to be issued under the act if deemed necessary for the protection of the water resource or property. This obligation to provide security is insufficiently cross referenced to the financial rehabilitation provisions in section 41 of the MPRDA.



The purpose of the NWA is to ensure that the country's water resources are protected, used, developed, conserved, managed and controlled, in a way, which takes into account, *inter alia* the reduction and prevention or degradation, of water resources.

Pollution Prevention in terms of the NWA: Pollution prevention of water resources and remediation of the effects thereof are to be performed in terms of the provisions of Section 19 of the NWA. Section 19 states that:

- "(1) An owner of land, a person in control of land or a person who occupies or uses land on which;
 - (a) any activity or process is or was performed or undertaken; or
 - (b) any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any pollution from occurring, continuing or recurring."

Should a person fail to take the reasonable measures required under subsection 1, a Catchment Management Agency may direct any person who fails to take the measures required under subsection (1) to commence taking specific measures before a given date, diligently continue with those measures and to complete them before a given date.

National Environmental Management Act 107 of 1998 (NEMA)

The Minister of Environmental Affairs published the 'Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations' in GN R1147 in Government Gazette 39425 (the "Regulations"), another key set of laws to finalise the transition to the Single Environmental System. These Regulations govern the transition from the MPRDA section 41 regime to the new NEMA section 24(P) regime.

Financial provision is defined in NEMA as "the insurance, bank guarantee, trust fund or cash that applicants for an environmental authorisation must provide in terms of this Act, guaranteeing the availability of sufficient funds to undertake the (a) the rehabilitation of the adverse environmental impacts of the listed or specified activities; (b) rehabilitation of the impacts of the prospecting, exploration, mining or production activities, including the pumping and treatment of polluted or extraneous water, (c) decommissioning and closure of the operations, (d) remediation of latent or residual environmental impacts which become known in the future; (e) removal of building structures and other objects; or (f) remediation of any other negative environmental impacts".

Section 24(P) of the NEMA details the requirements of financial provision for remediation of environmental damage.

- 1. An applicant for an environmental authorization relating to prospecting, exploration, mining or production must, before the Minister responsible for mineral resources issues the environmental authorization, comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts.
- 2. If any holder or any holder of an old order right fails to rehabilitate or to manage any impact on the environment, or is unable to undertake such rehabilitation or to manage such impact, the Minister responsible for mineral resources may, upon written notice to such holder, use all or part of the financial provision contemplated in subsection (1) to rehabilitate or manage the environmental impact in question.



- 3. Every holder must annually
 - a) assess his or her environmental liability in a prescribed manner and must increase his or her financial provision to the satisfaction of the Minister responsible for mineral resources; and
 - b) submit an audit report to the Minister responsible for mineral resources on the adequacy of the financial provision from an independent auditor.
- 4. If
 - a) the Minister responsible for mineral resources is not satisfied with the assessment and financial provision contemplated in this section, the Minister responsible for mineral resources may appoint an independent assessor to conduct the assessment and determine the financial provision.
 - b) Any cost in respect of such assessment must be borne by the holder in question.
- 5. The requirement to maintain and retain the financial provision contemplated in this section remains in force notwithstanding the issuing of a closure certificate by the Minister responsible for mineral resources in terms of the MPRDA, 2002 to the holder or owner concerned and the Minister responsible for mineral resources may retain such portion of the financial provision as may be required to rehabilitate the closed mining or prospecting operation in respect of latent, residual or any other environmental impacts, including the pumping of polluted or extraneous water, for a prescribed period.
- 6. The Insolvency Act, 1936 (Act No. 24 of 1936), does not apply to any form of financial provision contemplated in subsection (1) and all amounts arising from that provision.
- 7. The Minister, or an MEC in concurrence with the Minister, may in writing make subsections (1) to (6) with the changes required by the context applicable to any other application in terms of this Act.

On **26 October 2016** the Minister published a notice (GN 40371 - National Environmental Management Act (107/1998): Amendments to Financial Provisioning Regulations, 2015) that extended the transition for any person who held a right or permit when the Regulations came into force on 20 November 2015, or who had applied for the right or permit before the Regulations came into force but only obtained same after 20 November 2015.

These categories of persons must now comply with the Regulations by **20 February 2019**. In this transitional phase, it is seen that mines must continue to comply with the DMR / MPRDA system to complete their annual financial provisioning assessments.

National Environmental Management Waste Act 59 of 2008 (NEMWA)

Waste generated by mining is specifically included in the definition of waste. This is now active and defines "residue stockpiles" and "residue deposits" as waste management activities. The contaminated land provisions of the act, also active and applicable in the mining context, needs consideration during the operational and closure planning phases.



3. SCOPE OF WORK

The terms of reference of this project is related to the revision of the rehabilitation and closure cost provision for Hernic Ferrochrome (Pty) Ltd. The scope entails the following:

- Review site layout plans and quantity estimates made available by the mine to determine infrastructure and/or activities footprint areas.
- Compile closure bill of quantities.
- Apply DMR closure cost guideline / master rates.
- Compile rehabilitation closure cost report.

Actions to be performed:

The actions to be performed to full the terms of reference and support the stated project objectives will encompass the following components;

- Obtain approved EMPR, Closure Plan and current Cost Provision.
- Obtain latest surveyed information
- Identify, with support from the mine, areas which could undergo concurrent rehabilitation.
- Compile updated closure bill of quantities.
- Apply updated master rates (escalate on average Consumer Price Index (CPI) per year since 2005 based on DMR quantum guideline).
- Compile updated closure cost report.



4. SITE INFORMATION

4.1 SITE HISTORY

Hernic Ferrochrome (Pty) Ltd has been in operation since May 1996. The Operations, which expanded over the years, comprise both mining of Chromite Ore (initially opencast and then later from underground), ore beneficiation to yield feedstock chromite concentrate and lumpy ore, followed by pelletizing and sintering of the fine ore and finally Ferrochrome Smelting in four closed Furnaces, with an annual production capacity of 420 000 *tonnes* of ferrochrome. Several chrome recovery operations from chromite containing slag are also active on the site.

As the site expanded and was upgraded since 1996, Hernic Ferrochrome (Pty) Ltd has applied for, and obtained, the required Environmental Authorizations as and when required. It currently operates under an approved EMPR, which was amended as recently as 2016 and also holds a Water Use Licence, an Atmospheric Emissions Licence, as well as relevant EIA Authorizations.

The following approved EMPR and EMPR amendments have been undertaken for Hernic Ferrochrome (Pty) Ltd:

- Environmental Management Programme Report for the Maroelabult Mining Operation and Ferrochrome Plant (PWV 6/2/2/549) 23 October 1995
- Environmental Management Report for extension of the existing Hernic Ferrochrome Operations 28 July 1998
- Amendment to the Environmental Management Report: Disposal of Fine and Coarse Waste (RDNW (KL) 6/2/2/518) 08 March 2001
- Amendment to the Approved Environmental Management Programme in terms of Section 39(1) of the Minerals Act (Act 50 of 1991) for Hernic Ferrochrome (Pty) Ltd Fourth Furnace on Portion 103 of the Farm De Kroon 444 JQ in the Magisterial District of Brits (RDNW (KL) 6/2/2/2515) 01 April 2004
- Environmental Impact Assessment and Environmental Management Programme for a Railway Siding in terms of section 22 of the Environment Conservation Act 73 of 1989 (ECA)
 – 23 June 2006
- Approval of Environmental Management Programme in terms of Section 39(6) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002): for Hernic Ferrochrome (Pty) Ltd in respect of portions 52, 51, 122, 121, 123, 132, 115, 160, 159, 161, 157, 50, 49, 120, 119, 47, half share of remainder of Portion 48, Portions 119, 168, 167, 166, 165 (Portion of Portion 47) of the Farm De Kroon 444 JQ, situated in the Magisterial District of Brits, North West Region (NW 30/5/1/2/3/2/1/308 EM) 26 June 2012
- Approval of an Amendment to the Approved Environmental Management Programme in terms of Section 102 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) to include Tailing Storage Facility in respect of Portions 49, 50, 78, 104, 105, 135, 132, 151 and 199 of the Farm De Kroon 444 JQ, situated in the Magisterial District of Brits (NW 30/5/1/2/3/2/1/308 EM) 03 November 2015



 Approval of the Amended Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) Reports in terms of Section 102 of the Mineral and Petroleum Resources Development Act, (Act 28 of 2002) which are now regarded as an Environmental Authorisations issued in terms of Regulation 25(1) of the National Environmental Management Act, 1998 (Act 107 of 1998): Environmental Impact Assessment Regulations 2014, Regarding the Inclusion of additional Minerals which are Platinum, Ruthenium, Rhodium, Palladium, Osmium, Iridium, Gold Ore, Silver Ore, Nickel Ore, Copper Ore, Cobalt, Vanadium, Iron Ore, Rare Group Elements and Non-Metallic Elements being Sulphur, Selenium and Tellurium (in respect of middle group chromitite seams) and sand manufactured from waste rocks (excluding Portion 37 of the Farm Elandsfontein 440JQ (only chrome contained in the MG Chromitite seams in respect of Portion 37 of the farm Elandsfontein 440JQ) in respect of various portions of various farms as described on the issued mining rights, all situated in the Magisterial District of Brits, North West Region (NW 30/5/1/2/3/2/1/(308) EM & NW 30/5/1/2/3/2/1/ (396) EM) – 25 October 2016.

4.2 PROCESS DESCRIPTION

Chromite seams from the Middle Group Chromite Seams (MG-0 – MG-4) are mined by means of opencast and currently underground mining. Ore is also sourced from neighbouring mines which consist of chromite from the LG-6, MG-0, MG-1, MG-2 and UG-2 Chromite seams. Other materials such as dolomite, limestone, quartzite, anthracite, coke are procured for the process. The beneficiation and concentration of the ore is done by crushing, screening, spiralling and dense medium separation (DMS) in an Ore Beneficiation (OB) Plant. Pelletizing and sintering of the ore takes place at two pelletizing plants. Further smelting of the ore takes place in four Closed Submerged Arc Furnaces where the separation of Ferrochrome and Slag takes place. The chrome product is broken up after the smelting process. Ferrochrome is further recovered at the Fine Slag Recovery Plant, whereas PGM minerals are recovered from the OB Plant Slimes at the PGM Plant. Final preparation is made at the final product area before the product is dispatched to the markets.

Further manufacturing of sand from the slag and waste rocks are done at the Fine Slag Recovery Plant. Manufacturing of aggregate from slag and waste rocks are done at the Aggregate Plants.

The surface operations at Hernic Ferrochrome (Pty) Ltd are located on and restricted to the Farm De Kroon 444 JQ and cover a surface area of approximately 386 *ha*. The Hernic Ferrochrome (Pty) Ltd Mining Right Boundary (Mining Rights; NW 30/5/1/2/2/396 MR and NW 30/5/1/2/2/308 MR) includes the neighbouring Farm Elandsfontein 440 JQ as well. Historically both opencast as well as underground mining occurred on / below the Farm Elandsfontein 440 JQ. Whereas the opencast mining has been completed and is currently in a state of partial rehabilitation, underground mining of the MG-1 and MG-2 seams will continue below both properties.

Mining at Hernic Ferrochrome (Pty) Ltd's Morula (Maroelabult) section commenced in 1996. Initially only opencast mining was conducted with the underground operations only commencing in 2002/2003. The opencast mining operations were completed in 2014 and the underground mining was temporarily stopped as well. Future mining (from 2016 onwards) will take place by underground mining methods only.

4.3 SITE LAYOUT

The Hernic Ferrochrome (Pty) Ltd site is located 7km to the south-east of the town of Brits in the Madibeng Local and Bojanala District Municipalities within the North West Province of South Africa.



The Hernic Ferrochrome (Pty) Ltd site is flanked along the western perimeter by the R511 regional road and along the southern perimeter by the N4 national road. Access to the Hernic Ferrochrome (Pty) Ltd operations is obtained via the private entrance / access road from the R511 regional road.

A railway siding also provides access to the Hernic Ferrochrome (Pty) Ltd operations, although this is specifically used to load and offload final product and raw materials. The regional topographical setting for Hernic Ferrochrome (Pty) Ltd is portrayed in Figure 4.3(a).

A high resolution aerial photograph was commissioned during 2015 and was used to support a full site description and activity inventory for the Hernic Ferrochrome (Pty) Ltd operations. The site was divided into five separate operational areas based on the different activities occurring on the site, namely the Alloys Smelting Plant, the TSF Facility, the Office Complex and CRP Plant, the Morula Mining Opencast Operation and the Morula Mining Shaft Complex. Refer to Figure 4.3(b) for the five operational areas and to Figure 4.3(c) for the location of the different activities occurring on site, i.e. site inventory.

The map depicted in Figure 4.3(b) and Figure 4.3(c) focusses on the Hernic Ferrochrome (Pty) Ltd surface located activities which are restricted to the Farm De Kroon 444 JQ, and which covers a total surface area of approximately 386.45 ha.

The Hernic Ferrochrome (Pty) Ltd mining right extends onto the neighbouring Farm Elandsfontein 440 JQ as well, but at present no surface activities occur on this property. Historically both open-cast mining as well as underground mining occurred on Elandsfontein. Whereas the open-cast mining has been completed and is currently in a state of partial rehabilitation, underground mining of the MG-1 and MG-2 seams will continue on this property. The Hernic Ferrochrome (Pty) Ltd Property description is summarised as Table 4.3(a).





Figure 4.3(a): Regional Topographical Setting of Hernic Ferrochrome (Pty) Ltd





Figure 4.3(b): Operational Areas at Hernic Ferrochrome (Pty) Ltd





Figure 4.3(c): Site layout for Hernic Ferrochrome (Pty) Ltd with the Site Inventory



Form and Dortion	Dood	Size (ha)	Surface Owner	Minoral Owner		
	Deeu	Size (lia)	Surface Owner	Miller al Owlier		
De Kroon 444JQ						
Portion 78 (a Portion of Portion 1) of the farm De Kroon 444 Registration Division JQ	T17161/2004	40.8137	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
Portion 135 (a Portion of Portion 105) of the farm De Kroon 444 Registration Division JQ	T17161/2004	23.8187	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
The Remaining Extent of Portion 105 (a Portion of Potion 1) of the farm De Kroon 444 Registration Division JQ	T24244/1995*	30.1242	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
Portion 104 (a Portion of Portion 1) of the farm De Kroon 444 Registration Division JQ	T24244/1995*	43.1778	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
Portion 143 (a Portion of Portion 103) of the farm De Kroon 444 Registration Division JQ	T24244/1995*	28.4587	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
Portion 169 (a Portion of Portion 47) of the farm De Kroon 444 Registration Division JQ	T24244/1995*	7.7753	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
Remaining Extent of Portion 47 of the farm De Kroon 444 Registration Division JQ	T91069/1995	26.9487	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
Portion 170 (a Portion of Portion 47) of the farm De Kroon 444 Registration Division JQ	T91069/1995	7.7753	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
The Remaining Extent of Portion 173 of the farm De Kroon Registration Division JQ,	T76764/1999	27.7185	Giel Emma Barnard Trust (IT 3500/99)	Hernic Ferrochrome (Pty) Ltd		
Portion 342 of the farm De Kroon 444 Registration Division JQ	T21865/2010*	32.6281	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
Despite requests, the Registrar of Deeds could not provide a copy of the aforesaid Deed of Transfer.	T128153/2007*	-	Emile Stephan Van Druten	Hernic Ferrochrome (Pty) Ltd		
Remaining Extent of Portion 46 of the farm De Kroon 444 Registration Division JQ	T50199/2014	-	Hernic Ferrochrome (Pty) Ltd	Hernic Ferrochrome (Pty) Ltd		
Remaining Extent of Portion 100 (a Portion of Portion 1) of the farm De Kroon 444 Registration Division JQ	T93926/2005	23.62	Tertulus Graniet Beleggings CC (2002/075588/23)	Hernic Ferrochrome (Pty) Ltd		
Portion 37 (a Portion of Portion 16) of the farm Elandsfontein 440 Registration Division JQ	T103483/2006	530.9852	Eland Platinum Mines (Pty) Ltd (2005/025393/07)	Hernic Ferrochrome (Pty) Ltd		

Table 4.3(a): Hernic Ferrochrome (Pty) Ltd Property description



Infrastructure Requirements (Morula Mining Operation)

Mining at Hernic Ferrochrome (Pty) Ltd's Morula (Maroelabult) section commenced in 1996. Initially only open-cast mining was conducted with underground operations only commencing in 2002/2003. Open-cast mining was completed in 2007 and the underground mining was temporarily stopped during 2015. Future mining (from 2016 onwards) will be underground only. The operations at Hernic Ferrochrome (Pty) Ltd will be discussed under three headings:

- Morula Mining Shaft Complex
- Morula Mining Opencast Operation
- Morula Mining Underground Operation

Morula Mining Shaft Complex

The complex supports access to the underground mining operations through two incline shafts and provides the required ancillary services to the mining operation. The following facilities/infrastructure/activities occur within this area:

- Decline Materials Shaft
- Decline People Shaft
- Access Roads
- Water Storage Dams (No. 1, 2 and 3)
- Mining Offices
- Engineering Offices
- Engineering Workshops
- Parking Areas
- Ore/Waste Rock Transfer House
- Change House Complex
- CV1 Conveyor
- CV2 Conveyor
- CV3 Conveyer
- CV4 Conveyor
- CV5 Conveyor
- Grout Plant
- Peoples Walkway (from parking and hostel area to shaft)
- Emergency ROM Stockpile
- Mine Waste Rock Stockpile Area
- Topsoil Stockpile
- Morula Dewatering Dam
- Redundant Explosives Magazine
- Abandoned Hostel
- Old Contractors Supervisors Quarters (Demolished)
- Historic Slag Dump
- Old Hostel Area
- Mine Sewage Plant

Opencast Mining Operations

- Backfilled Open Cast Pit
- OB Plant Coarse Tailings
- OB Plant Fine Tailings
- OB Plant Mixed Tailings
- MG-4 Stockpile


- Final Void
- Re-Mining of Historical OB Fine Tailings
- Water Abstraction
- Water Pipe Lines

Alloys Smelting Plant

- General Plant Infrastructure
- Raw Materials Stockpile Area 1 & 2
- Ore Beneficiation Plant (Spiral and DMS)
- Pelletizing Plant 1 & 2



5. APPROACH AND METHODOLOGY

Mine Closure may be only temporary in some cases, or may lead into a program of care and maintenance. In this sense, the term mine closure encompasses a wide range of drivers, processes and outcomes.

Mine closure is the goal of mine closure planning. A completed mine has reached a state where mining lease ownership can be relinquished and responsibility accepted by the **<u>next land user</u>**. To achieve this in an environment of increasing regulatory and stakeholder expectations requires that superior outcomes are developed and implemented in consultation with relevant stakeholders, including local communities.

Mine completion ultimately determines what is left behind as a benefit or legacy for future generations. If mine closure and completion are not undertaken in a planned and effective manner, a site may continue to be a source of pollution for many years to come. The overall objective of mine completion is to prevent or minimize adverse long-term environmental, physical, social and economic impacts, and to create a stable landform suitable for the agreed future land use.

Mining operations are finite economic activities, which are usually relatively short term. For a mining project to contribute positively to an area's development in any lasting way, closure objectives and impacts must be considered from project inception. Mine closure policy and planning defines a vision of the end result and sets out concrete objectives to implement that vision. To achieve this mine closure planning should be an integral part of a project life cycle to ensure that:

- Future public health and safety are not compromised;
- Environmental resources are not subject to physical and chemical deterioration;
- The end land use of the site is beneficial and sustainable in the long term;
- Any adverse socio-economic impacts are minimized and;
- All socio-economic benefits are maximized.

These objectives can best be achieved by the preparation of a mine closure plan early in the process of mine development, in consultation with the regulating authority and local communities. Closure planning includes a commitment to progressive rehabilitation and detailed plan development and implementation. The plan must provide a framework against which short term actions can be measured during mine life and adjustments made to ensure a successful final closure. It also provides a view of the potential future for the community's economic and social life.

Operational mines that are close to the end of their economic life have limited options available for addressing sustainable development goals during closure. Operational facilities must focus on opportunities to address sustainable development issues. Ideally, planning for closure should start during the pre-feasibility stage of all mining projects.

The activities during the final closure stage include:

- 1) the removal of infrastructure,
- 2) the implementation of public safety measures (relates to the waste facilities, infrastructure remaining, water containment facilities, shafts and rehabilitated areas),
- 3) re-contouring and re-vegetation of disturbed footprints (rehabilitation),
- 4) on-going maintenance of site structures and monitoring of environmental issues,



- 5) the operation of site facilities required to mitigate or prevent long term environmental degradation; and
- 6) the completion of company involvement in sustainable community economic and social programmes.

Closure planning should be developed at the feasibility stage and have adequate technical validity and financial resources on which to base future updates and reviews. It should be consistent with the regulatory requirements of the particular jurisdiction and should include the following environmental considerations:

- A defined post-closure use for the site, with respect to safety and environmental standards;
- A good understanding of a site's background and baseline conditions and clear definitions of the zone of influence and key receptors;
- On-going and effective input from key stakeholders in plan development and modification;
- Explicit consideration of potential social impacts and benefits associated with environmental quality and potential future land use alternatives for the site (including consideration of possible uses for site infrastructure);
- The use of risk analysis methods in the closure plan development and to establish the design criteria, for example to address the possibility of major events (e.g. flooding, drought);
- A clearly identified sequence and schedule of closure activities;
- The application of, where possible, progressive (i.e. concurrent) rehabilitation of areas during the operating life of the mine to reduce the environmental footprint of the site;
- The review and adjustment of closure plans on a regular basis and after changes in operations or conditions;
- Periodic monitoring and audits that provide a measure of actual versus planned rehabilitation and;
- Closure costs calculations which are consistent and transparent, and based on reasonable estimates of actual costs taking into account local conditions and cost structures.

The following diagram (Figure 5(a)) summarizes the closure methodology taking the various life cycles of the operational activities into consideration.

Rehabilitation planning and legal authorization is a complex, iterative process that involves interaction with a wide range of people to ensure that it progresses smoothly. The recent developments in the mining and environmental legislative framework for the authorization process for mining (which relates directly to land rehabilitation) have also increased the complexity of the situation.

Rehabilitation is an expensive business, which can account large capital costs in certain circumstances. As the majority of these costs are usually incurred after mine closure, or at least after a significant portion of mining has been completed, some form of guarantee is required by authorities to ensure that these costs are met. In addition, there is now a requirement to provide financial assurance that the costs of rehabilitation will be met in the case of early or unplanned closure. The question is, how will the costs of rehabilitation be funded if the mine closes prematurely, either due to mining issues or to decreased value of the product? This emphasizes the importance for an accurate estimate of the cost of rehabilitation and when rehabilitation is going to be done.





Figure 5(a): Closure methodology considering the various life cycles of the Mine Operation.

Based on the DMR Quantum Guideline, the level of closure quantum information available determines if the quantum provided for financial provisioning can be accepted (Option 1) or if a "rule-based" approach needs to be followed (Option 2 or 3). See the Process Flow Diagram indicating the process and possible "routes" to be followed in the assessment of the quantum for financial provision for closure.



The criteria for selection of Option 1, 2 or 3 are listed below in Table 5(a).

Table	5(a):	Process	and	possible	"routes"	to	be	followed	in	the	assessment	of	the
quanti	um for	financia	l prov	vision for	closure								

Confidence Level - Level of info	rmation
An approved EMP as contemplated in Section 39 of the MPRDA, or an EMP that is in the process of being approved or amended.	Extensive information available.
A detailed Closure Plan, based on the EMP that covers all aspects of rehabilitation and closure of the mining operation.	Limited information available.
A detailed breakdown of costs envisaged for rehabilitation and closure, signed off by a competent person.	Information available.

Based on available information (Section 10 Reference documentation) it was concluded that the Level of quantum information available is "Limited". In this case Step 1 to 5 will be followed.

The indicated steps will be followed to determine the quantum for financial provision:

- Step 1: Determine risk class.
- Step 2: Determine area sensitivity.
- Step 3: Determine the Multiplication Factors for closure components
- Step 4: Determine Weighing Factor 1 and 2
- Step 5: Calculate closure costs.

The information generated above will be populated in the process flow diagram as provided in the guideline. The **Process Flow Diagram** below indicates the route to be followed in the assessment of the quantum for financial provision. It is a summary of the procedural steps to be taken to calculate the quantum of financial provision required.



PROCESS FLOW DIAGRAM:





6. DETERMINE QUANTUM PARAMETERS

This section of the report outlines and follows the Department of Mineral Resources (DMR) procedure for the determination of the quantum for financial provision for closure. Details of the approach used as prescribed by the guideline, and in a sense of the overall risk ranking and sensitivity of the mine in relation to its surroundings, are discussed below. The procedure complies out of the following input parameters.

6.1 INPUT PARAMETERS FOR QUANTUM PROVISION

Table 6.1 indicates the input parameters required to enable the determining of the quantum of financial provisioning.

No	Input data	Comment
6.1.1	Risk ranking for mine type and mineral by-product	Class A
6.1.2	Environmental sensitivity of the mining area	High Environmental Sensitivity
6.1.3	Level of information available	EMP/EIA/EMPr/Scoping Report (2017)
6.1.4	Type of mining operation	Underground Mine/ Processing Plant Operations
6.1.5	Geographical location of the mine	Peri-Urban
6.1.6	Closure components & Areas of disturbance (Components Map)	Survey information available

Primary Risk Class for type of minerals mined:

Mineral	Ore	Size: Larger if > than (tpm)	Primary ri	sk class		
			Large Mine / Mine, mine waste, plant and plant waste		Small Mine	
Chrome	Sulphide	10 000	А	А	С	А
	Oxide	10 000	С	А	С	А

*Underground mines have a minimum risk ranking of B (Medium risk)

The determination of the Primary Risk Class is based on the type of minerals / product being mined and produced on site. The nature of the saleable by-products is also taken into account during this risk ranking. This can be seen in Table B.14 of the guideline document.

Determine Risk Class:

Determine risk c	Determine risk class				
Class A	a high probability of the occurrence of the impact with a severe consequence,				
Class B	a moderate probability of occurrence of the impact with a manageable consequence,				
Class C	a low probability of occurrence of the impact with a negligible consequence.				



The Risk class is determined by using Table B.12 of the Guideline document for the Evaluation of the Quantum Calculation. Based on the following information the operations were classified as a Class A Mine.

Determine Area Sensitivity:

The mining operation can be located in a Low, Medium or High sensitivity area based on the biophysical, social and economic situation. **Section 6.1.3** provides the criteria on which the determination of the sensitivity of the area within which the mine is located. The Area Sensitivity is determined by using Table B.4 of the Guideline document.

Area sensitivity			
	Sensitivity criteria	riaSocialEconomicd from d from l fauna speciesThe local communities are not within sighting distance of the mining operation.The area is insensitive to development.speciesLightly inhabited area (rural).The local communities are in the proximity of the mining operation are in the proximity of the mining operation and distance).The area has a balanced economic development where a degree of income for the local communities is derived from the area.l and lora. a mix of mix of mix of wersal es are d flora, rk.The local communities are in close proximity of framework. Area developed with an establishedThe local communities are in close proximity of framework darea developed with an establishedl state. l lstate.The local communities are in close proximity of framework darea in close proximity of iversity in maining operation framework. Area developed with an establishedThe local communities derive the bulk of their income directly from the area is sensitive to development. derive the bulk of their income directly from the area is sensitive to development that could compromise the existing economic	
Sensitivity	Biophysical	Social	EconomicSThe area is insensitive to development. The area is not a major source of income to the local communities.SThe area has a balanced economic development n where a degree of g income for the local communities is derived h from the area. a The economic activity could be influenced by indiscriminate n development.PSThe local communities of derive the bulk of their n income directly from the area. The area is sensitive to development that could compromise the existing economic
Low	Largely disturbed from natural state. • Limited natural fauna and flora remains. • Exotic plant species evident. • Unplanned development. • Water resources disturbed and impaired.	The local communities are not within sighting distance of the mining operation. Lightly inhabited area (rural).	The area is insensitive to development. The area is not a major source of income to the local communities.
Medium	Mix of natural and exotic fauna and flora. Development is a mix of disturbed and undisturbed areas, within an overall planned framework. Water resources are well controlled.	The local communities are in the proximity of the mining operation (within sighting distance). Peri-urban area with density aligned with a development framework. Area developed with an established	The area has a balanced economic development where a degree of income for the local communities is derived from the area. The economic activity could be influenced by indiscriminate development.
High	Largely in natural state. Vibrant fauna and flora, with species diversity and abundance matching the nature of the area. Well planned development. Area forms part of an overall ecological regime of conservation value. Water resources emulate their original state.	The local communities are in close proximity of the mining operation (on the boundary of the mine). Densely inhabited area (urban/dense settlements). Developed and well- established communities.	The local communities derive the bulk of their income directly from the area. The area is sensitive to development that could compromise the existing economic activity.

Based on the following information the operations were classified as a High Environmental sensitivity Mine.



Determining the unit rates for closure components:

When determining the multiplication factor for determining the Master Rate, the risk class (Class A, B or C) and the Environmental Sensitivity (High, Medium, Low) are used to determine the unit rates for the applicable closure components. However, only three of these closure components are variable - Component 6, 8(C) and 13.

component o openeast in	mabilita					
COMPONENT 6	OPENC. REHAB	AST ILITATION				
	UNIT			MASTER RATE (2016)		
	ha		R 193 216.59			
	Multip	R 193 216.59 ultiplication factor 0.04 0.52 1.00				
	Α	0.04	0.52	1.00		
Risk Class	В	0.04	0.52	1.00		
(A, B or C)	С	0.04	0.52	1.00		
		Low	Medium	High		
	Enviro	nmental Sensit	ivity			

Component 6 - Opencast Rehabilitation:

Component 8 (c) - Processing water deposits & Evaporation ponds:

COMPONENT 8 (C)	PROCESSING WATER DEPOSITS & EVAPORATION PONDS					
	UNIT			MASTER RATE (2016)		
	ha		R 479 944.41			
	Multipl	ication factor				
	Α	0.59	0.80	1.00		
Risk Class	В	0.55	MASTER RATE (2016) R 479 944.41 ation factor 0.59 0.80 0.55 0.76 0.51 0.66 0.81 Low Medium High			
(A, B or C)	С	0.51	0.66	0.81		
		Low	Medium	High		
	Enviro	nmental Sensit	ivity			

Component 13 – Water Management:

COMPONENT 13	WATER MANAGEMENT				
	UNIT			MASTER RATE (2016)	
	ha			R 39 962.07	
	Multip	lication factor			
	Α	0.60	0.67	1.00	
Risk Class	В	MASTER RATE (2016) R 39 962.07 Dication factor 0.60 0.67 0.41 0.60 0.17 0.25 0.33 Low Medium High			
(A, B or C)	С	0.17	0.25	MASTER RATE (2016) R 39 962.07 1.00 0.67 0.33 High	
		Low	Medium	High	
	Enviro	nmental Sensit	tivity		



Determining Weighting Factor 1 and 2:

The following **Weight Factors** provided by the DMR guidelines are to be used to calculate the necessary financial provisioning required for mine closure. The highlighted block is the weighting factor applicable to Hernic. The calculations are attached as **Appendix I**.

Nature of the Terrain/Accessibility	Flat	Undulating	Rugged
Weighting Factor 1	1.00	1.10	1.20

Weighting factor 1 are applied to all closure components:

Flat: Generally flat over the mine area

Undulating:A mix of sloped and undulating areas within the mine areaRugged:Steep natural ground slopes (greater than 1:6) over the majority of the mine area

Based on the **Terrain/Accessibility** conditions for Hernic, Weighting Factor 1 is 1.00

Proximity to urban area where goods and services are supplied	Urban	Peri-urban	Remote
Weighting Factor 2	1.00	1.05	1.10

Weighting factor	2 is applied t	o preliminary and	d general item only	v:
- 0 - 0	- · · · · · · ·	· · · · · ·		

Urban:	Within a developed urban area
Peri-urban:	Less than 150 km from a developed urban area
Remote:	Greater than 150 km from a developed urban area

Based on the **"Proximity to urban area where goods and services are supplied"** the Weighting Factor 2 is selected as 1.05.



7.



REHABILITATION ESTIMATION COST

Mine:	HERNIC FERROCHROME PTY	LTD		Loc	Location: North We				North West
Evaluators:	JMA Consulting (Pty) Ltd			Dat	e:				Feb-17
			А		В	С	D		E=A*B*C*D
No	Description	Unit	Quantity	Ма	ster rate <mark>2016</mark>	Multiplicati on factor	Weighting factor 1		Amount (Rand)
1	Dismantling of processing plant and related structures (Including overland conveyors and power lines)	m²	733910.00	R	13.63	1	1	R	10 001 038.79
2(A)	Demolition of steel buildings and structures	m²	36467.00	R	189.82	1	1	R	6 922 159.05
2(B)1	Demolition of reinforced concrete buildings and structures	m²	19973.00	R	279.73	1	1	R	5 587 136.34
2(B)2	Demolition of light concrete slabs	m²	14220.00	R	179.32	1	1	R	2 549 930.40
3	Rehabilitation of access roads Including all haul roads	m²	55000.00	R	33.97	1	1	R	1 868 226.56
4(A)	Demolition and rehabilitation of electrified railway lines	m	0.00	R	329.69	1	1	R	-
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	4670.00	R	179.83	1	1	R	839 802.81
5	Demolition of housing and/or administration facilities	m ²	16660.00	R	379.64	1	1	R	6 324 796.11
6	Opencast rehabilitation including final voids and ramps	ha	5.20	R	193 216.59	1	1	R	1 004 726.25
7	Sealing of shafts, adits and inclines	m ³	3338.00	R	101.90	1	1	R	340 153.11
8(A)	Rehabilitation of overburden and spoils	ha	30.75	R	132 674.06	1	1	R	4 079 727.27
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	79.77	R	165 243.14	1	1	R	13 181 445.35
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	4.36	R	479 944.41	1	1	R	2 092 557.61
9	Rehabilitation of subsided areas	ha	0.00	R	111 094.54	1	1	R	-
10	General surface rehabilitation	ha	120.39	R	105 100.23	1	1	R	12 653 016.97
11	River diversions	ha	0.00	R	105 100.23	1	1	R	-
12	Fencing	m	15107.00	R	119.89	1	1	R	1 811 120.77
13	Water management	ha	0.00	R	39 962.07	1	1	R	-
14	2 to 3 years of maintenance and aftercare	ha	355.00	R	13 986.72	1	1	R	4 965 286.64
15	Specialist studies	Sum	1.00	R	1 170 979.00	1	1	R	1 170 979.00
							Sub Total 1	R	75 392 103.02
							Weighting factor 2	R	3 769 605.15
1	Preliminary and General					12 %	6 of Sub Total	R	9047052.36
2	Contingency					10 %	of Subtotal 1	R	7 539 210.30
							Sub Total 3	R	95 747 970.84
							VAT (14%)	R	13 404 715.92
							Grand Total	R	109 152 686.76



8. SUMMARY

The main cost components for review at Hernic Ferrochrome (Pty) Ltd are the following:

- The closure cost table includes the latest CPI data as updated up until December 2016.
- The footprint areas are based on an updated survey received from Hernic Ferrochrome.
- The total cost provision is inclusive of VAT @ 14%.
- Hernic Ferrochrome (Pty) Ltd should continue with the work to control and reduce environmental impacts during the operational phase. The will reduce closure cost in future.

9. **REFERENCES**

- Approval of Environmental Management Programme in terms of Section 39(6) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002): for Hernic Ferrochrome (Pty) Ltd in respect of portions 52, 51, 122, 121, 123, 132, 115, 160, 159, 161, 157, 50, 49, 120, 119, 47, half share of remainder of Portion 48, Portions 119, 168, 167, 166, 165 (Portion of Portion 47) of the Farm De Kroon 444 JQ, situated in the Magisterial District of Brits, North West Region (NW 30/5/1/2/3/2/1/308 EM) - 26 June 2012
- 2. Approval of an Amendment to the Approved Environmental Management Programme in terms of Section 102 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) to include Tailing Storage Facility in respect of Portions 49, 50, 78, 104, 105, 135, 132, 151 and 199 of the Farm De Kroon 444 JQ, situated in the Magisterial District of Brits (NW 30/5/1/2/3/2/1/308 EM) 03 November 2015
- 3. Department of Minerals and Energy, 2005. Guideline Document for the Evaluation of the Quantum of Closure-related Financial Provision provided by a Mine (Jan 2005)
- Draft Scoping Report, for Hernic Ferrochrome (Pty) Ltd, DMR Reference Number: NW 30/5/1/2/3/2/1/(308) EM & NW 30/5/1/2/3/2/1/(396) EM (January 2017) -Process underway



APPENDIX I

Hernic Ferrochrome Calculation of Rehabilitation Provision 2016 **CONSUMER PRICE INDEX (CPI)**

CONSUMER PRICE INDEX (CPI)

January Feb	January Feb	Feb	ruar y	March	April	May	June	July	August	September	October	November	December	Ave. %
% 3.0 2.6 3.0 3.4	3.0 2.6 3.0 3.4	2.6 3.0 3.4	3.0 3.4	3.4	I	3.3	2.8	3.4	3.9	4.4	4.0	3.4	3.6	3.4
% 4.0 3.9 3.4 3.3	4.0 3.9 3.4 3.3	3.9 3.4 3.3	3.4 3.3	3.3		3.9	4.9	5.0	5.4	5.3	5.4	5.4	5.8	4.6
% 6.0 5.7 6.1 7.0	6.0 5.7 6.1 7.0	5.7 6.1 7.0	6.1 7.0	7.0		6.9	7.0	7.0	6.7	7.2	7.9	8.4	9.0	7.1
% 9.3 9.8 10.6 11.1	9.3 9.8 10.6 11.1	9.8 10.6 11.1	10.6 11.1	11.1		11.7	12.2	13.4	13.7	13.1	12.1	11.8	9.5	11.5
% 8.1 8.6 8.5 8.4	8.1 8.6 8.5 8.4	8.6 8.5 8.4	8.5 8.4	8.4		8.0	6.9	6.7	6.4	6.1	5.9	5.8	6.3	7.1
% 6.2 5.7 5.1 4.8	6.2 5.7 5.1 4.8	5.7 5.1 4.8	5.1 4.8	4.8		4.6	4.1	3.7	3.5	3.2	3.4	3.6	3.5	4.3
% 3.7 3.7 4.1 4.2	3.7 3.7 4.1 4.2	3.7 4.1 4.2	4.1 4.2	4.2		4.6	5.0	5.3	5.3	5.7	6.0	6.1	6.1	5.0
% 6.3 6.1 6.0 6.1	6.3 6.1 6.0 6.1	6.1 6.0 6.1	6.0 6.1	6.1		5.7	5.5	4.9	5.0	5.5	5.6	5.6	5.7	5.7
% 5.4 5.9 5.9 5.9	5.4 5.9 5.9 5.9	5.9 5.9 5.9	5.9 5.9	5.9		5.6	5.5	6.3	6.4	6.0	5.5	5.3	5.4	5.8
% 5.8 5.9 6.0 6.1	5.8 5.9 6.0 6.1	5.9 6.0 6.1	6.0 6.1	6.1		6.6	6.6	6.3	6.4	5.9	5.9	5.8	5.3	6.1
% 4.4 3.9 4.0 4.5	4.4 3.9 4.0 4.5	3.9 4.0 4.5	4.0 4.5	4.5		4.6	4.7	5.0	4.6	4.6	4.7	4.8	5.2	4.6
% 6.2 7.0 6.3 6.2	6.2 7.0 6.3 6.2	7.0 6.3 6.2	6.3 6.2	6.2		6.1	6.3	6.0	5.9	6.1	6.4	6.6	6.8	6.3

DMR MASTER RATES TABLE FOR FINANCIAL PROVISION

	DMR		
0		Citra Citra	

R MASTER RATES TABLE FOR FINANCIAL PROVISION

			2004		2005	2006		2007	2008	2009	20.	10	2011	2	012	2013	201	[4	2015	2016	-
No	Description	Unit	Master rate	Ma	ister rate	Master rate	Ma	ster rate	Master rate	Master rate	Maste	r rate	Master rate	Mast	er rate	Master rate	Master	rate N	Master rate	Master rate	
			Published 2004	4	3.4%	4.6%		7.1%	11.5%	7.1%	4.3	%	5.0%	Ω.	7%	5.8%	6.19	%	4.6%	6.3%	
1	Dismantling of processing plant and related structures (Including overland conveyors and power lines)	m ²	R 6.82	2 R	7.05	R 7.3	8 R	7.90	R 8.81	R 9.4	4 R	9.85 R	10.34	R	10.93 F	R 11.50	6 R	12.25 R	12.82	R 13.65	
2(A)	Demolition of steel buildings and structures	m^2	R 95.00	0 R	98.22	R 102.75	9 R	110.07	R 122.76	R 131.5	2 R	137.18 R	144.05	Я	152.20 F	R 160.9	7 R	170.70 R	178.53	R 189.83	
2(B)	Demolition of reinforced concrete buildings and structures	m^2	R 140.0(0 R	144.75	R 151.4	8 R	162.20	R 180.90	R 193.8	2 R	202.15 R	212.26	R	224.30 F	R 237.2.	1 R	251.56 R	263.09	R 279.7:	
3	Rehabilitation of access roads	ш	R 17.00	0 R	17.58	R 18.3	9 R	19.70	R 21.97	R 23.5	4 R	24.55 R	25.77	R	27.24 F	R 28.81	0 R	30.55 R	31.95	R 33.93	-
4(A)	Demolition and rehabilitation of electrified railway lines	в	R 165.0(0 R	170.59	R 178.5	3 R	191.17	R 213.21	R 228.4	3 R	238.25 R	(250.17	, R	264.35 F	R 279.5'.	7 R	296.49 R	310.07	R 329.69	_
4(B)	Demolition and rehabilitation of non-electrified railway lines	m ²	R 90.00	0 R	93.05	R 97.38	8 R	104.27	R 116.29	R 124.6	0 R	129.96 R	136.45	×	144.19 F	R 152.4	9 R	161.72 R	169.13	R 179.8:	
5	Demolition of housing and/or administration facilities	m^2	R 190.00	0 R	196.44	R 205.58	8 R	220.13	R 245.51	R 263.0	4 R	274.35 R	288.07	R	304.40 F	R 321.9:	3 R	341.41 R	357.06	R 379.6	
9	Opencast rehabilitation including final voids and 1 ramps	ha	R 96 700.00	0 R	99978.13	R 104627.1.	1 R	112 034.71	R 124952.32	R 133873.9	1 R 139	630.49 R	146 612.01	I R 15	4 924.91	R 163846.0	1 R 173	758.69 R	181 722.63	R 193 216.59	_
7	Sealing of shafts, adits and inclines	m^3	R 51.0(0 R	52.73	R 55.18	8 R	59.09	R 65.90	R 70.6	1 R	73.64 R	17.32	R	81.71 F	R 86.4.	1 R	91.64 R	95.84	R 101.9	· · · ·
8(A)	Rehabilitation of overburden and spoils	ha	R 66400.00	0 R	68 650.96	R 71843.2	3 R	76 929.73	R 85799.73	R 91925.8	3 R 95	878.64 R	100 672.57	7 R 1(16 380.71 F	R 1125064	6 R 119	313.10 R	124 781.62	R 132 674.00	
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	R 82 700.00	0 R	85 503.53	R 89479.4	4 R	95 814.59	R 106862.01	R 114491.9	6 R 119	1415.11 R	125 385.87	7 R 15	(2 495.25 F	R 140124.7.	7 R 148	602.31 R	155 413.25	R 165 243.1	
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	R 240 200.00	0 R	248342.78	R 259890.7.	2 R :	278 290.98	R 310377.93	R 332 538.9	2 R 346	838.09 R	364 179.99) R 36	i4 829.00 F	R 406988.7 [,]	4 R 431	611.56 R	451 393.75	R 479 944.4	
6	Rehabilitation of subsided areas	ha	R 55 600.00	0 R	57 484.84	R 60157.85	9 R	64 417.06	R 71844.35	R 76974.0	4 R 80	1283.92 R	84 298.12	R 8	9 077.82 F	R 94207.2	2 R 99	906.75 R	104 485.81	R 111 094.5 ⁷	
10	General surface rehabilitation	ha	R 52 600.00	0 R	54383.14	R 56911.90	6 R	60 941.32	R 67967.86	R 72820.7	6 R 75	:952.05 R	29.749.66	3 R 8	4 271.46 F	R 89124.0	9 R 94	516.10 R	98 848.09	R 105 100.2	
11	River diversions	ha	R 52 600.00	0 R	54383.14	R 56911.9t	6 R	60 941.32	R 67967.86	R 72820.7	6 R 75	:952.05 R	79 749.66	5 R 6	4 271.46 F	R 89124.0	9 R 94	516.10 R	98 848.09	R 105 100.2	
12	Fencing	ш	R 60.00	0 R	62.03	R 64.9.	2 R	69.51	R 77.53	R 83.0	7 R	86.64 R	16.06	R	96.13 F	R 101.6	6 R	107.81 R	112.75	R 119.8	-
13	Water management	ha	R 20 000.00	0 R	20 678.00	R 21639.5	3 R	23 171.61	R 25843.29	R 27688.5	0 R 26	879.11 R	1 30 323.0t	S R S	:2 042.38 F	R 33887.4	9 R 35	937.68 R	37 584.83	R 39962.0	
14	2 to 3 years of maintenance and after care	ha	R 7 000.00	0 R	7 237.30	R 7573.8.	3 R	8 110.06	R 9045.15	R 9690.9	8 R 10	107.69 F	10 613.07	7 R 1	1214.83 I	R 11860.6.	2 R 12	578.19 R	13 154.69	R 13 986.77	
15	Specialist studies 5	Sum	R	- -		R	- 8		R	R	R		2	R		R	. В	R		R	<u> </u>

HERNIC FINANCIAL PROVISION



REHABILITATION ESTIMATION COST

Mine:	HERNIC FERROCHROME PTY	LTD		Loc	ation:				North West
Evaluators:	JMA Consulting (Pty) Ltd			Date	e:				Feb-17
			А		В	С	D		E=A*B*C*D
No	Description	Unit	Quantity	Mas	ster rate <mark>2016</mark>	Multiplicati on factor	Weighting factor 1		Amount (Rand)
1	Dismantling of processing plant and related structures (Including overland conveyors and power lines)	m ²	733910.00	R	13.63	1	1	R	10 001 038.79
2(A)	Demolition of steel buildings and structures	m ²	36467.00	R	189.82	1	1	R	6 922 159.05
2(B)1	Demolition of reinforced concrete buildings and structures	m ²	19973.00	R	279.73	1	1	R	5 587 136.34
2(B)2	Demolition of light concrete slabs	m ²	14220.00	R	179.32	1	1	R	2 549 930.40
3	Rehabilitation of access roads Including all haul roads	m ²	55000.00	R	33.97	1	1	R	1 868 226.56
4(A)	Demolition and rehabilitation of electrified railway lines	m	0.00	R	329.69	1	1	R	-
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	4670.00	R	179.83	1	1	R	839 802.81
5	Demolition of housing and/or administration facilities	m ²	16660.00	R	379.64	1	1	R	6 324 796.11
6	Opencast rehabilitation including final voids and ramps	ha	5.20	R	193 216.59	1	1	R	1 004 726.25
7	Sealing of shafts, adits and inclines	m ³	3338.00	R	101.90	1	1	R	340 153.11
8(A)	Rehabilitation of overburden and spoils	ha	30.75	R	132 674.06	1	1	R	4 079 727.27
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	79.77	R	165 243.14	1	1	R	13 181 445.35
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	4.36	R	479 944.41	1	1	R	2 092 557.61
9	Rehabilitation of subsided areas	ha	0.00	R	111 094.54	1	1	R	-
10	General surface rehabilitation	ha	120.39	R	105 100.23	1	1	R	12 653 016.97
11	River diversions	ha	0.00	R	105 100.23	1	1	R	-
12	Fencing	m	15107.00	R	119.89	1	1	R	1 811 120.77
13	Water management	ha	0.00	R	39 962.07	1	1	R	-
14	2 to 3 years of maintenance and aftercare	ha	355.00	R	13 986.72	1	1	R	4 965 286.64
15	Specialist studies	Sum	1.00	R	1 170 979.00	1	1	R	1 170 979.00
							Sub Total 1	R	75 392 103.02
							Weighting factor 2	R	3 769 605.15
1	Preliminary and General					12 %	% of Sub Total	R	9 047 052.36
2	Contingency					10 %	of Subtotal 1	R	7 539 210.30
							Sub Total 3	R	95 747 970.84
							VAT (14%)	R	13 404 715.92
							Grand Total	R	109 152 686.76

APPENDIX II

DETAILS OF DMR CLOSURE COMPONENTS

The information discussed below were taken from the Official guideline (Guideline Document for the Evaluation of the Quantum of Closure-related Financial Provision provided by a mine, report no. 5863-5900-2-p, Rev 1.5, 23 April 2004) provided by the Department of Mineral Resources.

Generally accepted closure methods, based on experience in the field, have been used as the basis for determining the Master rates for the various closure components in the DMR "rules-based" approach. The details enclosed in the approved EMP will however take precedence over these generally accepted closure methods.

COMPONENT 1: PROCESSING PLANT

The common method of valuation to determine the Master rate for processing plants is that:

- All infrastructure and concrete buildings should be broken down to natural ground and buried adjacent to the plant site,
- Foundations, structures and conveyors should be broken down to natural ground level,
- The areas are to be covered with 1,0m subsoil, top soiled with 300mm of topsoil and vegetation established, or as noted in the relevant EMP,
- The monitoring and maintenance of these areas has been costed under the appropriate areas,
- The concrete hardstand is the area between the plant buildings,
- Top soiling and vegetation for the areas are included under general surface rehabilitation,
- No credits are allowed for scrap steel and equipment that can be re-used or sold.

COMPONENTS 2(A) AND 2 (B): STEEL AND REINFORCED CONCRETE STRUCTURES BUILDINGS AND STRUCTURES

The common method of valuation to determine the Master rate for steel and reinforced concrete buildings and structures is that:

- All structures should be demolished to 1m below ground level,
- The rubble is to be buried adjacent to the sites, provided this adheres to the National Waste Management Strategy,
- Silos should be imploded and buried,
- The areas should be shaped, top soiled with 300mm of topsoil and vegetated or as stated in the relevant EMP document,
- Monitoring and maintenance is costed in the relevant areas,
- The concrete hardstand in the area between buildings such as workshops, offices, etc.

COMPONENT 3: ACCESS ROADS

(No details provided in DMR guideline)

COMPONENT 4 (A) AND 4 (B): RAILWAYS

The valuation of the removal of railway lines is based on:-

- The removal of the ballast, sleepers and rail,
- All culverts, bridges and structures are to remain,
- No rehabilitation to the general earthworks, neither cut nor fill,
- Removal of the electrification of the railway lines, including sub-stations and signalling,
- General clean up and making certain of adequate drainage,
- No credit is allowed for second-hand rail and ballast.

COMPONENT 5: HOUSING AND ADMINISTRATION FACILITIES



Same as for Component 2(A) and 2(B): Steel and Reinforced Concrete Buildings and Structures **COMPONENT 6: OPENCAST REHABILITATION**

Some form of beneficial land use is desirable after mining. Hence, in-filling of opencast pits is advocated in order to facilitate post-mining beneficial land use. In-filling normally constitutes the following modes of action:

- Concurrent in-filling and subsequent spoils rehabilitation as routinely conducted for opencast pits on collieries.
- In-filling by obtaining material from adjacent opencast pits and/or other parts of the same opencast pit as routinely conducted on iron ore mines.

Difficulties could be experienced with concurrent infilling in those cases where the ore body is limited to a single opencast pit and various grades of ore need to be sourced from the pit. This requires access to the full pit and in-filling could sterilise ore reserves. In these cases rehabilitation should be facilitated as follows:

- Excess material from the opencast pit is deposited in close proximity to the pit for in-filling of the opencast pit once the ore body has been removed.
- Excess material is deposited in such a manner in relation to the opencast pit that mine residue deposit rehabilitation can be conducted with respect to this material. In this case the opencast pit perimeter walls must still be rendered safe for humans and domestic animals. This is normally achieved by means of the following:
- Sloping the perimeter walls of the opencast pit at 1:3 (18°) to the pit floor or to the stable groundwater level that could establish within a reasonable period within the opencast pit.
- Providing enviro berms along the opencast pit perimeter when perimeter wall flattening is not feasible as in those cases where opencast mining has been conducted on steep mountain sides.

Notwithstanding the above, owing to removal of the mined product off-site, notably less material remains on site for pit in-filling than was originally removed from the opencast pit. This could be despite bulking of the removed material. Hence final voids with respect to most opencast pits would be unavoidable. These voids should be addressed in the same manner as making the opencast pit safe and pollution free.

Unit cost determination for the Master Rate is based on making the opencast pit safe for humans and domestic animals. For calculation purposes, the Master Rate is based on an opencast pit having a surface area of about 150 ha and is 30 m deep to the pit floor. A typical opencast dimension of 2500m length and 600 m width has been assumed. Mining has been conducted in relatively stable/hard rock material, resulting in steep (near vertical) opencast perimeter walls. It should be noted that the above does not apply for an opencast pit that has already been infilled, but only for the remaining final voids. The Master Rate was determined for the closure situation of sloping the opencast perimeter walls, assumed to be 3:1 (70°), to 1:3 and shaping and grassing the sloped area. A 1:1 cut to fill ratio was assumed. In this case the sectional cutand-fill volume to reduce this slope to 18° would equate to approximately 300 m3/m. The costs of geotechnical investigations and surveying were fixed at R50 000 and R20 000 respectively. Professional fees were taken at 2,5 % of the rehabilitation cost. Supervision fees were not included.

COMPONENT 7: SEALING OF SHAFTS, ADITS AND INCLINES

The sealing of vertical and incline shafts are primarily a safety consideration and this should be conducted in such a manner that potential safety risks are largely obviated.



Normally, inert building rubble arising from the demolition of surface infrastructure should be deposited into the shafts. A mass concrete cap of 1 000 mm thickness is placed onto the building rubble deposited into the shaft. It should be noted that, in specific circumstances, dedicated engineering design and specification of these caps could be required.

Allowance should also be made for methane venting of the underground mine workings with a methane formation potential by means of strategically placed venting boreholes.

The unit cost is based on filling and capping of both vertical and inclined shafts of dimensions 12,5 m diameter and 5,5 x 5,5 m respectively. The Master Rate allows for the average cost of rendering both vertical and an incline shafts safe.

The costs of geotechnical investigations and surveying were fixed at R50 000 and R20 000 respectively. Professional fees were taken at 2,5 % of the rehabilitation cost. Supervision fees were not included.

COMPONENTS 8 (A), 8 (B) AND 8 (C): OVERBURDEN AND SPOILS, PROCESS PLANT WASTE: BASIC, SALT-PRODUCING AND PROCESS PLANT WASTE: ACIDIC, METAL-RICH. Component 8A: Overburden and spoils

Overburden and spoils normally have a low pollution potential and hence only need to be shaped to create a stable landform. The Master rate thus includes shaping and grassing/vegetation of the overburden and spoils.

Component 8B: Process plant waste: basic, salt-producing

Basic, salt-producing residue deposits are typical of the following mining activities:

- Base metals (copper, cadmium, cobalt, iron-ore, molybdenum, nickel and tin),
- Chrome,
- Diamonds and precious stones,
- Gold, silver and uranium,
- Phosphate,
- Platinum,
- Mineral sands (ilmenite, titanium, rutile and zircon), and
- Industrial sands (andalusite, barite, bauxite, cryolite and fluorspar)

The Master rate for basic, salt-producing process plant waste includes shaping and grassing/ vegetation of the dumps as well as establishing an armoured cover on the reshaped surface of the dump.

Component 8C: Process plant waste: acidic, metal-rich

Acidic, metal-rich residue deposits are typical of the following mining activities:

- Antimony,
- Asbestos,
- Base metals (vanadium),
- Coal,
- Chrome, if there is a smelter present on the mine, and
- Zinc and lead

The Generally accepted closure methods for acidic, metal-rich plant waste are primarily aimed at the following:

- Limiting seepage of contaminants from the processing waste deposit
- Prevention of contaminated seepage entering local surface and groundwater sources.

The Master rate includes allowances for slope modification, armouring and evaporative covers, lined pollution control dams and lined cut-off trenches.



Closure elements specific to 8 (A), 8 (B) or 8 (C)

Generally, average modified outer slopes of 1:3 (18°) are required. Although not specifically stated, benches at regular intervals are also required. This should ensure that the modified outer slopes between benches do not exceed 35 to 40 m in order to curb storm water flow velocities on the outer slopes. Benches should be at least 5 m wide, sloping inwards at a slope of about 1:10.

Moreover, the lateral slopes of the benches should be selected with the following in mind:

- 1:2 year flow events should not result in bench flow velocities of less than 0,3m/s. Flow velocities less than 0,3 m/s could cause sediment build-up on the benches and eventual bench overtopping and resultant outer slope damage.
- 1:50 year flow events should not result in bench flow velocities exceeding 1m/s. Flow velocities in excess of 1m/s could cause bench scouring and hence, damage to storm water chutes, resulting in failure of the storm water handling system.

Experience indicates that mine residue deposits are normally formed by end tipping, either by truck and/or overland conveyor. This results in outer slope at the natural angle of repose of the deposited material. This could vary between 25° to 35° and even steeper for more rocky material. Residue deposits normally vary between 10 and 40 m in height. Heights even up to 80 to 120 m are also encountered. The Master Rate was based on a typical ellipse formed dump 30 m high, with unmodified outer slopes of 35°, covering a footprint area of 12 ha. In this case the sectional cut-and-fill volume to reduce this slope to 18° would equate to approximately 170 m3/m. The creation of the required outer slope of 18° would require the movement of about 185 000 m3 of material and would increase the footprint area to approximately 15 ha. The total outer slope area of the shaped residue deposit amounts to about 18 ha.

Current generally accepted closure methods allows for a dedicated cover to be provided on the modified outer slopes of the residue deposit. The cover has to fulfil the following primary functions:

- Protection of the integrity/stability of the modified outer slope.
- Limiting the ingress of air and water into residue material that has the potential to contaminate local groundwater by means of contaminated seepage arising from the footprint area of the deposit.
- Separation of the deposited residue from uncontaminated surface runoff arising from the outer slopes of the residue deposit.
- Contribution to the aesthetic appeal of the rehabilitated residue deposit.

Covers fulfilling the above functions could be of varying nature, comprising of natural and/or synthetic material. If natural materials are to be used, current practice allows for an evaporative cover, varying in thickness between 750 and 1 000 mm, with an outer cover layer of 300 m thickness of armouring or topsoil with vegetation. The armouring also requires vegetation, but this is not essential for the long-term integrity of the outer cover layer.

Depending on the nature of the deposited material covered, capillary breaker layers between the evaporative cover and the deposited material could also be required.

Current generally accepted closure methods indicates that operational pollution control dams are properly lined to prevent the migration of the contaminated water impounded in the dam to the shallow groundwater or the nearby receiving surface water environment. Mostly, synthetic (HDPE) liners are provided for this purpose. However, these liners have a finite life and eventual failure of these liners would result in the salts and other contaminants that accumulated in the pollution control dam(s) over the years to be dissipated into the receiving



water environment. Hence, from a holistic view the provision of a pollution control dam served a limited function, only postponing the release of contaminants into the receiving water environment. However, contaminant release has been spread-out over a period of about 50 years, starting from mine residue deposit rehabilitation to final disintegration of the liner in the pollution control dam(s). This situation would most likely allow for an acceptable residual impact, with salt/contaminant release into the receiving water environment at a rate that does not exceed the "natural" assimilative capacity of the receiving water resource. The only exception could be extremely sensitive water resources.

Based on the above, the Master Rate allows for a pollution control dam lined with a 1,5 mm thick HDPE liner, located on a prepared bed of 250 mm thickness. Allowance has also been made for geosynthetic layer between the bed and the HDPE liner. The liner would be secured to the outer perimeter of the pollution control dam by means of routine folding-in methods.

The surface area of the dam is based on a nett evaporation of 750 mm. The volume of contaminated seepage arises from the residue deposit that cannot be intercepted by the evaporative cover is estimated at 1 percent MAP (750 mm). A surface area of about 1 500 m2 is required.

Storm water runoff arising from the upper and outer slopes of the rehabilitated residue deposit should be managed for the following primary reasons:

- Prevention of uncontrolled runoff from the residue deposit, thereby creating surface erosion and resultant damage to the cover and under extreme cases exposing the deposited material.
- Routing of the runoff arising from the rehabilitated residue deposit into the surrounding surface water drainage regime in a manner that would limit the creation of secondary erosion in the receiving surface water environment and/or possible damage to downstream surface infrastructure.
- Allowing for the control routing of the runoff collected on the rehabilitated residue deposit across cut-off, seepage or solution trenches provided to handle excess contaminated seepage from the residue deposit.

In addition to the above, upslope storm water diversion measures could also be required to route upslope runoff past the residue deposit to prevent possible cover damage and other specific local drainage requirements. Toe paddocks could also be required along the outer perimeter toe of the rehabilitated residue deposit to capture sediment arising from the cover material whilst vegetation on the cover is still in the process of establishment.

Current practice allows for two broad approaches to handle runoff arising from the rehabilitated residue deposit. These are as follows:

- Collection of the runoff arising from the benches in chutes to route this water to the toe of the residue deposit. Chutes must be constructed from concrete or other suitable material to cater for the high flow velocities that could be encountered.
- Collection of runoff arising from the modified outer slopes on the benches itself and allowing this water to evaporate on the benches. Under these circumstances bench width could be wider than the normal 5 m width, with parapet walls provided on the outer edges of the benches. These walls must be designed for at least the 1:200 year rainfall events. The residue deposit material must also be suitable for this type of storm water contaminant and must not be susceptible to slumping under saturated conditions.

The Master Rate allowed for the following:

- Concrete storm water chutes at 200 m spacing along the modified perimeter of the rehabilitated residue deposit.
- Benches to be integrated into the storm water chutes.
- Energy dissipation in the chutes just upslope of chute/bench crossings as well as within the final chutes reaches, just before discharge into the receiving surface water environment.



In very sensitive environmental situations and/or where the seepage from the residue deposit could be highly contaminated, a cut-off drain around the perimeter of the residue deposit may be required. Abstraction of the seepage collected in the cut-of drain by means of pumps at predetermined spacing would be required. The collected seepage has to be routed to a pollution control dam for disposal.

COMPONENT 9: SUBSIDED AREAS

(No details provided in DMR guideline, but presumed to be similar to Component 10: General Surface Rehabilitation)

COMPONENT 10: GENERAL SURFACE REHABILITATION

Final surface rehabilitation of areas disturbed by mining and related activities should be aligned to the selected final land use.

Irrespective of the final land use, general surface rehabilitation normally should ensure the following:

- Surface topography that emulates the surrounding areas and aligned to the general landscape character. Steep slopes in excess of 6 percent should also be avoided if possible.
- Landscaping that would facilitate surface runoff and result in free draining areas. If possible, the drainage lines should be reinstated.
- An area without unnecessary remnants of structures and surface infrastructure to give the rehabilitated area a "neat" appearance. Special attention must be given to shape and/or removal of heaps of excess material being the legacy of prolonged mining and related activity.
- An area suitable for re-vegetation.

The unit cost for general rehabilitation allows for shaping and landscaping of disturbed areas. The Master rate allows for the shaping of material to a depth/thickness of about 500 mm. An extra over allowance in the unit cost of 50 percent has been made to cover the removal and/or destruction of surface infrastructure remnants and/or other undesirable objects such as trees, foundations, concrete slabs, etc.

COMPONENT 11: RIVER DIVERSIONS

Although not desirable, river diversions are unavoidable in some cases to allow mining, especially opencast mining, to proceed.

Wetland areas are normally associated with river diversions and during the operational period some form of riparian habitat could most likely have established within the stream diversion area. Hence considerations should be given whether a stream diversion should be changed at mine closure. This could require dedicated assessments to guide decision-making in this regard. Moreover, removal of stream diversions could result in stream flow over mined areas that could result in undesirable water quality effects.

In the event that river diversions should be removed at closure, the Master rate is the same as for general surface rehabilitation.

COMPONENT 12: FENCING

(No details provided in DMR guideline)



COMPONENT 13: WATER MANAGEMENT

Current practice is to provide in-pit evaporation dams for opencast pits. Ideally these dams should coincide with pit final voids. The dams should be sized that groundwater inflow into the pit plus rehabilitated spoils recharge can be evaporated from the dam. The dam perimeter as in the case of opencast pits must be shaped to render it safe. The same approach as for opencast pits is generally followed.

Underground mine workings has the potential to eventually fill up with water and decant. Depending on the decant mode and the type of product mined, this water could be of a poor quality. Hence provision should be made to collect and handle this water to limit degradation of water resources in the vicinity of potential decant. Collection and neutralisation (with associated metal removal) is an established management practice to deal with this water. However, the elevated salt content normally associated with this water is still a matter of concern. Hence, advanced treatment such as desalination of this water is currently considered and in some cases pilot pants have been established to assess feasibility. Treatment technologies not producing brine are currently favoured. However, this is not possible with all types of excess mine water.

It should be noted that the filling of a mine could involve a notable period of time and the required treatment capacity to handle the excess mine water could only be required decades after mine closure. Hence the future implementation of these plants most likely by third parties should also receive consideration.

The Master Rate is based on a hypothetical mine that comprises the following:

- Both opencast and underground mine workings,
- The opencast workings amount is about 800 ha,
- The underground working amount is about 5 500 ha,
- Decant from the mine will occur over periods varying from 15 years to 90 years after mining at a specific mining area has ceased,
- Decant flow is likely to be 840 m3 per hectare per year for the opencast workings (15 percent recharge) and 300 m3 per hectare per year for the underground workings (3 percent recharge)
- Decant flow is treated prior to discharge at a rate of R7-00 per m3,
- Capital costs for the treatment plants are R15 million per 1 000 m3 for the opencast workings (less than 2 500 m3/d per site) and R10 million per 1000 m3 for the underground workings (about 5 000 m3/d).

Note: Costs associated with brine producing treatment technologies were also assessed. Although the capital costs associated with these technologies could be lower than for non-brine producing technologies, the operating and maintenance costs are notably higher. Hence the overall costs for water management and treatment in the guideline document are not notably different, based on the water treatment method, to warrant distinction.

COMPONENT 14: MAINTENANCE AND AFTERCARE

Maintenance and aftercare is planned for 2 to 3 years after mine production ceases, and covers:

- Annually fertilising of rehabilitated areas,
- Monitoring of surface and subsurface water quality surface,
- Control of alien plants,
- General maintenance, including rehabilitation of cracks



APPENDIX 19(C)

Proof of Closure Cost Financial Provisioning

31 May 2017

The Regional Manager

Department of Mineral Resources Private Bag A1 Klerksdorp 2570

Dear Sir,

Our Reference: GR/G/20654/0517/0452 Your Reference: NW30/5/1/2/2/308MR NW30/5/1/2/2/396MR

FINANCIAL GUARANTEE FOR THE REHABILITATION OF LAND DISTURBED BY MINING (EXECUTION OF ENVIRONMENTAL MANAGEMENT PROGRAMME)

- Concerning the responsibility in terms of the Mineral and Petroleum Resources 1. Development Act, 2002, which is incumbent on Hernic Ferrochrome (Pty) Ltd (Registration Number 1994/008293/07) (hereinafter referred to as "the mine owner") to execute the environmental management programme approved in terms of the provisions of the said Act for the mining rights on mines known as Old Order Portions 51, 52, 122, 121, 123, 132, 115, 160, 159, 161, 157, 50, 49, 120, 119, 47, half share of the remaining portion of portion 48, portions 199, 168, 167, 166, 165 (portions of portion 47) all of the Farm De Kroon 444JQ and being New Order Portion 78, 105(remaining extent), 135, 104, 143, 169, 170, 47(remaining extent), remaining extent of portion 46 and the remaining extent of portion 100 of the farm De Kroon 444 JQ situated in the magisterial districts of Brits, North West Province. I, Richard Eales, in my capacity as Managing Director and as duly representative of Guardrisk Insurance Limited (hereinafter referred to as "the guarantor") confirm that the amount of R106 159 645.69 (One Hundred and Six Million, One Hundred and Fifty Nine Thousand, Six Hundred and Forty Five Rand and Sixty Nine Cents only), is available to you for the purpose of executing the said environmental management programme.
- 2. The guarantor, who hereby waives the advantages of the exceptions *non numeratae pecuniae non causa debiti excussionis et divisionis*, the meaning and the consequences of which is known to the guarantor, undertakes to pay to you the said sum of **R106 159 645.69 (One Hundred and Six Million, One Hundred and Fifty Nine Thousand, Six Hundred and Forty Five Rand and Sixty Nine Cents only)**, upon receipt of a written claim from you to do so and the claim may be submitted by you, if (in your opinion and discretion) the mine owner fails or remains in default to execute the said environmental management programme, or if he ceases mining/ prospecting operations, or if his estate is sequestrated, or if he should hand over his estate in terms of the Insolvency Acts which are applicable in the Republic of South Africa, or if the guarantor gives written notice to you in terms of clause 5 of this agreement. The said claim may be instituted by you at any stage commencing from the date of signature of this guarantee.
- 3. The said amount of R106 159 645.69 (One Hundred and Six Million, One Hundred and Fifty Nine Thousand, Six Hundred and Forty Five Rand and Sixty Nine Cents only), may be held by you on the condition that you, after having complied with all the provisions of the said environmental management programme, will give account to the guarantor of how the amount was appropriated and repay any unappropriated amount to the guarantor.



GUARDRISK INSURANCE COMPANY LIMITED 1 Reg. No.: 1992/001639.06 | FSP.75 | Authorised Financial Services Provider 102 Rivenia Read: Sandion, 2196 | PO Box 786015, Sandion, 2146 | Tel: (+27.011).669-1000 Cape Town Tel: (+27.037).742-9500 | E-mail: guardisk op za | Website: www.guardisk.co.za | Directors: NAS Kruger' (Chairman). RJ Eales (Managing Director), DJ Botes', LJ Botha, EC de Waal', D Konar'', FC Schaep, SH Schoeman, MZ Sibanda, and MH Zilmbola'' *Non-Executive - Independent* Company Secretary: M Chetty

- 4. This undertaking is neither negotiable nor transferable, and
 - a. must be returned to the guarantor when giving account to the guarantor in terms of the clause 3 above;
 - b. shall lapse on the granting of a closure certificate in terms of the Mineral and Petroleum Resources Development Act, 2002; and
 - c. shall not be construed as placing any other responsibility on the guarantor other than the paying of the guaranteed amount.
- 5. The guarantor reserves the right to withdraw from this guarantee after having given you at least three months' written notice in advance of his intention to do so.

Yours Faithfully On Behalf Of The Guarantor: WITNESS (1) Betta (2) ALL ADDRESS : of Guarantor

102 Rivonia Road	P O Box 786015
Sandton	Sandton
2196	2146

DATE: 31 May 2017

PLEASE NOTE:

- (1) No amendments and/or additions to the wording of this guarantee will be accepted.
- (2) The address of the addressee of this Guarantee must be stated clearly.
- (3) This guarantee must be returned to:

Guardrisk Insurance Company Limited102 Rivonia RdP O Box 786015SandtonSandton21962146



A subsidiary of MMI Holdings

13 May 2013

The Regional Manager Department of Mineral Resources Private Bag A1 Klerksdorp 2570

Sir

Our Reference: GR/G/20654/0513/0056 Your Reference:NW30/5/1/2/3/2/1/308EM

FINANCIAL GUARANTEE FOR THE REHABILITATION OF LAND DISTURBED BY MINING (EXECUTION OF ENVIRONMENTAL MANAGEMENT PROGRAMME)

- Concerning the responsibility in terms of the Mineral and Petroleum Resources Development Act, 2002, which is incumbent on Hernic Ferrochrome (Pty) Ltd (hereinafter referred to as "the mine owner") to execute the environmental management programme approved in terms of the provisions of the said Act for the mining rights on mines known as Portion 52, 51, 122, 121, 123, 132, 115, 160, 159, 161, 157, 50, 49, 120, 119, 47 half share of the remaining extent of portion 48, portion 199, 168, 167, 166, 165 (Portion of Portion 47) of the farm De Kroon 44 JQ situated in the magisterial districts of Brits, North West Province. I, Herman Schoeman, in my capacity as Managing Director and as duly representative of Guardrisk Insurance Limited (hereinafter referred to as "the guarantor") confirm that the amount of R18 506 546.63(Eighteen million, five hundred and six thousand, five hundred and forty six rand and sixty three cents only), is available to you for the purpose of executing the said environmental management programme.
- 2. The guarantor, who hereby waives the advantages of the exceptions *non numeratae pecuniae non causa debiti excussionis et divisionis*, the meaning and the consequences of which is known to the guarantor, undertakes to pay to you the said sum of R18 506 546.63(Eighteen million, five hundred and six thousand, five hundred and forty six rand and sixty three cents only)upon receipt of a written claim from you to do so and the claim may be submitted by you, if (in your opinion and discretion) the mine owner fails or remains in default to execute the said environmental management programme, or if he ceases mining/ prospecting operations, or if his estate is sequestrated, or if he should hand over his estate in terms of the Insolvency Acts which are applicable in the Republic of South Africa, or if the guarantor gives written notice to you in terms of clause 5 of this agreement. The said claim may be instituted by you at any stage commencing from the date of signature of this guarantee.
- 3. The said amount of R18 506 546.63(Eighteen million, five hundred and six thousand, five hundred and forty six rand and sixty three cents only), may be held by you on the condition that you, after having complied with all the provisions of the said environmental management programme, will give account to the guarantor of how the amount was appropriated and repay any unappropriated amount to the guarantor.





GUARDRISK INSURANCE COMPANY LIMITED | Reg. No.: 1992/001639/06 | FSP 75 | Authorised Financial Services Provider 115 West Street: Sandown, Sandton, 2196 | PO Box 786015, Sandton, 2146 | Tel: (±27 011) 669-1000 | Fax: (±27 011) 669-1931 Cape Town Tel: (±27 021) 401-9929 | E-mail: guardrisk@guardrisk.co.za | Website: www.guardrisk.co.za | Directors: E Chr Kieswetter' (Chairman), SH Schoeman (Nanadur Director), LJ Botha, G Dhombox, RJ Eales (, D Konar', MZ Sibanda, LW Stevens', DM Viljoen', MH Zilmbola' "Non-Executive +Alternate Independent Company Secretary: Alexander Forbes Group & Technology Services Proprietary Limited 13 May 2013

Marsh Africa Marsh Risk Consulting 156 5th Street Sandton 2146

Attention: Gert Wahl

GUARDRISK / HERNIC FERROCHROME (PTY) LTD MINING REHABILITATION GUARANTEE

Dear Gert,

Please find attached original signed guarantee for the above mentioned client.

Should you require further information please do not hesitate to contact me.

Regards

Thembeka Mngadi

Portfolio Manager Tel: 011 669 3067





GUARDRISK INSURANCE COMPANY LIMITED | Reg. No.: 1992/001639/06 | FSP 75 | Authorised Financial Services Provider 115 West Street, Sandown, Sandton, 2146 | PO Box 786015, Sandton, 2146 | Tel: (+27 011) 669-1000 | Fax: (+27 011) 669-1931 Cape Town Tel: (+27 021) 401-9929 | E-mail: guardrisk@guardrisk.co.za | Website: www.guardrisk.co.za | Directors: E Chr Kleswetter' (Chairman), SH Schoeman (Managing Director), LJ Botha, G Dhombo+, RJ Eales+, D Konar', MZ Sibanda, LW Stevens', DM Viljoen', MH Zilimbola' ' 'Non-Executive +Alternate Independent Company Secretary: Alexander Forbes Group & Technology Services Proprietary Limited

- 4. This undertaking is neither negotiable nor transferable, and
 - a) must be returned to the guarantor when giving account to the guarantor in terms of the clause 3 above;
 - b) shall lapse on the granting of a closure certificate in terms of the Mineral and Petroleum Resources Development Act, 2002; and
 - c) shall not be construed as placing any other responsibility on the guarantor other than the paying of the guaranteed amount.
- 5. The guarantor reserves the right to withdraw from this guarantee after having given you at least three months' written notice in advance of his intention to do so.

Yours Faithfully

1 ouro 1 diditatiy		X	T	
On Behalf Of T	`he Guara	ntor:	<u>,</u>	
WITNESS	(1)	Athurgoh	TUCMPERA MNGABZ	

GLAANE HEUDERSON

ADDRESS : of Guarantor

115 West Street Sandton 2196 P O Box 786015 Sandton 2146

13 May 2013

DATE :

PLEASE NOTE :

 No amendments and/or additions to the wording of this guarantee will be accepted.

- (2) The address of the Guarantee must be stated clearly.
- (3) This guarantee must be returned to Guardrisk Insurance Ltd.
 P O Box 786015
 Sandton
 2146
 Johannesburg
 2196

N