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**	**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: Utilise local contractors.					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**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Minor-	Short Term	Site	**Low**	Possible	**Low**	+	Medium
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Avoid recruiting directly or through sub-contractors from the adjacent informal 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**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Minor	Short Term	Site	**Low**	Possible	**Low**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Limit expansion to footprint area					Construction Phase		Design Specifications	
Impact AFTER Management	Minor	Short Term	Site	**Low**	Unlikely	**Low**	-	High

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 *in-situ* 'topsoil' or overburden 'waste' or non-waste' to the required depth during development/expansion of canals. Developed infrastructure areas: Dispose of (in an appropriate facility) or re-process 'waste' or 'non-waste' overburden that is most likely to be encountered/excavated in these areas; Establish a 'topsoil' berm from excavated soil material adjacent to the canals (entire length on the downslope side); Do not establish berms in highly developed areas; Transport excess excavated 'dirty' soil (polluted) to 'dirty' 'topsoil' stockpiles. Undeveloped natural areas: Transport excavated 'clean' soil (non-polluted) to 'clean' 'topsoil' stockpiles; Establish a 'topsoil' berm from excavated soil material adjacent to the canals (entire length on the downslope side).Re-vegetate (locally indigenous grasses) the 'topsoil' berms and stockpiles.					During development/expansion process		Chamber of Mines Guidelines	
Measure 2: 'Dirty' polluted areas: Construct canals from concrete to prevent seepage of 'dirty' water. 'Clean' non-polluted areas: Construct an earth canal; Compact the vertic soil base and side-walls of the canal to achieve a relatively impermeable compacted-'re-moulded' soil seal' layer.					During development/expansion process		Chamber of Mines Guidelines	
Impact AFTER Management	Moderate	Medium Term	Local	**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 Implementation**		**Compliance with Standards**	
Measure 1: Strip *in-situ* 'topsoils' during development/expansion. Polluted areas: Transport excess stripped 'dirty' soil (polluted) to 'dirty' 'topsoil' stockpiles.Non-Polluted areas (undeveloped natural areas): Transport excess stripped 'clean' soil (non-polluted) to 'clean' 'topsoil' stockpiles. Re-vegetate (locally indigenous grasses) the 'topsoil' stockpiles.					During development/expansion process		Chamber of Mines Guidelines	
Measure 2: Compact vertic soil base of dam to create a relatively impermeable compacted-'re-moulded' 'seal' layer; Build impoundment walls from compacted-'re-moulded' vertic soil material; Place appropriate impermeable membrane liner seal overlying compacted-'re-moulded' vertic soil base and walls. Construct an earth 'dirty' water intercept drain downslope of each dam, together with its adjacent soil berm (entire length on the downslope side); Compact the vertic soil base and downslope (not upslope) side-walls of the drains to achieve a relatively impermeable compacted-'re-moulded' soil 'seal' layer. Ameliorate soils (sample and fertilise), and Re-vegetate (locally indigenous grasses) the side-slopes of dam walls where appropriate, as well as the drain berms.					During development/expansion process		Chamber of Mines Guidelines	
Impact AFTER Management	Moderate	Medium Term	Local	**Medium**	Possible (soil contamination)	**Medium**	-	High

<table>
<tr><td colspan="9">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</td></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Major</td><td>Long Term</td><td>Local</td><td>High</td><td>Definite</td><td>High</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Strip in-situ vertic ‘topsoils’ during expansion of TSF. Non-Polluted areas: Transport excess excavated ‘clean’ soil (non-polluted) to ‘clean’ ‘topsoil’ stockpiles (since majority of footprint expansion and drain occurs in undeveloped natural areas). Polluted areas: Transport excess excavated ‘dirty’ soil (polluted) to ‘dirty’ ‘topsoil’ stockpiles. Construct an earth ‘clean’ water diversion drain surrounding the upslope sections of the TSF, together with its adjacent soil berm (entire length on the downslope side); Compact the vertic soil base and downslope (not upslope) side-wall of the drain to achieve a relatively impermeable compacted-‘re-moulded’ soil ‘seal’ layer.
Re-vegetate (locally indigenous grasses) the ‘topsoil’ stockpiles and the drain berm.</td><td colspan="2">During development/expansion process</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measure 2: Compact the vertic soil base of the TSF to create a relatively impermeable compacted-‘re-moulded’ soil ‘seal’ layer; Build impoundment walls from compacted-‘re-moulded’ vertic soil material; Place appropriate impermeable membrane liner ‘sea’l overlying the compacted ‘re-moulded’ vertic soil base and walls; Construct surrounding paddocks and associated vertic soil earth walls. Ameliorate (sample and fertilise), and Re-vegetate (locally indigenous grasses) the paddock earth walls.</td><td colspan="2">During development/expansion process</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td>Impact AFTER Management</td><td>Moderate</td><td>Long Term</td><td>Site</td><td>Medium</td><td>Unlikely (soil contamination)</td><td>Low</td><td>-</td><td>High</td></tr>
</table>

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 Implementation**		**Compliance with Standards**	
Measure 1: Scrape off the overburden 'waste' or non-waste' overlying the *in-situ* soils where it occurs, and dispose of (in an appropriate facility) or re-process as applicable. Excavate *in-situ* 'topsoil' to the required depth during the construction of the 'clean' water diversion drain and 'dirty' water intercept drains (refer to Measures 3).					During development process		Chamber of Mines Guidelines	
Measure 2: Compact the vertic soil base of the Yard Footprint to create a relatively impermeable compacted-'re-moulded' soil 'seal' layer					During development process		Chamber of Mines Guidelines	
Measure 3: Construct an earth 'clean' water diversion drain surrounding the upslope sections of the Yard Footprint, together with its adjacent soil berm (entire length on the downslope side); Construct an earth 'dirty' water intercept drain downslope of the Yard Footprint, together with its adjacent soil berm (entire length on the downslope side); Compact the vertic soil base and downslope (not upslope) side-wall of the 'dirty' water drain to achieve a relatively impermeable compacted-'re-moulded' soil 'seal' layer; Re-vegetate (locally indigenous grasses) the 'topsoil' drain berms.Construct a concrete pad in appropriate sections of the Yard Footprint; Construct a roofed area under which bins/skips are placed on a concrete pad for the future storage of used hazardous materials/chemicals or oils.					During development process		Chamber 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**		**Compliance with Standards**	
Measure 1: Spray water to limit blown dust during construction. Construct a concrete pad and drain for potential future scrubber effluent spillages.					During expansion process		Chamber 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**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Pump out ponding water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction Phase		None applicable.	
Impact AFTER Management	Minor	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**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Minor	Short Term	Local	**Low**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Pump out ponding water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction Phase		None applicable	
Measure 2: Optimise size of PCD during design.					Pre-Construction Phase		Design of Small Dams & Water Balance	
Impact 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 capturing of direct rainfall 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**	
Measure 1: Pump out ponding water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction Phase		None applicable.	
Measure 2: Optimise size of PCD during design.					Pre-Construction 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**	**SIGNIFICANCE**	**+/-**	**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 water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction Phase		None applicable.	
Measure 2: Optimise size of PCD during design.					Pre-Construction Phase		Design of Small Dams & Water Balance	
Impact AFTER Management	Minor	Short Term	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 liner from damage during construction.					Construction Phase		Engineer's Design Specifications	
Measure 2: Pump out ponding water into the clean water canal.					Construction Phase		None applicable	
Measure 3: Optimise size of TSF during design.					Pre-Construction 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 rainfall 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 for Implementation**		**Compliance with Standards**	
Measure 1: Pump out ponding water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction Phase		None applicable.	
Measure 2: Optimise size of PWD and silt traps during design.					Pre-Construction 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 for Implementation**	**Compliance with Standards**		
Measure 1: Pump out ponding water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction Phase	None applicable.		
Measure 2: Optimise size of PCD during design.					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.								
	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: Pump out ponding water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction 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	**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: Pump out ponding water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction Phase	None applicable.		
Measure 2: Optimise size of the PWD during design.					Pre-Construction 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.								
	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: Pump out ponding water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction Phase		None applicable.	
Measure 2: Optimise size of salvage yard during design.					Pre-Construction Phase		SANS 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 for Implementation**		**Compliance with Standards**	
Measure 1: Pump out ponding water from excavated foundations and divert all other surface water run-off past the construction works into the natural environment.					Construction Phase		None applicable.	
Measure 2: Optimise size of PCD during design.					Pre-Construction Phase		Design of Small Dams & Water Balance	
Impact AFTER Management	Minor	Short Term	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 Traps - -ASPECT: 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 Standards**	
Measure 1: Ensure that any reduction in runoff to natural resources stays within the permitted parameters of the ecological reserve.					Construction Phase		Ecological 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 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 Implementation**		**Compliance with Standards**	
Measure 1: Avoid placement of PCD, Process Water and Stormwater Dams in sensitive floral habitat.					Construction 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.								
	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 new salvage yard in sensitive floral habitat.					Construction Phase		Sensitivity map in Floral 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 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 Implementation**		**Compliance with Standards**	
Measure 1: Avoid expansion of the TSF into sensitive floral habitat.					Construction 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 reduction in runoff to natural resources stays within the permitted parameters of the ecological reserve					Construction Phase		Ecological 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 PCD, Process Water and Stormwater Dams in sensitive faunal habitat.					Construction Phase		Sensitivity map in Faunal 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 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 the new salvage yard in sensitive faunal habitat.					Construction Phase		Sensitivity 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 for Implementation**		**Compliance with Standards**	
Measure 1: Avoid expansion of the TSF into sensitive faunal habitat.					Construction Phase		Sensitivity map in Faunal Report	
Impact AFTER Management	Minor	Medium Term	Local	Low	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 reduction in runoff to natural resources stays within the permitted parameters of the ecological reserve through minimisation of the extent of the dirty water area created.					Construction Phase		Ecological 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.

	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 of vegetation is kept to the project footprint, that clearance is performed in a phased manner and that effective stormwater and erosion management measures are implemented.					Construction Phase		Stormwater 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.

	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 of vegetation is kept to the project footprint, that clearance is performed in a phased manner and that effective stormwater and erosion management measures are implemented.					Construction Phase		Storm water Management Plan	
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: 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 of vegetation is kept to the project footprint, that clearance is performed in a phased manner and that effective stormwater and erosion management measures are implemented.					Construction Phase		Stormwater 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 reduction in runoff to natural resources stays within the permitted parameters of the ecological reserve.					Construction Phase		Ecological Reserve and Water Use License	
Measure 2: Very strict control of water consumption must take place and detailed 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					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Avoid placement of PCD, Process Water and Stormwater Dams within natural drainage lines; flood lines, riparian zones or their associated buffer zones.					Construction Phase		Refer to sensitivity map in the Wetland Report	
Measure 2: Ensure that alien species proliferation along road verges and fences is managed and controlled according to an alien and invasive species management strategy.					Construction Phase		NEMBA (Act 10 of 2004): Alien and Invasive Species Regulations, GN R598 of 2014	
Measure 3: Erosion control and storm water and dirty water management.					Construction Phase		Ecological Reserve and Water Use License	
Impact AFTER Management	Minor	Medium Term	Local	**Low**	Unlikely	**Low**	-	High

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 new salvage yard within natural drainage lines; flood lines, riparian zones or their associated buffer zones; Minimise loss of aquatic features where possible through planning and suitable layouts.					Construction Phase		Refer to the sensitivity map in the Wetland Report	
Measure 2: Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas and the concomitant recharge of streams in the area.					Construction Phase		Ecological Reserve and Water Use License	
Measure 3: All soils compacted as a result of construction activities falling outside of development footprint areas should be ripped and profiled. As much vegetation growth as possible should be promoted within the proposed construction area during all phases in order to protect soils and vegetation clearance should be kept to a minimum as the biomass in the area is not very high and so hence the plants will not grow quickly.					Construction 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

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**		**Compliance with Standards**	
Measure 1: Dust Suppression.					Construction Phase		Air Quality Specialist 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					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Dust Suppression.					Construction Phase		Air Quality Specialist Report	
Impact 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 of De Kroon settlement in cooperation with relevant government departments.					Medium Term		None	
Measure 2: Continue with policy to demolish empty shacks.					Medium Term		None	
Measure 3: Continue with quarterly meetings with affected parties to register grievances and resolve issues.					Medium Term		None	
Measure 4: Create liaison structures 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**		**Compliance with Standards**	
Measure 1: Implement management measures of air quality report.					Medium Term		Air Quality Legislation	
Measure 2: Continue with quarterly meetings with affected parties to register grievances and resolve issues.					Medium Term		None	
Impact AFTER Management	Minor	Medium Term	Local	**Low**	Possible	**Low**	-	High

ACTIVITY: HERNIC Operations – ASPECT: Social Impact Institutional Processes - IMPACT DESCRIPTION: Changes in perceptions related to community safety								
	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 Standards**	
Measure 1: Implement management measures of water impact reports and traffic report.					Medium Term		Relevant Legislation	
Measure 2: Regular disclosure of management measures and monitoring results.					Medium Term		None	
Measure 3: Continue with quarterly meetings with affected parties to register grievances and resolve issues.								
Impact AFTER Management	Moderate	Medium Term	Local	**Medium**	Possible	**Medium**	-	High

ACTIVITY: HERNIC Operations – ASPECT: Economic Efficiency – IMPACT DESCRIPTION: 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 Standards**	
Measure 1: As per the current Social And Labour Plan focus on local labour recruitment, human resource development and the development of local entrepreneurs for local procurement.					Medium Term		Social And Labour Plan	
Measure 2: Avoid recruitment from the neighbouring De Kroon informal settlement.					Medium Term		None	
Measure 3: Specify local procurement targets for Madibeng LM that is feasible for both HERNIC and its sub-contractors.					Medium Term		None	
Measure 4: Develop a database of goods and services that could potentially be outsourced to the local community alongside the market analyses of potential vendors that is planned in the Social And Labour Plan.					Medium Term		None	
Measure 5: Put a contractor management plan in place to ensure that the local employment and procurement targets are met.					Medium Term		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**		**Compliance with Standards**	
Measure 1: Put a contractor management plan in place to ensure that the local employment targets in terms of unskilled labour are met.					Medium Term		Social and Labour Plan	
Measure 2: Avoid the recruitment of unskilled labour from the neighbouring De Kroon informal settlement.					Medium 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								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Moderate	Medium Term	National	**High +**	Definite	**High +**	+	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: None					None		None	
Impact AFTER Management	Moderate	Medium Term	National	**High +**	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	**Medium+**	+	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Implement as per the Social and Labour Plan.					Medium Term		Social and Labour Plan	
Impact AFTER Management	Moderate	Medium Term	Local	**Medium+**	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**		**Compliance with Standards**	
Measure 1: None					None		None	
Impact AFTER Management	Moderate	Medium Term	Site	**Medium**	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 Implementation**		**Compliance with Standards**	
Measure 1: None					Short 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**		**Compliance with Standards**	
Measure 1: As per specialist reports (air quality, ground and surface water and traffic impact reports).					Long Term		Yes (Air Quality, 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 for Implementation**		**Compliance with Standards**	
Measure 1: As per the current Social And Labour Plan, focus on the support of non-mining related activities in community development programmes and business support programmes.					Medium Term		Social and Labour Plan	
Measure 2: Focus the local procurement programme on non-core mining inputs (e.g. catering, accommodation).					Medium 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 Implementation**		**Compliance with Standards**	
Measure 1: Develop a resource use plan with the specific objective to minimize HERNIC's energy and water use as far practical.					Medium Term		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 for Implementation**		**Compliance with Standards**	
Measure 1: Heritage Management Plan					Operational Phase		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**	**Probability**	**SIGNIFICANCE**	**+/-**	**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								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Minor	Long Term	Local	**Medium**	Unlikely	**Low**	-	High
Management Measures					**Time Period for 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 products during daylight off-peak hours for safety purposes					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 Awareness Campaigns					Operational Phase		-	
Impact AFTER Management	Minor	Short Term	Local	**Low**	Possible	**Low**	-	High

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	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		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 Implementation**		**Compliance with Standards**	
Measure 1: Encourage use of large capacity vehicles					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 soil stripping on site					Operational Phase		-	
Measure 2: Conduct stockpiling in accordance with specifications of soil scientist					Operational Phase		Soil Scientist Specifications	
Measure 3: Stockpile ROM material according to operational requirements					Operational Phase		-	
Measure 4: Confine stockpiles to designated footprint areas					Operational 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								
	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 pit area and flatten steep slopes					Operational Phase		-	
Measure 2: Surface stones/boulders and remnants must be buried					Operational Phase		-	
Measure 3: Even out all rough surfaces					Operational Phase		-	
Measure 4: Backfill deep voids/depressions					Operational 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					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Operate dump according to operational activities/ customer requirements					Operational Phase		-	
Measure 2: Confine dump to designated footprint areas					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 Implementation**		**Compliance with Standards**	
Measure 1: Operate stockpiles according to operational feedstock requirements					Operational Phase		-	
Measure 2: Confine stockpiles to designated footprint areas					Operational 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 Implementation**		**Compliance with Standards**	
Measure 1: Reshape disturbed pit area and flatten steep slopes					Operational Phase		-	
Measure 2: Surface stones/boulders and remnants must be buried					Operational Phase		-	
Measure 3: Even out all rough surfaces					Operational Phase		-	
Measure 4: Backfill deep voids/depressions					Operational 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 Implementation**		**Compliance with Standards**	
Measure 1: Operate stockpiles according to operational feedstock requirements					Operational Phase		-	
Measure 2: Confine stockpiles to designated footprint areas					Operational 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 Implementation**		**Compliance with Standards**	
Measure 1: Operate stockpiles according to operational feedstock/ customer requirements					Operational Phase		-	
Measure 2: Confine stockpiles to designated footprint areas					Operational 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 Implementation**		**Compliance with Standards**	
Measure 1: Operate stockpiles according to customer requirements					Operational Phase		-	
Measure 2: Confine stockpiles to designated footprint areas (bins)					Operational Phase		-	
Impact AFTER Management	Minor	Medium Term	Site	**Low**	Unlikely	**Low**	-	High

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 Implementation**		**Compliance with Standards**	
Measure 1: Confine stockpile to designated footprint area					Operational Phase		-	
Measure 2: Re-Process through CRP Plant					Operational 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 Implementation**		**Compliance with Standards**	
Measure 1: Operate stockpiles according to operational feedstock/ customer requirements					Operational Phase		-	
Measure 2: Confine stockpiles to designated footprint areas					Operational 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 Implementation**		**Compliance with Standards**	
Measure 1: Operate stockpiles according to operational feedstock/ customer requirements					Operational 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 Implementation**		**Compliance with Standards**	
Measure 1: Operate stockpiles according to customer requirements					Operational Phase		-	
Measure 2: Confine stockpiles to designated footprint areas					Operational Phase		-	
Impact AFTER Management	Minor	Medium Term	Site	**Low**	Unlikely	**Low**	-	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 Implementation**		**Compliance with Standards**	
Measure 1: Operate stockpiles according to operational feedstock/ customer requirements					Operational 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 rehabilitated quarry is not reworked or altered					Operational Phase		-	
Measure 2: Routine soil erosion monitoring and maintenance must be carried out					Operational Phase		-	
Measure 3: Conduct vegetation condition assessments. Implement recommendations (e.g. fertilization, irrigation, removal of aliens, etc.) as per outcome of assessment.					Quarterly during Operational 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: 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	Medium Term	Site	Medium	Possible	Medium	-	High
Management Measures					Time Period for Implementation		Compliance 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	+/-	Confidence
Impact BEFORE Management	Moderate	Medium Term	Site	Medium	Possible	Medium	-	High
Management Measures					Time Period for Implementation		Compliance with Standards	
Measure 1: Operate stockpiles according to operational feedstock/ customer requirements					Operational 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 (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 Implementation		Compliance with Standards	
Measure 1: Operate stockpiles according to operational feedstock/ customer requirements					Operational 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 Implementation**		**Compliance with Standards**	
Measure 1: Operate stockpiles according to operational feedstock/ customer requirements					Operational 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 and maintain vegetative (grass) basal cover and soil erosion in the vicinity of the foundation holes; Mature seeded grass may be mown from elsewhere and then spread out in eroded areas displaying poor grass cover; Do not scalp off or poison the grass cover along fence and power line routes; Utilise steel (not wooden) poles for fences and power lines; Do not fertilise the soils in these areas; No grazing or burning allowed					Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains)		Chamber of Mines Guidelines	
Impact AFTER Management	Minor	Short Term	Site	**Low**	Unlikely	**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 Standards**	
Measures 1: Soil Erosion: Monitor and maintain vegetative (lawn) basal cover in the vicinity and surrounds; Fertilise lawn soils annually upon commencement of the rainy season					Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains), Annually upon commencement of the rainy season (soil quality-fertilise lawn)		Chamber of Mines Guidelines	
Measures 2: Soil Contamination: Monitor accidental oil/chemical spillages; Clean up spills immediately; Discuss further during Induction Training. 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' and 'clean' run-off water derived from elsewhere from entering these areas.					Immediately/daily (spills-various facility staff), Quarterly (drainage features-monitor and maintain)		Chamber of Mines Guidelines	
Impact AFTER Management	Minor	Medium Term	Site	**Low**	Possible	**Low**	-	High

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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 *in-situ* 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' and 'clean' run-off water derived from elsewhere from impacting these areas.					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: Report, monitor and clean up accidental spillages immediately; Sweep roads/verges periodically. Spray water for dust suppression; Tarpaulin covers over haul truck and rail vehicle bins to limit dust; Monitor dust.					Immediately (spills), Daily (spray water), Quarterly (sweep roads/verges), Continuously (tarpaulin bin cover)		Chamber 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' materials layer 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. 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 for Implementation**		**Compliance with Standards**	
Measures 1a: Soil Contamination: Firstly, scrape up and remove the generally thick historically accumulated 'waste'/'non-waste' materials layer that is spread out over extensive areas; Secondly, scrape up and remove daily generated/spilled 'wastes'/'non-wastes' on a continual ongoing basis (especially in spring before the rainy season); Transport 'wastes' to the designated 'waste' storage facility (TSF if potentially polluting), and the 'non-wastes' to the opencast pit (if potentially non-polluting), or re-process as applicable; Tarpaulin cover over haul truck bin to limit dust. Monitor and Clean up spillages of hazardous materials/chemicals or oils; Periodically clean the existing concrete pads inside these structures; Maintain the roofed area and concrete pads in order to prevent the ingress of rainfall or run-off; Periodically Spray water for dust suppression when necessary.					Immediately (scrape up accumulated historical 'waste'/'non-waste' layer), Continuously (scrape up generated daily 'waste'/'non-waste' fines material), Continuously (tarpaulin haul tuck bin cover), Immediately (clean up spillages), Monthly, or immediately after a spill (clean up, clean concrete pads), Ongoing (maintenance of roofed areas and pads), Daily or when necessary (spray water)		Chamber of Mines Guidelines and Soil Scientist	
Measures 1b: Soil Contamination: Monitor and maintain optimum functioning (remove siltation and vegetation) of the earth 'clean' water diversion drain surrounding the upslope sections of the relevant 'Infrastructure' areas, together with the drains adjacent soil berm (entire length on the downslope side); as well as the earth 'dirty' water intercept drain/berm surrounding the downslope sections of the relevant 'Infrastructure' areas. The aforementioned will limit 'clean' water run-off from entering the 'Infrastructure' areas, as well as intercept 'dirty' water seepage and run-off derived from the 'Infrastructure' areas respectively. Institute all possible measures (e.g. additional concrete slabs, secondary drains, and berms) to encourage the run-off of 'dirty' water and rain water into drains, rather than allowing trapped water to infiltrate/leach through the 'waste'/'non-waste' layers, and thereafter into the buried *in-situ* soils (underlying a number of these areas) and water-tables.					Quarterly (drainage features-monitor and maintain)		Chamber of Mines Guidelines	
Measures 2: 'Waste'/'Non-Waste' Erosion: Note: all *in-situ* soils are either deeply buried, or already removed (during Construction process) in these areas. These 'active' areas cannot be vegetated during the Operational phase of the project. Refer to Measures 1b above.							Chamber of Mines Guidelines	
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 *in-situ* soils are deeply buried by 'Infrastructure' and 'waste'/'non-waste' layers.					-		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 *in-situ* 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					**Time Period for Implementation**		**Compliance with Standards**	
Measures 1: Soil Contamination: Monitor, repair leaks, and clean up accidental spillages; Maintain concrete pad and drain for potential future spillages; Ongoing maintenance of equipment and processes; Ongoing implementation of appropriate pollution reducing measures currently in place.					Immediately (leaks and spills), Daily (monitor), Continuously (implement appropriate measures, equipment/process maintenance),Weekly (clean concrete pad and drain)		Soil Scientist	
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: Contaminated Land Assessment soil/'waste'/'non-waste' samples (already collected, and stored in deep freeze) must be analysed and interpreted in order to identify downwind (mostly) areas that are impacted by Smelter Fallout, as well as potential solutions to any potential identified issues; Monitor emissions and dust, both in the plant and downwind areas; Ongoing implementation of appropriate pollution reducing measures that are currently in place; Ongoing maintenance of equipment and processes that are designed to reduce emissions and dust; Clean up and dispose of accumulated 'waste' material layers (particularly fines); Tarpaulin covers over haul truck bins to limit dust; Spray water to limit blown dust in 'safe' 'non-heat'/'non-electrical' areas only!![Maintain concrete pad and drain for potential future scrubber effluent spillages].					Immediately (Contaminated Land Assessment analyses of samples and interpretation of resultant data), Continuously (monitor emissions and dust, implement appropriate measures, equipment/process maintenance, tarpaulin covers on haul trucks), Periodically at intervals on a daily basis (spray water in 'safe' 'non-heat'/'non-electrical' areas only!!)		Soil 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 *in-situ* 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: Construct a sloped concrete pad with a sump at the fuel tank/vehicle filling site (if not currently present); Clean concrete pad and sump periodically; Report, monitor and clean up accidental spillages immediately.					Immediately (spills), Weekly (clean concrete pad and sump)		Soil Scientist	
Measures 1b: Soil Contamination: Maintain local drainage features (direct/contain 'dirty' water run-off 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' and 'clean' run-off water derived from elsewhere from entering this area.					Quarterly (drainage features-monitor and maintain)		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: Sweep up spilled material periodically. Spray water onto the raw materials that are to be transported by conveyor before these materials are deposited on the conveyor, the aforementioned for dust suppression.					Monthly (sweep up spilled materials), Continuously (spray water for dust suppression)		Chamber of Mines Guidelines and Soil Scientist	
Measures 2: Soil Erosion: Monitor soil erosion and Maintain local drainage features (direct/contain 'dirty' water runoff and keep 'clean' water away).Maintain vegetative (grass) basal cover in the surrounding areas; Mature seeded grass may be mown from elsewhere and then spread out on those sections of the surrounding areas that display a poor grass basal cover; No grazing or burning allowed.					Quarterly (drainage features-monitor and maintain), Biannually (monitor soil erosion and vegetative cover - spring before- and autumn after- the 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 *in-situ* 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. ***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**	-	Medium
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measures 1a: Soil Contamination: Sweep up accumulated raw material layers off the concrete pad (if present) periodically when necessary; Construct concrete pads if they do not already exist. Institute all possible measures (e.g. secondary drains, and berms) to encourage the run-off of 'dirty' water and rain water into drains, rather than allowing trapped water to infiltrate into the buried *in-situ* soils (underlying the area) and water-tables; Spray water for raw material dust suppression; Do not spray excessive volumes of water (that drains through the pile) onto the anthracite/coal stockpiles as this may lead to 'acid rock drainage' to the underlying layers; Cover the anthracite/coal (and other potentially polluting) stockpiles with a portable impermeable sheet during the rainy season for the same reason. Tarpaulin cover over haul truck and rail vehicle bins to limit dust. Soil compaction is not an issue since the underlying soils are deeply buried.					Immediately (construct concrete pads), When necessary-monthly (sweep), Daily (spray water), Continuously (tarpaulin bin cover)		Chamber of Mines Guidelines	
Measures 1b: Soil Contamination: 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' and 'clean' run-off water derived from elsewhere from entering these areas.					Quarterly (drainage features-monitor and maintain)		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 *in-situ* 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. ***Note:*** *Soil compaction is not an issue since the underlying soils are deeply buried*								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Moderate	Long Term	Local	**Medium**	Possible	**Medium**	-	Medium
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measures 1a: Soil Contamination: Sweep up accumulated product fines off the concrete pad periodically when necessary; Institute all possible measures (e.g. secondary drains, and berms) to encourage the run-off of 'dirty' water and rain water into drains, rather than allowing trapped water to infiltrate into the buried *in-situ* soils (underlying the area) and water-tables; Spray water for chrome fines dust suppression. Tarpaulin cover over haul truck and rail vehicle bins to limit dust.					When necessary-monthly (sweep), Daily (spray water), Continuously (tarpaulin bin cover)		Chamber of Mines Guidelines	
Measures 1b: Soil Contamination: 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' and 'clean' run-off water derived from elsewhere from entering these areas.					Quarterly (drainage features-monitor and maintain)		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								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Major	Medium Term	Local	**Medium**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measures 1a: Soil Contamination: Monitor and Clean up spillages of used hazardous materials/chemicals or oils. Periodically Scrape off the overburden ‘waste’ or non-waste’ fines material that accumulates overlying the concrete pads or *in-situ* soils, and dispose of (in an appropriate facility) or re-process as applicable. Periodically clean the concrete pads. Spray water for dust suppression when necessary. Maintain the roofed area and concrete pads. Re-use or sell off unwanted materials as soon as possible.					Immediately (clean up spillages), Monthly, or immediately after a spill (clean concrete pads), Monthly (scrape up accumulated ‘waste’ or ‘non-waste’ fines materials), When necessary (spray water), Ongoing (maintenance of roofed area and pads, and re-use or selling of unwanted materials)		Chamber of Mines Guidelines and Authors opinion	
Measures 1b: Soil Contamination: Monitor and maintain optimum functioning (remove siltation and vegetation) of the earth ‘clean’ water diversion drain surrounding the upslope sections of the Yard Footprint, together with its adjacent soil berm (entire length on the downslope side); as well as the earth ‘dirty’ water intercept drain/berm surrounding the downslope sections of the Yard Footprint. The aforementioned will limit ‘clean’ water run-off from entering the salvage yard, as well as intercept ‘dirty’ water run-off derived from the salvage yard respectively.					Quarterly (drainage features-monitor and maintain)		Chamber 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 in-situ 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: Firstly, scrape up and remove the generally thick historically accumulated slag layer that is spread out over extensive areas; Secondly, scrape up and remove daily generated slag on a continual ongoing basis (especially in spring before the rainy season); Sell or re-process scraped up slag as applicable; Tarpaulin cover over haul truck bin to limit dust. Institute all possible measures (e.g. secondary drains, and berms) to encourage the run-off of 'dirty' water and rain water into drains, rather than allowing trapped water to infiltrate into the buried *in-situ* soils (underlying the area) and water-tables; Spray water for dust suppression.					Immediately (scrape up accumulated historical slag layer), Continuously (scrape up generated daily slag material), Continuously (tarpaulin haul tuck bin cover), Daily (spray water)		Chamber of Mines Guidelines	
Measures 1b: Soil Contamination: 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' and 'clean' run-off water derived from elsewhere from entering these areas.					Quarterly (drainage features-monitor and maintain)		Chamber of Mines Guidelines	
Impact AFTER Management	Major	Long Term	Site	**High**	Definite	**High**	-	High

<table>
<tr><td colspan="9">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.</td></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Major</td><td>Long Term</td><td>Local</td><td>High</td><td>Possible</td><td>High</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measures 1a: Soil Contamination (TSF): The 'New' Activities and Aspects (indicated in orange text) are likely to have addressed the majority of the potential pollution issues in the TSF Expansion area. In the Existing TSF area, the soil survey indicated very few signs of leakage from the TSF (i.e. few moist soils attributable to the TSF in a downslope position), the aforementioned indicating that the Existing TSF is well constructed.Monitor soil contamination on an ongoing basis via the downslope boreholes.Tailings erosion from the side slopes of the TSF will be intercepted by the paddock walls upslope of the paddocks; Immediately scrape up any tailings spills/accumulation (unlikely to be any since over-topping of the TSF is carefully controlled) in the paddocks area and re-deposit on top of the TSF. Monitor and maintain optimum functioning (remove siltation and vegetation) of the earth 'clean' water diversion drain surrounding the upslope sections of the TSF, together with its adjacent soil berm (entire length on the downslope side); as well as the earth 'dirty' water intercept drain/berm surrounding the downslope sections of the TSF. The aforementioned will limit 'clean' water run-off from entering the TSF area, as well as intercept potential (unlikely) 'dirty' water seepage derived from the TSF respectively.</td><td colspan="2">Monitoring of Contamination (ongoing basis as per Groundwater Specialist Study Report recommendations),

Immediately (scrape up and remove tailings spills from paddocks),

Quarterly (drainage features-monitor and maintain)</td><td colspan="2">Chamber of Mines Guidelines, Groundwater Specialist Study Report, and Authors opinions</td></tr>
<tr><td colspan="5">Measures 2a: Soil Erosion (TSF): Monitor soil erosion and maintain the vegetative cover of the soil paddock walls and drain berms; Soil Erosion may be reduced by reducing side-slopes of the paddock walls and drain berms to < 6.4 degrees (11.2 % percentage grade) where necessary.
Mature seeded grass may be mown from elsewhere and then spread out on the paddock walls and drain berms in sections that display a poor grass basal cover; No grazing or burning allowed.</td><td colspan="2">Biannually (monitor soil erosion and vegetative cover / maintain soil paddock and berm walls - spring before- and autumn after- the rains)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measures 3a: Soil Quality (TSF):Sample/Fertilize the soil paddock walls and drain berms 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.</td><td colspan="2">Once every 3-4 years (fertility monitoring: sample and fertilise)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measures 1b: Soil Contamination (Piping):Clean up tailings from pipeline leaks and spills immediately; as well as that spilled from haul trucks (if any); Monitor, maintain, and repair pipelines where necessary.</td><td colspan="2">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)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
</table>

Measures 2b: Soil Erosion (Piping):Monitor soil erosion and Maintain the vegetated Earth ('topsoil' or other) Bund walls (vegetated) along the entire length of slurry pipelines.Monitor and maintain the vegetative cover of the earth bund walls; Soil Erosion may be reduced by reducing side-slopes of the bund walls to < 6.4 degrees (11.2 % percentage grade) where necessary.Mature seeded grass may be mown from elsewhere and then spread out on the bund walls in sections that display a poor grass basal cover; No grazing or burning allowed.					Biannually (monitor soil erosion and vegetative cover / maintain earth bund walls - spring before- and autumn after- the rains)		Chamber of Mines Guidelines	
Measures 3b: Soil Quality (Piping):Sample/Fertilize the earth bund walls 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.					Once every 3-4 years (fertility monitoring: sample and fertilise)		Chamber 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**		**Compliance with Standards**	
Measures 1: Soil Contamination: The features will have been sealed in the following ways during Decommissioning (Refer to Construction Tables): - Two Historic Slimes Dams: possibly a compacted-'re-moulded' vertic soil 'seal' layer, - Phase 1 of H:H Slimes Dam: Sealed with various appropriate impermeable Membrane liner seals 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, Thus the infiltration of rainwater is not likely to be an issue. Monitor and maintain optimum functioning (remove siltation and vegetation) of the earth 'clean' water diversion drain surrounding the upslope sections of the decommissioned features, together with the drains adjacent soil berm (entire length on the downslope side); as well as the earth 'dirty' water intercept drain/berm surrounding the downslope sections of the decommissioned features. The aforementioned will limit 'clean' water run-off from entering the rehabilitated feature areas, as well as intercept 'dirty' water seepage and run-off derived from the rehabilitated feature areas respectively.					Decommissioning /'rehabilitation' of these 'New' Activities (Refer to Construction Tables), Quarterly (drainage features- monitor and maintain)		Chamber of Mines Guidelines	
Measures 2: Soil Erosion: The features will have ideally been re-sloped to < = 5.7 degrees (10 % percentage grade) during Decommissioning (Refer to Construction Tables). Thus, soil erosion is not likely to be an issue. Monitor and maintain soil erosion and vegetative cover on the features; Mature seeded grass may be mown from elsewhere and then spread out on the features in sections that display a poor grass basal cover; No grazing or burning allowed.					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: The features will have been sampled and fertilised during Decommissioning (Refer to Construction Tables). Sample/Fertilize 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.					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**		**Compliance with Standards**	
Measures 1a: Soil Contamination: Construct a vegetated berm from 'softs' material (weathering rock and fines) around the outer boundary of the opencast (rock dumps/open void) footprint area, only along those sections where this feature was not already previously constructed during the Construction phase (certain sections, particularly along the southern boundary). The objective of this berm feature is to intercept 'dirty' water rainfall run-off derived from the opencast area. Vegetated 'topsoil' stockpile berms should already exist (as they do in some sections) adjacent (downslope) of the 'softs' 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. The spraying of water for dust suppression will be beneficial during mechanical operations related to the back-filling process, but not during the 'topsoiling' process as the raised moisture content will in this case lead to soil compaction; Haul trucks and vehicle traffic must obey speed limits in order to reduce the amount of blown dust. Although extensive sections of the opencast area have been back-filled ('moving' opencast) and re-graded (re-sloped) [as indicated on the map set by the term 'level' – slope 1 -2 degrees], these areas still remain to be 'topsoiled' and re-vegetated. Furthermore, many sections of the back-filled opencast area have not yet been re-graded, while two opencast final void sections remain to be back-filled with potentially non-polluting spoil, waste rock, and 'waste' from the plants. The **completion of these rehabilitation operations will be ongoing throughout the operational and closure phases** of the project. Detailed rehabilitation information is provided in the Impact/Mitigation Tables for the closure phase.					Immediately during Operational phase (surrounding 'softs' berm, if not already established during the construction phase), Immediately when necessary (spraying of water during back-filling process), Continuously (speed limits for haul trucks and vehicles), Continuously ongoing during the Operational and Closure phases (back-filling, re-grading/'topsoiling'/soil sampling/re-vegetation)		Chamber of Mines Guidelines	
Measures 1b: Soil Contamination: 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' and 'clean' run-off water derived from elsewhere from seeping into these 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 *in-situ* 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**		**Compliance with Standards**	
Measures 1a: Soil Contamination: Scrape up and process the historical accumulated layer that is spread out in these sites before commencing with new material; Institute all possible measures (e.g. secondary drains, and berms) to encourage the run-off of 'dirty' water and rain water into drains, rather than allowing trapped water to infiltrate into the buried *in-situ* soils (underlying some of these areas) and water-tables; Spray water for dust suppression. Tarpaulin cover over haul truck bins to limit dust.					Immediately (historical accumulated layer), Continuously (tarpaulin bin cover), Daily (spray water)		Chamber of Mines Guidelines	
Measures 1b: Soil Contamination: 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' and 'clean' run-off water derived from elsewhere from entering these areas.					Quarterly (drainage features-monitor and maintain)		Chamber 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**		**Compliance with Standards**	
Measures 1a: Soil Contamination: Firstly scrape up and remove the accumulated historical 'waste' layer that is spread out over extensive areas; Clean up and remove 'wastes' on a continual ongoing basis (especially in spring before the rainy season); Institute all possible measures (e.g. additional concrete slabs, secondary drains, and berms) to encourage the run-off of 'dirty' water and rain water into drains, rather than allowing trapped water to infiltrate into the buried *in-situ* soils (underlying the area) and water-tables; Spray water for dust suppression. Transport 'wastes' to the opencast pit (if potentially non-polluting) or a designated 'waste' storage facility (TSF if potentially polluting); Tarpaulin cover over haul truck bin to limit dust; Bund walls along slurry piping routes (if any)					Immediately (scrape up accumulated historical 'waste' layer), Continuously (generated daily 'wastes'), Continuously (tarpaulin bin cover), Daily (spray water)		Chamber of Mines Guidelines	
Measures 1b: Soil Contamination: 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' and 'clean' run-off water derived from elsewhere from entering these areas.					Quarterly (drainage features-monitor and maintain)		Chamber of Mines Guidelines	
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**		**Compliance with Standards**	
Measures 1: Soil Erosion *versus* Land Capability:Monitor soil erosion. Significant Soil Erosion is highly unlikely given that the post-rehabilitation slopes indicated in 'Rehabilitated areas - General Information' are generally well below the determined critical minimum erosion slope of 6.4 degrees (11.2 % percentage grade), in point two degrees (majority). Thus the existing 'topsoiling' depth that currently generally varies from 30-60cm (post-disturbance/mining Grazing Capability class) will not be reduced by erosion, and the Land Capability will thus not change. The client has already monitored the post-disturbance Land Capability by means of the current soil survey. Pick up (glean) and dispose of the surface small stones and rocks that occur on the surface in some areas, since these impact on the Land Capability. Surface stone/rock presently varies between 5-10 % of surface cover.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' and 'clean' run-off water derived from elsewhere from entering these areas.					Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains), Immediately Post-Rehabilitation (post-rehabilitation land capability already monitored by means of current soil survey), Immediately Post-Rehabilitation (client needs to glean and dispose of surface stones and rocks), Quarterly (drainage features-monitor and maintain)		Chamber of Mines Guidelines	
Measures 2: Soil Quality *versus* Land Use:Monitor soil fertility and vegetative basal cover. Sample/Fertilize the 'topsoiled' rehabilitated areas 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. Vegetative cover should be comprised of self-sustaining indigenous (to the area) 'grasses', while indigenous trees and shrubs may re-colonise naturally. Mature seeded grass may be mown from elsewhere and then spread out in rehabilitated areas that display a poor grass basal cover. Remove alien (non-indigenous) vegetation and weeds that may sprout in the rehabilitated (and other) areas. The existing grass basal cover in the rehabilitated areas currently meets the standard required for the stated end-land use of Extensive Grazing. No grazing or burning allowed until the post-closure phase.					Immediately after rehabilitation 'topsoiling' exercise, and once every 3-4 years thereafter (fertility monitoring: sample and fertilise), Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains, also including weed removal)		Chamber 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					-		Soil Specialist	

(rehabilitated grazing capability class ‘topsoiling’ depth of 20 - 30cm, 2 - 8 degree slope, 5 - 10 % surface rocks must be removed). NON-HERNIC OWNED (BUT SURVEYED) SURROUNDING AREAS: - Crocodile Mine Area (one large back-filled and ‘topsoiled’ opencast area, and two ‘topsoiled’ low peripheral ‘rock dump’ areas). Former area rehabilitated to a high standard (north - rehabilitated grazing capability class ‘topsoiling’ depth of 20 - 30cm, average 2 degrees evenly sloping, no surface rocks); and a low standard (south - rehabilitated wilderness capability class ‘topsoiling’ depth of 20cm, 2 degree slope, 30 - 40 % surface rocks must be removed). Latter areas rehabilitated to a low standard (rehabilitated grazing capability class ‘topsoiling’ depth of 20 - 30cm, uneven surface, 2 - 4 degree slope, 5 - 20 % surface rocks must be removed).								
Impact AFTER 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**	**Compliance with Standards**
Measures 1: Soil Quality: Monitoring required. Sample/Fertilize the 'topsoil' stockpile 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. Vegetative cover should be comprised of self-sustaining indigenous (to the area) 'grasses', while indigenous trees and shrubs may re-colonise naturally. Mature seeded grass may be mown from elsewhere and then spread out on areas of the pile that display a poor grass basal cover. No grazing or burning allowed.	Immediately after stockpiling, and once every 3-4 years thereafter (fertility monitoring: sample and fertilise)	Chamber of Mines Guidelines
Measures 2: Soil Erosion: Monitoring required. Reduced slopes (<= 6.4 degrees, 11.2 % percentage grade) and a high grass basal cover (refer to Measures 1) will limit soil erosion on the side-slopes of the stockpile. The establishment of a soil berm (grassed) on the downslope boundaries of the stockpile will intercept run-off/eroded soil derived from the stockpile, and will thus prevent siltation of the surrounds. The spraying of water for dust suppression will not be required on the pile since the stockpiled vertic topsoils are not susceptible to wind erosion.	Biannually (erosion and vegetative monitoring: spring before- and autumn after- the rains)	Chamber of Mines Guidelines
Measures 3: Soil Contamination: Monitoring required. The 'topsoil' stockpile must not be allowed to become contaminated; by means of the implementation of the following measures: Do not deposit contaminated 'waste' materials on the 'clean' 'topsoil' stockpile. A separate 'dirty' 'topsoil' stockpile may be developed for soils that were previously (before stripping) contaminated with 'dirty' water (or 'waste'). 'Waste' must be identified/removed from this pile and disposed of. 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' and 'clean' run-off water derived from elsewhere from entering these areas. The spraying of water for dust suppression in other developed areas (as recommended) will limit dust pollution of the 'topsoil' stockpile.	Annually (contamination monitoring), Quarterly (drainage features-monitor and maintain)	Chamber of Mines Guidelines
Measures - General Information regarding soil that may be stockpiled for whatever reason during the operational phase (i.e. further developments in the future):Available 'topsoil' reserves must be stripped as per the depths indicated on Map 6 (Soil Utilization [Stripping] Guide) during the construction and operational phases (varies for different features). 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. The organisation must plan not to stockpile the soils wherever it can, but rather utilize the stripped 'topsoil' material immediately in an area that is being rehabilitated (e.g. opencast area). Provision should also be made for limited stockpiling of excess 'topsoil' material for use in repair work during the post-closure	Operational phase	Chamber 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 capability class 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**		**Compliance with Standards**	
Measures 1: Soil Distribution: A sufficient safety factor (leaving un-mined pillars) must be built into the underground design. Re-grade (re-slope) to a slope of <= 6.4 degrees (11.2 % percentage grade) [for vertic broad soil group that overlies the underground mining areas], in order to re-establish a free draining final topography. The ideal aim (usually not entirely possible) is to achieve the pre-subsidence slope grade, slope shape (contours), drainage density and drainage pattern. Limited 'topsoiling' (vertic 'topsoil') and re-vegetation (locally indigenous grasses) may be necessary in order to promote the free flow of rainfall run-off and limit erosion. Thus, limited 'topsoil' (stockpiles) must be held in reserve for use in repair work during the operational, closure and post-closure phases. 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' and 'clean' run-off water derived from elsewhere from entering these areas.					Operational phase (un-mined pillars), Immediately after subsidence (re-grading/'topsoiling'/re-vegetation during the Operational, Closure, and Post-Closure phases of the project), Quarterly (drainage features-monitor and maintain)		Chamber of Mines Guidelines	
Measures 2: Land Capability: Re-grading and limited 'topsoiling' in order to re-establish a free draining final topography.					Immediately after subsidence (re-grading/ 'topsoiling'/ re-vegetation during the Operational Phase		Chamber of Mines Guidelines	
Measures 3: Land Use: 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.					Immediately after subsidence (re-grading/ 'topsoiling'/ re-vegetation during the Operational Phase		Chamber of Mines Guidelines	
Subsided Areas - General Information: Areas of underground mining (MG1- and MG2-chromite layers may be relevant) could be unstable, and particularly so when the mining depth is relatively close to the surface. Underground mining may also exist at the non-HERNIC owned Crocodile Mine. In the current area the probability is considered negligible that underground mining will affect the surface in the long term. Nevertheless, the method for rehabilitating subsided areas was provided for information purposes. **Mitigation Measures are equally applicable to the Operational, Closure, and Post-Closure phases of the project, the aforementioned since subsided areas must be attended to immediately when they occur. Thus, the current Table will be largely replicated, with certain additions for each subsequent phase of the project.**					Immediately after subsidence (re-grading/ 'topsoiling'/ re-vegetation during the Operational Phase			
Impact AFTER Management	Minor	Long Term	Site	**Medium**	Unlikely	**Low**	-	High

<table>
<tr><td colspan="9">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/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) - 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 Erosion 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 non-fertilisation.</td></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Major</td><td>Long Term</td><td>Local</td><td>High</td><td>Possible</td><td>High</td><td>-</td><td>Medium</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measures1: Soil Contamination and Soil Erosion: The 'New' Activities and Aspects (indicated in orange text) are likely to have addressed the majority of these issues.</td><td colspan="2">Refer to Construction phase</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measures 2a and 2b: Soil Contamination: 2a. Monitor seepage from the dams and maintain these features. Monitor and maintain optimum functioning (remove siltation and vegetation) of the earth 'dirty' water intercept drain downslope of each dam, together with its adjacent soil berm (entire length on the downslope side). 2b. Dredged material from the dams and drains must either be disposed of in the TSF (high pollution potential) or re-processed (plant), but not dumped on the dam/drain walls or in surrounding areas.</td><td colspan="2">Quarterly (dams-monitor and maintain),
Quarterly (drainage features-monitor and maintain),
Annually (dredging where necessary)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measures 3: Soil Erosion: Monitor soil erosion, and monitor and maintain the vegetative cover of the 'topsoil' dam walls. Soil Erosion may be reduced by reducing side-slopes to < 6.4 degrees (11.2 % percentage grade) where necessary. Mature seeded grass may be mown from elsewhere and then spread out on the dam walls that display a poor grass basal cover; No grazing or burning allowed.</td><td colspan="2">Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measures 4: Soil Quality: Sample/Fertilize the 'topsoil' dam walls 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.</td><td colspan="2">Once every 3-4 years (fertility monitoring: sample and fertilise)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td>Impact AFTER Management</td><td>Moderate</td><td>Long Term</td><td>Local</td><td>Medium</td><td>Possible</td><td>Medium</td><td>-</td><td>High</td></tr>
</table>

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 *in-situ* 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	Site	**Medium**	Possible	**Medium**	-	Medium
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measures 1: Soil Contamination: Monitor, repair leaks, and clean up accidental spillages.					Immediately (leaks and spills), Daily (monitor)		Soil Scientist	
Impact 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**		**Compliance with Standards**	
Measures 1: Soil Contamination: Monitor pollution levels (from settled dust) of the water in the dam, and levels of thus 'dirty' water seepage from the dam into the underlying/surrounding soils, and maintain this existing feature. Upgrade the 'drinking water dam' to the form of a closed (from pollution) reservoir that stores piped municipal drinking water if deemed necessary/appropriate in terms of human health (in relevant Specialist Study Reports). Note: The 'drinking water dam' is poorly sited, will become contaminated by dust (including metals), and is probably not well sealed due to the following points: Location within the infrastructure area; location in a downwind position from the plant; high dust loads that will settle on the water in this area; there was no need to seal a potentially non-polluting (at the time of construction) feature, and dumped 'waste' on some sections of the lower walls. Thus Seeping water will also be contaminated.					Immediately (remove any dumped 'waste' from the lower walls), Monthly (monitor levels of water contamination and seepage; and maintain existing feature), Immediately (upgrade to reservoir if deemed necessary in relevant Specialist Reports, or re-locate if feature will remain a dam)		Soil Scientist	
Measures 2: Soil Erosion: Monitor soil erosion, and monitor and maintain the vegetative cover of the 'topsoil' dam walls. Soil Erosion may be reduced by reducing side-slopes to < 6.4 degrees (11.2 % percentage grade) where necessary.Mature seeded grass may be mown from elsewhere and then spread out on the dam walls in sections that display a poor grass basal cover; No grazing or burning allowed.					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

<table>
<tr><th colspan="9">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 in-situ 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.</th></tr>
<tr><th></th><th>Magnitude</th><th>Duration</th><th>Scale</th><th>Consequence</th><th>Probability</th><th>SIGNIFICANCE</th><th>+/-</th><th>Confidence</th></tr>
<tr><td>Impact BEFORE Management</td><td>Moderate</td><td>Short Term</td><td>Site</td><td>Low</td><td>Possibly</td><td>Low</td><td>-</td><td>High</td></tr>
<tr><th colspan="5">Management Measures</th><th colspan="2">Time Period for Implementation</th><th colspan="2">Compliance with Standards</th></tr>
<tr><td colspan="5">Measures 1: Soil Contamination: Monitor levels of ‘dirty’ water seepage from the drying beds into the underlying/surrounding soils, and maintain the existing features. The dried up sewage sludge material must be scraped up periodically and utilised as a ‘topsoil’ fertiliser in Opencast areas that are being rehabilitated on an ongoing basis during the Operational and Closure phases.</td><td colspan="2">Biannually (monitor levels of seepage and maintain existing features - spring before- and autumn after- the rains), Annually in spring (scrape up sludge and utilise as a ‘topsoil’ fertiliser)</td><td colspan="2">Chamber of Mines Guidelines and Soil Scientist</td></tr>
<tr><td colspan="5">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 < 6.4 degrees (11.2 % percentage grade) where necessary. Mature seeded grass may be mown from elsewhere and then spread out on the drying bed walls in sections that display a poor grass basal cover; No grazing or burning allowed.</td><td colspan="2">Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measures 3: Soil Quality: Sample/Fertilize the 'topsoil' drying bed walls 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.</td><td colspan="2">Once every 3-4 years (fertility monitoring: sample and fertilise)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Short Term</td><td>Site</td><td>Low</td><td>Possibly</td><td>Low</td><td>-</td><td>High</td></tr>
</table>

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 *in-situ* soils due to possible leakage of water from piping.2. Soil Contamination of the Underlying/Surrounding *in-situ* 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 - spring before- and autumn after- the rains)		Chamber of Mines Guidelines	
Measures 2: Soil Contamination: Clean up oil/fuel spillages below pumps in pump station immediately; Clean concrete pad below pumps in pump station periodically, in order to collect up minor oil/fuel leakage; Ongoing maintenance of equipment.					Immediately (clean up oil/fuel spillages), Monthly (clean concrete pad in pump station), Ongoing (equipment maintenance)		Soil Scientist	
Impact AFTER Management	Minor	Short Term	Site	**Low**	Possible	**Low**	-	High

<table>
<tr><td colspan="9">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.</td></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Major</td><td>Long Term</td><td>Local</td><td>High</td><td>Possible</td><td>High</td><td>-</td><td>Medium</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measures 1: Soil Contamination and Soil Erosion:‘New’ Activities and Aspects (indicated in orange text) are likely to have addressed the majority of these issues.</td><td colspan="2">Refer to Construction phase</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measures 2: Soil Contamination: Monitor and 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’ and ‘clean’ run-off water. Promote water flow in the canals/drains in order to limit seepage below those that may be poorly sealed. Dredged material from the canals/drains must either be disposed of in the TSF (high pollution potential) or re-processed (plant), but not dumped on the canal/drain walls or in surrounding areas.</td><td colspan="2">Quarterly (drainage features-monitor and maintain),
Annually (dredging where necessary)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measures 3: Soil Erosion: Monitor soil erosion, and monitor and maintain the vegetative cover of the ‘topsoil’ berms. Soil Erosion may be reduced by reducing side-slopes to < 6.4 degrees (11.2 % percentage grade) where necessary. Mature seeded grass may be mown from elsewhere and then spread out on berms that display a poor grass basal cover; No grazing or burning allowed.</td><td colspan="2">Biannually (soil erosion and vegetative monitoring: spring before- and autumn after- the rains)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td colspan="5">Measures 4: Soil Quality:Sample/Fertilize the 'topsoil' berms 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.</td><td colspan="2">Once every 3-4 years (fertility monitoring: sample and fertilise)</td><td colspan="2">Chamber of Mines Guidelines</td></tr>
<tr><td>Impact AFTER Management</td><td>Moderate</td><td>Medium Term</td><td>Local</td><td>Medium</td><td>Possible</td><td>Medium</td><td>-</td><td>Medium</td></tr>
</table>

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 Implementation**		**Compliance with Standards**	
Measure 1: Excavate *in-situ* 'topsoil' to the required depth during the construction of the 'clean' water diversion drain and 'dirty' water intercept drain (refer to Measures 2), as well as the foundation holes.					During construction/development process		Chamber of Mines Guidelines	
Measure 2: Spray water to limit blown dust during construction/development. Construct an earth 'clean' water diversion drain surrounding the upslope sections of the facilities, together with its adjacent soil berm (entire length on the downslope side); Construct an earth 'dirty' water intercept drain downslope of the facilities, together with its adjacent soil berm (entire length on the downslope side); Compact the vertic soil base and downslope (not upslope) side-wall of the 'dirty' water drain to achieve a relatively impermeable compacted-'re-moulded' soil 'seal' layer; Re-vegetate (locally indigenous grasses) the 'topsoil' drain berms.					During construction/development 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 Implementation**		**Compliance with Standards**	
Measure 1: Spray water to limit blown dust during construction/development/stockpiling.					During construction/ development/ stockpiling process		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		Compliance with Standards	
Measure 1: Mining Engineer / Surveyor to inspect development of the mining shaft complex.					Operational Phase		Design 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 Standards	
Measure 1: Relevant personnel to note and record material being backfilled into the opencast pits.					Operational 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 Standards	
Measure 1: Mining Engineer / Surveyor to inspect development of the underground workings.					Operational Phase		Design 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 Standards**	
Measure 1: Maintain the current footprint area for the current Pelletizing and Sintering Plants during the operation thereof.					Operational 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.								
	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 Standards**	
Measure 1: Maintain the current footprint area for the 4 Furnaces during the operation thereof.					Operational Phase		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 Standards**	
Measure 1: Responsible personnel to inspect the Diesel Fuel Tanks and Collection Sumps for evidence of potential spillages / leaks. (Source Control Measure)					Continuously		No	
Measure 2: Any leaks and spillages are to be reported to the relevant personnel, after which the area is to be cleaned up accordingly. (Source Control Measure)					Immediately. Within 1 day of recorded leak / 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 Period for Implementation**		**Compliance 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)					Continuously		Yes (Water Use Licence)	
Measure 2: Monitor & report the quality (quarterly) and quantity (monthly) of water used for dust suppression. (Source Control Measure)					Quarterly and Monthly		Yes (Water Use Licence)	
Measure 3: Continue monitoring the groundwater resource quality. (Resource Directed Measure)					Quarterly		Yes (Water 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**	**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: Minimize groundwater cone of depression extent and optimize groundwater abstraction by pumping water directly from the shaft during the operational phase and not from adjacent abstraction boreholes. (Resource Directed Measure)					Continuously		No	
Measure 2: Monitor groundwater levels adjacent to the decline shaft in the dedicated weathered zone groundwater monitoring boreholes. (Resource Directed Measure)					Quarterly		Yes (Water 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**	**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: Responsible engineer to inspect and record the status / integrity of the dams. (Source Control Measure)					Annually		No	
Measure 2: The water levels in the dams are to be operated below the calculated Maximum Operating Level (MOL) at all times. (Source Control Measure)					Continuously		No	
Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the dams. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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**	**+/-**	**Confidence**
Impact BEFORE Management	Moderate	Medium Term	Local	**Medium**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Minimise cone of depression extent by abstracting water directly from the opencast pits and not from adjacent abstraction boreholes. (Resource Directed Measure)					Continuously		No	
Measure 2: Monitor groundwater levels adjacent to the opencast pits in dedicated weathered zone groundwater monitoring boreholes. (Resource Directed Measure)					Quarterly		Yes (Water Use Licence)	
Impact AFTER Management	Minor	Medium Term	Local	**Low**	Definite	**Medium**	-	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 for Implementation**		**Compliance with Standards**	
Measure 1: Drill and construct groundwater monitoring boreholes within the rehabilitated opencast pits once backfilled with Waste Rock and shaped at the surface, to monitor the quality of the water in the rehabilitated pit. (Source Control Measure)					Immediately after rehabilitation		No	
Measure 2: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the rehabilitated opencast pits. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: 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 (National 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**	**+/-**	**Confidence**
Impact BEFORE Management	Minor	Medium Term	Local	**Low**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Minimise cone of depression extent by abstracting water directly from the underground workings and not from adjacent abstraction boreholes. (Resource Directed Measure)					Continuously		No	
Measure 2: Monitor groundwater levels adjacent to and above the underground workings in the dedicated weathered zone groundwater monitoring boreholes. (Resource Directed Measure)					Quarterly		Yes (Water 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 Standards**	
Measure 1: Remove waste rock dump footprints by placing the waste rock back into the opencast pits, once space becomes available, as part of the rehabilitation thereof. (Source Control Measure)					Immediately once space is available in the opencast pits for backfilling.		No.	
Measure 2: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the unlined waste rock dumps. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Impact 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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
Measure 2: The water level in the dam is to be operated below the calculated Maximum Operating Level (MOL) at all times, until the dam is replaced by the Morula Pollution Control Dam. (Source Control Measure)					Continuously		Yes (National Water Act & Water Use Licence)	
Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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**	**+/-**	**Confidence**
Impact BEFORE Management	Moderate	Medium Term	Local	**Medium**	Possible	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the raw material stockpiles. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 2: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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.								
	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 Standards**	
Measure 1: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the raw material stockpiles. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 2: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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.								
	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 Standards**	
Measure 1: Re-work the current arising slag stockpiles as quickly as possible, in order to reduce the residence time of the slag material at the surface.					Continuously		No	
Measure 2: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the current arising slag stockpiles. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Re-work the slag stockpiles at the Primary CRP as quickly as possible, in order to reduce the residence time of the slag material at the surface.					Continuously		No	
Measure 2: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the Primary CRP slag stockpiles. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
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)					Continuously		Yes (National Water Act & Water Use Licence)	
Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National Water Act)	
Impact AFTER Management	Moderate	Medium Term	Local	**Medium**	Possible	**Medium**	-	High

<table>
<tr><th colspan="9">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.</th></tr>
<tr><th></th><th>Magnitude</th><th>Duration</th><th>Scale</th><th>Consequence</th><th>Probability</th><th>SIGNIFICANCE</th><th>+/-</th><th>Confidence</th></tr>
<tr><td>Impact BEFORE Management</td><td>Moderate</td><td>Medium Term</td><td>Local</td><td>Medium</td><td>Possible</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the TSF. (Resource Directed Measure)</td><td colspan="2">Quarterly (or as specified in the amended WUL).</td><td colspan="2">Yes (Water Use Licence)</td></tr>
<tr><td colspan="5">Measure 2: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan. (Resource Directed Measure)</td><td colspan="2">Immediately if/when identified.</td><td colspan="2">Yes (National Water Act)</td></tr>
<tr><td>Impact AFTER Management</td><td>Moderate</td><td>Medium Term</td><td>Local</td><td>Medium</td><td>Possible</td><td>Medium</td><td>-</td><td>High</td></tr>
</table>

<table>
<tr><th colspan="9">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.</th></tr>
<tr><th></th><th>Magnitude</th><th>Duration</th><th>Scale</th><th>Consequence</th><th>Probability</th><th>SIGNIFICANCE</th><th>+/-</th><th>Confidence</th></tr>
<tr><td>Impact BEFORE Management</td><td>Moderate</td><td>Medium Term</td><td>Local</td><td>Medium</td><td>Definite</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)</td><td colspan="2">Annually</td><td colspan="2">Yes (Water Use Licence)</td></tr>
<tr><td colspan="5">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)</td><td colspan="2">Continuously</td><td colspan="2">Yes (National Water Act & Water Use Licence)</td></tr>
<tr><td colspan="5">Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the dam. (Resource Directed Measure)</td><td colspan="2">Quarterly (or as specified in the amended WUL).</td><td colspan="2">Yes (Water Use Licence)</td></tr>
<tr><td colspan="5">Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan. (Resource Directed Measure)</td><td colspan="2">Immediately if/when identified.</td><td colspan="2">Yes (National Water Act)</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Medium Term</td><td>Local</td><td>Low</td><td>Possible</td><td>Low</td><td>-</td><td>High</td></tr>
</table>

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 for Implementation		Compliance with Standards	
Measure 1: Drill and construct groundwater monitoring boreholes within the rehabilitated opencast pits once backfilled with OB Plant Fines, to monitor the quality of the water in the rehabilitated pit. (Source Control Measure)					Immediately after rehabilitation		No	
Measure 2: Maintain the water level in the pit at depths below the groundwater level depths within the adjacent aquifers. (Source Control Measure)					Continuously		No	
Measure 3: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the rehabilitated opencast pits. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water 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 (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	SIGNIFICANCE	+/-	Confidence
Impact BEFORE Management	Moderate	Medium Term	Local	Medium	Definite	Medium	-	High
Management Measures					Time Period for Implementation		Compliance with Standards	
Measure 1: Drill and construct groundwater monitoring boreholes within the rehabilitated opencast pits once backfilled with OB Plant Fines, to monitor the quality of the water in the rehabilitated pit. (Source Control Measure)					Immediately after rehabilitation		No	
Measure 2: Maintain the water level in the pit at depths below the groundwater level depths within the adjacent aquifers. (Source Control Measure)					Continuously		No	
Measure 3: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the rehabilitated opencast pits. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water 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 (National Water Act)	
Impact AFTER Management	Minor	Medium Term	Local	Low	Possible	Low	-	High

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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
Measure 2: The water level in the dam is to be operated below the calculated Maximum Operating Level (MOL) at all times, until the dam is replaced by the proposed Plant Process Water Dam. (Source Control Measure)					Continuously		Yes (National Water Act & Water Use Licence)	
Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National Water Act)	
Impact AFTER Management	Minor	Medium Term	Local	**Low**	Possible	**Low**	-	High

ACTIVITY: OB Plant Return 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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
Measure 2: The water level in the dam is to be operated below the calculated Maximum Operating Level (MOL) at all times, until the dam is replaced by the proposed OB Plant Process Water Dam. (Source Control Measure)					Continuously		Yes (National Water Act & Water Use Licence)	
Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National Water Act)	
Impact AFTER Management	Minor	Medium Term	Local	**Low**	Possible	**Low**	-	High

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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
Measure 2: The water level in the dam is to be operated below the calculated Maximum Operating Level (MOL) at all times, until the dam is replaced by the proposed CRP Process Water Dam. (Source Control Measure)					Continuously		Yes (National Water Act & Water Use Licence)	
Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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 Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
Measure 2: The water level in the dam is to be operated below the calculated Maximum Operating Level (MOL) at all times, until the dam is replaced by the proposed Plant Storm Water Pollution Control Dam No.1. (Source Control Measure)					Continuously		Yes (National Water Act & Water Use Licence)	
Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (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 authorised volume of groundwater from each of the 3 authorised abstraction boreholes. (Resource Directed Measure)					Continuously		Yes (Water Use Licence)	
Measure 2: Optimise the abstraction of groundwater from each of the 3 boreholes so that the daily abstraction volumes remain consistent and do not fluctuate. (Resource Directed Measure)					Continuously		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**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Minor +	Long Term	Local	**Medium**	Definite	**Medium**	+	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Optimise the abstraction of groundwater from each of the 3 boreholes so that the daily abstraction volumes remain consistent and do not fluctuate. (Resource Directed Measure)					Continuously		No	
Measure 2: Abstract the authorised volume of groundwater from each of the 3 authorised abstraction boreholes. (Resource Directed Measure)					Continuously		Yes (Water Use Licence)	
Impact AFTER Management	Minor +	Long Term	Local	**Medium**	Definite	**Medium**	+	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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
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)					Continuously		Yes (National Water Act)	
Measure 3: Implement groundwater monitoring plan adjacent to the dam. (Resource Directed Measure)					Immediately once constructed (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 4: Monitor groundwater resource quality and quantity (water levels) at dedicated boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 5: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan.					Immediately if/when identified.		Yes (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
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)					Continuously		Yes (National Water Act)	
Measure 3: Implement groundwater monitoring plan adjacent to the dam. (Resource Directed Measure)					Immediately once constructed (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 4: Monitor groundwater resource quality and quantity (water levels) at dedicated boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 5: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan.					Immediately if/when identified.		Yes (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
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)					Continuously		Yes (National Water Act)	
Measure 3: Implement groundwater monitoring plan adjacent to the dam. (Resource Directed Measure)					Immediately once constructed (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 4: Monitor groundwater resource quality and quantity (water levels) at dedicated boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 5: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan.					Immediately if/when identified.		Yes (National Water Act)	
Impact AFTER Management	Minor	Medium Term	Local	**Low**	Possible	**Low**	-	High

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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
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)					Continuously		Yes (National Water Act)	
Measure 3: Implement groundwater monitoring plan adjacent to the dam. (Resource Directed Measure)					Immediately once constructed (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 4: Monitor groundwater resource quality and quantity (water levels) at dedicated boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 5: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan.					Immediately if/when identified.		Yes (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
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)					Continuously		Yes (National Water Act)	
Measure 3: Implement groundwater monitoring plan adjacent to the dam. (Resource Directed Measure)					Immediately once constructed (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 4: Monitor groundwater resource quality and quantity (water levels) at dedicated boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 5: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan.					Immediately if/when identified.		Yes (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
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)					Continuously		Yes (National Water Act)	
Measure 3: Implement groundwater monitoring plan adjacent to the dam. (Resource Directed Measure)					Immediately once constructed (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 4: Monitor groundwater resource quality and quantity (water levels) at dedicated boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 5: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan.					Immediately if/when identified.		Yes (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
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)					Continuously		Yes (National Water Act)	
Measure 3: Implement groundwater monitoring plan adjacent to the dam. (Resource Directed Measure)					Immediately once constructed (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 4: Monitor groundwater resource quality and quantity (water levels) at dedicated boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (National Water Act)	
Measure 5: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan.					Immediately if/when identified.		Yes (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Responsible engineer to inspect and record the status / integrity of the dam. (Source Control Measure)					Annually		Yes (Water Use Licence)	
Measure 2: Monitor groundwater resource quality and quantity (water levels) at dedicated weathered zone monitoring boreholes adjacent to the TSF. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Re-work the current arising slag stockpiles as quickly as possible, in order to reduce the residence time of the slag material at the surface.					Continuously		No	
Measure 2: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the current arising slag stockpiles. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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: Water Recovery Sumps– IMPACT DESCRIPTION: Deterioration 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 for Implementation**		**Compliance with Standards**	
Measure 1: Operate the sumps as empty as possible and inspect sump integrity. (Source Control Measure)					Continuously		No	
Measure 2: Implement groundwater monitoring plan adjacent to the dam. (Resource Directed Measure)					Immediately once constructed.		Yes (Water Use Licence)	
Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan.					Immediately if/when identified.		Yes (National 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 for Implementation**		**Compliance with Standards**	
Measure 1: Re-work the current arising slag stockpiles as quickly as possible, in order to reduce the residence time of the slag material at the surface.					Continuously		No	
Measure 2: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the current arising slag stockpiles. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: Any adverse trends in the groundwater quality recorded from the dedicated groundwater 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 (National 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: Water Recovery Sumps– IMPACT DESCRIPTION:Deterioration 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 for Implementation**		**Compliance with Standards**	
Measure 1: Operate the sumps as empty as possible and inspect sump integrity. (Source Control Measure)					Continuously		No	
Measure 2: Implement groundwater monitoring plan adjacent to the dam. (Resource Directed Measure)					Immediately once constructed.		Yes (Water Use Licence)	
Measure 3: Monitor groundwater resource quality and quantity (water levels) at dedicated boreholes adjacent to the dam. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated groundwater monitoring boreholes are to be reported and assessed, followed by the development of a site specific groundwater remediation plan.					Immediately if/when identified.		Yes (National 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.								
	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: Close transport trucks with tarpaulin sheet during transport.					Operational Phase		None applicable.	
Measure 2: Clean road surfaces and storm water ditches on regular basis.					Operational 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 of dirty/affected runoff by providing isolation/diversion berms and additional PCD capacity.					Operational 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**	
Measure 1: Minimising interception of surface water by isolating dirty area and diverting water around plant and stockpiles.					Operational 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 for Implementation**		**Compliance with Standards**	
Measure 1: Provision of additional PCD capacity.					Operational 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 additional PCD capacity.					Operational Phase		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.					Operational 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**	
Measure 1: Minimising interception of surface water by isolating dirty area and diverting water around feed material plant and slag stockpile.					Operational 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 interception of surface water by isolating dirty area and diverting surface water around facilities and final product stockpile.					Operational 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**	**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 suitable capacity and isolation berms to prevent spillage from wash bay.					Operational Phase		None applicable.	
Measure 2: Proper Operation and Maintenance procedures to be adhered to.					Operational Phase		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.								
	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: Reduced volumes of groundwater to be treated for use.					Operational Phase		None applicable.	
Impact AFTER Management	Minor+	Long Term	Local	**Medium**	Definite	**Medium**	-	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.								
	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 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 water storage requirement.					Operational Phase		None applicable.	
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**	
Measure 1: Minimising interception of surface water by isolating dirty area and diverting water around processing plant.					Operational 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 for Implementation**		**Compliance with Standards**	
Measure 1: Provide silt traps to improve water quality in recovery sumps.					Operational 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.								
	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 plant and raw materials stockpile.					Operational Phase		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 additional PCD capacity for capturing of dirty water.					Operational 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 for Implementation**		**Compliance with Standards**	
Measure 1: Minimising interception of surface water by isolating dirty area and diverting water around plant.					Operational Phase		None applicable	
Measure 2: Provision of additional PCD capacity for capturing of dirty water.					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 for Implementation**		**Compliance with Standards**	
Measure 1: Minimising interception of surface water by isolating dirty area and diverting water around plant.					Operational Phase		None applicable	
Measure 2: Provision of additional PCD capacity for capturing of dirty water.					Operational Phase		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 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 Tap Hole Fume Extraction and Dust Abatement areas and diverting water around these areas.					Operational Phase		None applicable	
Measure 2: Provision of additional PCD capacity for capturing of effluent water.					Operational Phase		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.								
	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 break floor area.					Operational Phase		None applicable	
Measure 2: Provision of additional PCD capacity for capturing of dirty water.					Operational 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.					Operational Phase		None applicable	
Measure 2: Provision of additional PCD capacity for capturing of dirty water.					Operational 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 interception of surface water by isolating dirty area and diverting water around crushing/screening area.					Operational Phase		None applicable	
Measure 2: Provision of additional PCD capacity for capturing of dirty water.					Operational 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.								
	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 PGM feed area and diverting water around the area.					Operational Phase		None applicable	
Measure 2: Provision of additional PCD capacity for capturing of dirty water.					Operational 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	**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 the screening and stockpile areas.					Operational Phase		None applicable	
Measure 2: Provision of additional PCD capacity for capturing of dirty water.					Operational 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.								
	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 additional PCD capacity for capturing of dirty water.					Operational 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.								
	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: Minimise interception and storage of dirty/affected runoff by providing clean water diversion berms.					Operational 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.								
	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: Decommissioning and capping of the two Historic Slimes Dams.					Operational Phase		Waste Management Regulations	
Measure 2: Monitor seepage quality to confirm capping efficiency.					Operational Phase		South African National Standard (SANS) 241:2011 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	**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: Decommissioning and capping of the two Historic Slimes Dams and diversion of run-off from capped slimes dam to clean water environment.					Operational Phase		Waste Management Regulations	
Measure 2: Monitor quality of water in RWD to confirm capping efficiency.					Operational Phase		South African National Standard (SANS) 241:2011 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.								
	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 interception of surface water by isolating ore/waste rock transfer house and diverting contaminated water into the new storm water PCD.					Operational 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 the Morula Dewatering Dam.					Operational 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: Contamination of the surface water resource due to spillages of contaminated water from the 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: Removal of contaminated sediment in basin.					Operational Phase		O&M Manual	
Measure 2: Decommissioning of the Morula Dewatering Dam					Operational 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 for Implementation**		**Compliance with Standards**	
Measure 1: Isolate water abstraction and pipeline areas and divert contaminated water to the void.					Operational Phase		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 and divert contaminated water to the void and clean water to the natural environment.					Operational 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.					Operational Phase		None applicable	
Impact AFTER Management	Minor	Medium Term	Local	**Low**	Possible	**Low**	-	High

<table>
<tr><th colspan="10">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.</th></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td colspan="2">SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Minor</td><td>Medium Term</td><td>Local</td><td>Low</td><td>Definite</td><td colspan="2">Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="3">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Proper operation and maintenance of Morula Dewatering Dam.</td><td colspan="2">Operational Phase</td><td colspan="3">O&M Manual</td></tr>
<tr><td colspan="5">Measure 2: Divert clean water past Morula Dewatering Dam.</td><td colspan="2">Operational Phase</td><td colspan="3">None applicable</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Medium Term</td><td>Local</td><td>Low</td><td>Possible</td><td colspan="2">Low</td><td>-</td><td>High</td></tr>
</table>

<table>
<tr><th colspan="10">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.</th></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td colspan="2">SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Minor</td><td>Medium Term</td><td>Local</td><td>Low</td><td>Definite</td><td colspan="2">Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="3">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Proper operation and maintenance of the Morula Dewatering Dam to contain dirty water.</td><td colspan="2">Operational Phase</td><td colspan="3">O&M Manual</td></tr>
<tr><td colspan="5">Measure 2: Divert clean water past Morula Dewatering Dam.</td><td colspan="2">Operational Phase</td><td colspan="3">None applicable</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Medium Term</td><td>Local</td><td>Low</td><td>Possible</td><td colspan="2">Low</td><td>-</td><td>High</td></tr>
</table>

<table>
<tr><th colspan="10">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.</th></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td colspan="2">SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
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<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="3">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Minimising interception of surface water by isolating Plant area and waste rock product and diverting contaminated water into the new storm water PCD.</td><td colspan="2">Operational Phase</td><td colspan="3">None applicable</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Medium Term</td><td>Local</td><td>Low</td><td>Possible</td><td colspan="2">Low</td><td>-</td><td>High</td></tr>
</table>

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 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	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 for Implementation**		**Compliance with Standards**	
Measure 1: Flatten steep slopes and uneven surfaces and 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	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**		**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	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: 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	Minor	Medium Term	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 for Implementation**		**Compliance with Standards**	
Measure 1: Contain contaminated water within TSF and RWD boundaries and maximise clean water run-off to the existing clean water cut-off drain.					Operational Phase		O&M Manual	
Impact AFTER Management	Minor	Medium Term	Local	**Low**	Possible	**Low**	-	High

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 for Implementation**		**Compliance with Standards**	
Measure 1: Move existing clean water cut-off drain and divert all clean storm water run-off into relocated drain.					Operational 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/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**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Proper operation and maintenance of the dams, PCD's and silt traps to utilise captured water.					Operational Phase		O&M Manuals	
Measure 2: Divert clean water past the dams, PCD's and silt traps.					Operational 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**		**Compliance with Standards**	
Measure 1: Proper operation and maintenance of the dams and PCD's to contain dirty water.					Operational Phase		O&M Manuals	
Measure 2: Regular removal of silt and cleaning of silt traps.					Operational Phase		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 maintenance of the Storm Water PCD.					Operational Phase		O&M Manuals	
Measure 2: Divert clean water past PCD.					Operational Phase		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 maintenance of the PCD to contain dirty water.					Operational Phase		O&M Manuals	
Measure 2: Regular removal of silt and cleaning of silt traps.					Operational Phase		O&M Manuals	
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: 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 maintenance of the Process & Storm Water Canal system and silt traps.					Operational Phase		O&M Manual	
Measure 2: Divert clean water past Process and Storm Water Canal system and traps.					Operational Phase		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.								
	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 Standards**	
Measure 1: Proper operation and maintenance of the Process & Storm Water Canal system and silt traps.					Operational Phase		O&M Manual	
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**	
Measure 1: Proper operation and maintenance of the Process Water Dams and surface water diversion berms.					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: 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 Standards**	
Measure 1: Proper operation and maintenance of the Process Water Dams.					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		O & 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	Minor	Medium Term	Local	**Low**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Ongoing rehabilitation and provision of free drainage of the Returns Materials area and existing rehabilitated area to maximise clean water run-off.					Operational Phase		None applicable	
Measure 2: Installation of silt fences to manage sediments.					Operational Phase		None applicable	
Impact AFTER Management	Minor+	Medium 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**	**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 maintenance of the sludge drying beds.					Operational Phase		O&M Manual	
Measure 2: Diversion of clean water past the sludge drying beds.					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.								
	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 alien species proliferation is managed and controlled according to an alien and invasive species management strategy.					Operational 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: Fuel Supply – ASPECT: Diesel Fuel Tanks – IMPACT DESCRIPTION: Accidental spillage of hydrocarbons polluting the soil and in turn floral 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					Operational 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 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 all water storage facilities are managed as 'zero-discharge' facilities and that all facilities are designed to accommodate a 1:100 year storm event.					Operational 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**	**+/-**	**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 particulate matter emissions comply with the relevant standards.					Construction Phase		Air Emission License and Air Quality Report.	
Measure 2: Monitor surrounding vegetation to determine whether particulate matter fallout is affecting leaf surfaces and photosynthetic processes.					Construction Phase		Air Emission License and Air Quality Report.	
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 floral 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 the facility is managed as 'zero-discharge' facility and that no effluent is discharged into the environment.					Construction Phase		Surface 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 floral 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 the TSF is managed as 'zero-discharge' facility and that the facility is designed to accommodate a 1:100 year storm event.					Construction Phase		Surface Water Balance Report and Water Use License.	
Impact AFTER Management	Minor	Medium 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	Moderate	Long Term	Local	**Medium**	Possible	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Ensure that topsoil stockpiles are vegetated with indigenous and endemic species and that alien species proliferation is monitored and managed.					Operational 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: Salvage Yard and Mine Sewage Plant – ASPECT: Sludge Drying Beds – 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					**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.					Operational 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 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 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

ACTIVITY: Morula Dewatering Dam – ASPECT: Storage of Process Water – 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 all water storage facilities are managed as 'zero-discharge' facilities and that all facilities are designed to accommodate a 1:100 year storm event.					Operational Phase	Surface Water Balance Report and Water Use 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.								
	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 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.					Operational Phase	Surface Water Balance Report and Water Use License		
Impact AFTER Management	Minor	Medium Term	Local	**Low**	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
Management Measures					**Time Period for Implementation**	**Compliance with Standards**		
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 fallout is affecting leaf surfaces and photosynthetic processes.					Annually during Operational Phase	Air Emission License and Air Quality Report		
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 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 is managed as 'zero-discharge' facility and that the facility is designed to accommodate a 1:100 year storm event.					Operational Phase		Surface Water Balance Report and Water Use License	
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					Time Period for Implementation	Compliance with Standards		
Measure 1: Implement a 60km/h speed limit on all internal roads and place signboards where roads traverse sensitive faunal habitat, warning motorists of the possibility of faunal collisions.					Operational 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.								
	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: Place bird-flappers in areas where powerlines traverse sensitive faunal habitat such as freshwater features					Operational 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 Assessment		
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 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					Operational 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 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 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.					Operational 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	Moderate	Long Term	Local	**Medium**	Possible	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Ensure that topsoil stockpiles are vegetated with indigenous and endemic species and that alien species proliferation is monitored and managed.					Operational 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: Salvage Yard and Mine Sewage Plant – ASPECT: Sludge Drying Beds – 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 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.					Operational 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 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

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	Medium	Possible	Medium	-	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.					Operational Phase		Surface Water Balance Report and Water Use 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 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 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.					Operational 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	**Medium**	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.					Operational 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	Minor	Long Term	Local	**Medium**	Possible	**Medium**	-	High
Management Measures					**Time Period for Implementation**	**Compliance with Standards**		
Measure 1: Ensure that particulate matter emissions comply with the relevant standards.					Construction Phase	Air Emission License and Air Quality Report		
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 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 the facility is managed as 'zero-discharge' facility and that no effluent is discharged into the environment.					Construction Phase	Surface 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 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 1:100 year storm event.					Construction Phase		Surface Water Balance Report and Water Use License	
Impact AFTER Management	Minor	Medium Term	Local	Medium	Unlikely	Low	-	High

Table 9.2(l): 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**	**+/-**	**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.					Operational 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								
	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 all water storage facilities are managed as 'zero-discharge' facilities and that all facilities are designed to accommodate a 1:50 year storm event.					Operational Phase		Surface 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.					Operational Phase		Geohydrological 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 stockpiles are vegetated with indigenous and endemic species and that erosion is monitored and managed.					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								
	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 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.					Operational 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 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

ACTIVITY: Morula Dewatering Dam – ASPECT: Storage of Process Water – 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 all water storage facilities are managed as 'zero-discharge' facilities and that all facilities are designed to accommodate a 1:50 year storm event.					Operational Phase		Surface 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 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.					Operational Phase		Surface 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.					Operational 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: 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**		**Compliance with Standards**	
Measure 1: Ensure that the facility is managed as 'zero-discharge' facility and that no effluent is discharged into the environment.					Construction Phase		Surface Water 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 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.					Construction 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 for Implementation**		**Compliance with Standards**	
Measure 1: Erosion control and storm water management.					Operational Phase		Ecological Reserve and Water Use License	
Measure 2: Ensure that alien species proliferation along road verges and fences is managed and controlled according to an alien and invasive species management strategy.					Operational 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**		**Compliance with Standards**	
Measure 1: Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised.					Operational 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 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.					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 for Implementation**		**Compliance with Standards**	
Measure 1: Limit the footprint area of the operational activities to what is absolutely essential in order to minimise the loss of clean water runoff areas and the concomitant recharge of streams in the area.					Operational Phase		Storm Water Management Plan	
Measure 2: Erosion control and stormwater management.					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 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.					Operational 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; 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 for Implementation**		**Compliance with Standards**	
Measure 1: Ensure that topsoil stockpiles are vegetated with indigenous and endemic species and that alien species proliferation is monitored and managed.					Operational Phase		NEMBA (Act 10 of 2004): Alien and Invasive Species Regulations, GN R598 of 2014	
Measure 2: 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.					Operational Phase		Surface Water Balance Report and Water Use License	
Measure 3: Ensure that where relevant, stockpiles are capped and suitably contained so as to prevent runoff and erosion from these structures to the receiving environment.					Operational 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 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.					Operational 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 parameters of the ecological reserve					Operational Phase		Ecological Reserve and Water Use 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 for Implementation**		**Compliance with Standards**	
Measure 1: Ensure that operational surfaces are appropriately bermed and sealed so as to prevent runoff and contamination of the surface and groundwater resources present.					Operational Phase		Waste Licence and Storm Water Management Plan	
Measure 2: All spills must be immediately cleaned up and suitably treated in line with the correct waste management procedures.					Operational 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 for Implementation**		**Compliance with Standards**	
Measure 1: Ensure that operational surfaces are appropriately bermed and sealed so as to prevent runoff and contamination of the surface and groundwater resources present.					Operational Phase		Waste Licence and Storm Water Management Plan	
Measure 2: All spills must be immediately cleaned up and suitably treated in line with the correct waste management procedures.					Operational 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 Period for Implementation**		**Compliance with Standards**	
Measure 1: Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be 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: 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 Implementation		Compliance with Standards	
Measure 1: Dust Suppression					Operational Phase		-	
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	-	High

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 Implementation		Compliance with Standards	
Measure 1: Dust Suppression					Operational Phase		-	
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	-	High

ACTIVITY: Stockpiles/Materials – ASPECT: Vehicle Movement on Gravel Roads – 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					Operational Phase		-	
Measure 2: Consider alternative techniques to reduce the extent by which vehicles are used to move material					Operational Phase			
Impact AFTER Management	Minor	Medium Term	Site	Low	Possible	Low	-	High

ACTIVITY: Stockpiles/Materials – ASPECT: Vehicle Movement on Gravel Roads – 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 Implementation**		**Compliance with Standards**	
Measure 1: Manage Vehicle fleet and movement of vehicles on site					Operational Phase		-	
Measure 2: Limit the use of vehicles in poorly ventilated areas					Operational Phase		-	
Measure 3: Plan routes in such a manner as to allow for exhaust fumes to disperse sufficiently and not to affect air quality to the extent whereby exceedences of standards could occur					Operational Phase		-	
Measure 4: Consider alternative options to vehicles with combustion engines					Operational Phase		-	
Impact AFTER Management	Minor	Medium Term	Site	**Low**	Possible	**Low**	-	High

ACTIVITY: Pelletizing and Sintering Plants and Furnaces – ASPECT: Uncontrolled Emission of Primary Pollutants– IMPACT DESCRIPTION: Particulate Matter Emissions								
	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: Implement control measures that will prevent/limit the probability, duration, extent and magnitude of uncontrolled emissions from point sources					Operational Phase		-	
Impact AFTER Management	Minor	Medium Term	Site	**Low**	Possible	**Low**	-	High

Table 9.2(o): Noise Aspects Operational Phase Impact and Risk Significance Table

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
Management Measures					**Time Period for Implementation**		**Compliance with Standards**		
Measure 1: No daytime management measures proposed.					Not applicable		SANS 10103:2008 (Urban)		
Impact AFTER 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

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
Management Measures					**Time Period for Implementation**		**Compliance with Standards**		
Measure 1: The implementation of a quarterly noise monitoring programme for 2 years, if noise levels are a concern at receptors implement Measure 2 and 3. **Measure 2:** A noise emission audit to determine the source of significant noises. **Measure 3:** Study to define potential mitigation measures that could reduce noise levels as well as the potential effectiveness of the measures.					Within a year, to be completed within 2 years after implementation.		SANS 10103:2008 (Urban)		
Impact AFTER Management (Effectiveness of mitigation measures will depend on the mitigation 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**		**Compliance with Standards**	
Measure 1: Dust Suppression.					Operational Phase		Air 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.								
	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 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.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**		**Compliance with Standards**	
Measure 1: Dust Suppression.					Operational Phase		Air 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.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**		**Compliance with Standards**	
Measure 1: Dust Suppression.					Operational Phase		Air Quality Report	
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**		**Compliance with Standards**	
Measure 1: Particulate Emissions Management.					Operational Phase		Air Quality Report	
Impact AFTER 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**		**Compliance with Standards**	
Measure 1: Particulate Emissions Management.					Operational Phase		Not Applicable	
Impact AFTER Management	Moderate	Medium Term	Site/Local	**Medium**	Definite	**Medium**	-	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**		**Compliance with Standards**	
Measure 1: Particulate Emissions Management.					Operational Phase		Relevant Specialist Reports	
Impact AFTER Management	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 – 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 on possible impacts and involvement in key decisions.					Short Term		None	
Measure 2: Grievances register that is easily excisable and regularly monitored.					Medium 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.					Medium 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 Labour Plan develop mechanisms to assist employees, prior to retrenchment date in the transition phase after closure of the operations.					Medium Term		Social and Labour Plan	
Measure 2: Focus on non-core related local supply links during the operational phases of the mine 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 Implementation**		**Compliance 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

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 for 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): Traffic Aspects Decommissioning and Closure Phase Impact and Risk Significance Table

ACTIVITY: Rubble Removal – ASPECT: Increase in Heavy Vehicles Trips – IMPACT DESCRIPTION: 19 Trips per day and Traffic Congestion								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**Significance**	**+/-**	**Confidence**
Impact BEFORE Management	Minor	Short term	Local	**Low**	Possible	**Low**	-	Medium
Management Measures					**Time Period for Implementation**		**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 Implementation**		**Compliance with Standards**	
Measure 1: Limit excavation activities to footprint area					During decommissioning of the dams		-	
Measure 2: Even out all rough surfaces					During decommissioning of the dams		-	
Measure 3: Backfill deep voids/ depressions					During decommissioning 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	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: 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 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: 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 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: 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 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: 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 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: 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 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: 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 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: 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 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: 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								
	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**	
Measure 1: Flatten steep slopes					Decommissioning Phase		-	
Measure 2: Even out all rough surfaces for final land use form					Decommissioning 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

<table>
<tr><td colspan="9">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.</td></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Moderate</td><td>Medium Term</td><td>Site</td><td>Medium</td><td>Definite</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measures 1: Soil Contamination: Scrape up and remove the generally thin (10-40cm) historical ‘waste’ or ‘non-waste’ layer that is spread extensively throughout some areas, exposing the underlying in-situ soils (when present). Remove the power lines and fences from the site. Sell-off steel/roofing/wire/fencing at the Salvage Yard. Remove imported concrete/stone/rock foundations/platforms/surfaces from the site, and dispose of in the opencast pit. Spray water for dust suppression where necessary when working with machinery. Haul trucks and vehicle traffic must obey speed limits in order to reduce the amount of blown dust; Tarpaulin cover over haul truck bins to limit dust. 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 (not applicable to fences and power lines). 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.
Measures 2. Soil Distribution: 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.
Measures : Soil Erosion: Re-grade (re-slope) removed facility/feature 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). Remove loose rocks and stony material.
Measures 4: Soil Quality (compaction and fertility): Machinery - utilize tracked vehicles for ‘topsoil’ handling during the dry season in order to minimise compaction. ‘Topsoil’ the removed foundation holes with ‘topsoil’ sourced from the adjacent ‘topsoil’ berms (where present), or alternatively source soil from the ‘topsoil’ stockpiles. Minimal 'topsoiling' of excavated foundations/holes/erosion in the removed power line and fence areas. Utilise live topsoil (and</td><td colspan="2">Decommissioning/Closure Supervision:

Weekly (all measures).

Post-Closure Monitoring:

Immediately after rehabilitation (soil survey to determine post-disturbance land capability as indicated by ‘topsoiling’ depth),

Annually (soil erosion and vegetative monitoring: autumn after the rains).</td><td colspan="2">Chamber of Mines Guidelines and Soil Scientist</td></tr>
</table>

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.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 Seeded ‘Grass’ must 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’) only in those problematic 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. **Measures 6: Land Capability:** The stated End Land Capability for the rehabilitated HERNIC areas in general is the 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). Given the minimal levels of disturbance to the majority of these areas, the pre-disturbance land capability is likely to be regained (where in-situ soils remain intact underlying the removed feature).								
Impact AFTER Management	Minor	Short Term	Site	**Low**	Possible	**Low**	-	High

<table>
<tr><td colspan="9">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’/’non-wastes’/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.</td></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Moderate</td><td>Long Term</td><td>Site</td><td>Medium</td><td>Definite</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measures 1: Soil Contamination: Scrape up and remove the generally thin (10-40cm) historical ‘waste’ or ‘non-waste’ layer that is spread extensively throughout some areas (surrounding buildings, and on dirt roads), exposing the underlying in-situ soils (when present).Demolish and remove facilities/features from the site. Remove imported concrete/stone/rock foundations/platforms/surfaces from the site. 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.
Measures 2: Soil Erosion: Re-grade (re-slope) 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). Remove loose rocks and stony material.
Measures 3. Soil Distribution: 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’.
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’).‘Topsoil’ the removed road footprints with ‘topsoil’ sourced from the adjacent (to the roads) ‘topsoil’ berms (where present), or alternatively source soil from the ‘topsoil’ stockpiles. Minimal 'topsoiling' of excavated foundations/holes/erosion in the removed building areas. 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) ‘grass’ cover.
Measures 5: Land Use: Functional surface cover (basal, canopy) to be achieved naturally. Thus, Mature Seeded ‘Grass’ must 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-</td><td colspan="2">Decommissioning/Closure Supervision:

Weekly (all measures).

Post-Closure Monitoring:

Immediately after rehabilitation (soil survey to determine post-disturbance land capability as indicated by ‘topsoiling’ depth),

Annually (soil erosion and vegetative monitoring: autumn after the rains).</td><td colspan="2">Chamber of Mines Guidelines and Soil Scientist</td></tr>
</table>

sustaining locally indigenous 'grasses') only those problematic areas where the spread seeded 'grass' did not germinate/create cover. No grazing or fire allowed. **Measures 6:** Land Capability:The stated planned End Land Capability is the 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). Utilise vertic 'topsoil' material in the majority of areas given that this broad soil group occurs extensively.								
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, 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-wastes'/building materials/hydrocarbons. 2. Soil Distribution loss (loss of horizons/depth) during removal of foundations and the scraping up of accumulated historical 'waste'/'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/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	Regional (Cadastral)	**Very High**	Definite	**Very High**	-	High

Management Measures	**Time Period for Implementation**	**Compliance with Standards**
Measures 1: Soil Contamination: Scrape up and remove the generally thick (> 40cm - > 100 cm) historical 'waste' or 'non-waste' layer that is spread extensively throughout some areas (surrounding buildings, and on dirt roads), exposing the underlying *in-situ* soils (when present). Demolish and remove facilities/features/dumps/stockpiles from the site. Remove imported concrete/stone/rock foundations/platforms/surfaces from the site. Construct a seal layer (compacted-'re-moulded' soil layer) directly overlying potentially highly-polluting rehabilitated features only. 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. **The End Land Use of these areas may remain Industrial due to residual Soil Contamination (pollution), and only after the completion of a Contaminated Land Assessment will the current status of the area become determinable. 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 Erosion: Re-grade (re-slope) 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). Remove loose rocks and stony material. **Measures 3.** Soil Distribution: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'.	Decommissioning/Closure Supervision: Daily (all measures), Immediately (Contaminated Land Assessment). Post-Closure Monitoring: Immediately after rehabilitation (soil survey to determine post-disturbance land capability as indicated by 'topsoiling' depth), Biannually (monitor soil erosion and vegetative cover - spring before- and autumn after- the rains).	Chamber of Mines Guidelines and Soil Scientist

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'). 'Topsoil' the removed facilities/features/dumps/stockpiles 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) 'grass' cover. **Measures 5:** Land Use: The End Land Use of these areas may remain Industrial due to residual Soil Contamination, pending the completion of a Contaminated Land Assessment (refer to Soil Contamination). 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') problematic areas, as well as 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 future Contaminated Land Assessment.** **Measures 6:** Land Capability:The stated End Land Capability is the 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). Utilise vertic 'topsoil' material in the majority of areas given that this broad soil group occurs extensively								
Impact AFTER Management	Major	Long Term	Local	**High**	Definite	**High**	-	High

<table>
<tr><td colspan="9">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.</td></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Major</td><td>Long Term</td><td>Local</td><td>High</td><td>Definite</td><td>High</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measures 1: Soil Contamination: Scrape up and remove the generally thick (> 40cm - > 100 cm) historical slag layer that is spread extensively throughout the temporary slag processing and stockpiling areas, exposing the underlying in-situ soils (when present). Demolish and remove facilities/features/dumps/stockpiles from the sites. Sell-off steel/roofing/fixtures/machinery at the Salvage Yard. Remove imported concrete/stone/rock foundations/platforms/pads/surfaces from the sites, and dispose of in the opencast pit. Consolidate all unwanted slags at one permanent (to remain in perpetuity) slag stockpile, or alternatively dispose of in the opencast pit only if potentially non-polluting; the aforementioned after selling-off that portion of the slags that are potentially ‘non-polluting/feasible/required. Spray water for dust suppression where necessary when working with machinery. Haul trucks and vehicle traffic must obey speed limits in order to reduce the amount of blown dust; Tarpaulin cover over haul truck bins to limit dust. Construct a seal layer (compacted-'re-moulded' soil layer) directly overlying potentially highly-polluting slag dumps that will remain in perpetuity only. 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 (e.g. previous slag dump footprints) or permanent features (e.g. slag dump). 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.</td><td colspan="2">Decommissioning (Closure) Supervision and Timing:

Immediately during Decommissioning (conduct a Contaminated Land Assessment of the entire property, if not already completed during Operational phase),

Immediately upon closure (scrape up and remove accumulated historical ‘waste’ [mostly slag]/’non-waste’ layer if present),

Daily where necessary (spraying of water when operating machinery and haul trucks),

Continuously (speed limits and tarpaulin haul truck bin cover),

Daily-Weekly supervision during Decommissioning phase (re-grade, rip compacted surfaces only, pick up loose rocks, ‘topsoiling’, soil sampling,</td><td colspan="2">Chamber of Mines Guidelines and Soil Specialist</td></tr>
</table>

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:** Avoid unnecessary disturbance of any underlying/surrounding *in-situ* soils that may already be 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. removed slag dumps). **Measures 3: Soil Erosion:** Re-grade (re-slope) removed facility/feature 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). Slope cannot easily be reduced to this extent for a permanent Slag Dump, and will thus not be able to be 'topsoiled'/re-vegetated either (given soil erosion on steep slopes). Thus, slag dumps must be re-vegetated using ecological restoration principles and phytoremediation. **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.	ameliorate/fertilise soils, mow/spread mature 'seeded' grass, thereafter re-vegetation where necessary), Quarterly (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 accordingly, and release back to the environment-refer to Groundwater Specialist Report).	

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. **Measures 6: Land Capability:** The stated End Land Capability for the area in general is the 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). The aforementioned applies to the removed slag footprints. The End Land Capability of the slag dumps that remain in perpetuity will be Industrial (non-grazing capability class), 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.								
Impact AFTER Management	Moderate	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 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, 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 '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	Moderate	Long Term	Local	Medium	Possible	Medium	-	High

Management Measures	Time Period for Implementation	Compliance with Standards
Measures 1: Soil Contamination: TSF: Tailings erosion from the side-slopes of the TSF will be intercepted by the paddock walls upslope of the paddocks; Immediately scrape up any tailings spills/accumulation (unlikely to be any since over-topping of the TSF is carefully controlled) in the paddocks area and re-deposit on top of the TSF. Spray water for dust suppression where necessary when working with machinery. Haul trucks and vehicle traffic must obey speed limits in order to reduce the amount of blown dust; Tarpaulin cover over haul truck bins to limit dust. The decision regarding the necessity for the placement of a compacted-'remoulded' vertic soil seal underlying the vertic 'topsoil' material on top of the TSF will be determined by the pollution potential of the tailings stored in the TSF (refer to relevant Specialist Study Report). Furthermore, the base of the TSF was also 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. **'Two Historic Slimes Dams, Phase 1 of the H:H Slimes Dam, and Morula Dewatering Dam' (already decommissioned):** No 'wastes' require to be scraped up in these areas. Construct a seal layer (compacted-'re-moulded' soil layer) directly overlying potentially highly-polluting features that will remain in perpetuity only. The aforementioned was previously conducted for these features. The surface of these features will have already been sealed in the following ways during Decommissioning of 'New' Activities/Aspects (Refer to Construction Tables): - Two Historic Slimes Dams: possibly a compacted-'re-moulded' vertic soil 'seal' layer, - Phase 1 of H:H Slimes Dam: Sealed with various appropriate impermeable Membrane liner seals 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.	**Decommissioning (Closure) Supervision and Timing:** Immediately during Decommissioning (conduct a Contaminated Land Assessment of the entire property, if not already completed during Operational phase), Immediately during decommissioning (scrape up and remove tailings accumulation from the paddocks if present, and re-deposit on TSF), Daily where necessary (spraying of water when operating machinery and haul trucks), Continuously (speed limits and tarpaulin haul truck bin cover), **Daily-Weekly supervision** during Decommissioning phase (re-grade, rip compacted surfaces only, pick up loose rocks, establishment of a compacted-'re-	Chamber of Mines Guidelines and Soil Scientist

Furthermore, the base of these features was also 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. **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. all of aforementioned features, albeit 'rehabilitated'). The aforementioned will limit '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 potentially polluting 'rehabilitated' 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:** Avoid unnecessary disturbance of any underlying/surrounding *in-situ* soils that may already be 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). **Measures 3: Soil Erosion**: 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 'topsoil' 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-slopes must be re-sloped 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' 'topsoiled' tailings/slimes dams, pollution control/return water/process water dams, evaporation ponds, and potentially polluting dumps) 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**.	moulded' vertic soil seal overlying potentially polluting features, 'topsoiling', soil sampling, ameliorate/fertilise soils, mow/spread mature 'seeded' grass, thereafter re-vegetation where necessary), Quarterly (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 accordingly, and release back to the environment-refer to Groundwater Specialist Report).	

Measures 4: Soil Quality (compaction and fertility): Machinery - utilize tracked vehicles during the dry season in order to minimise compaction. 'Topsoil' the re-graded TSF (slimes dams already 'topsoiled' during the construction phase for the 'New' activities/Aspects) 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. Sewerage sludge derived from the sludge drying beds of the two sewage plants may be spread out on the TSF as 'compost'/mulch. 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 re-graded Slimes Dams and the TSF 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). 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). Furthermore, in the case of the TSF, the probably steep (unlikely to be less than 18.4 degrees after re-grading) side-slopes will consequently be poorly-'topsoiled'/re-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 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. **Measures 6: Land Capability:** The stated End Land Capability for the area in general is the 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). The End Land Capability of the TSF side-slopes that remains in perpetuity will be Industrial (non-grazing capability class), 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. The End Land Capability of the TSF crest, as well as the Slimes Dams that remain in perpetuity will be Industrial (non-grazing capability class), due to potential contamination.								
Impact AFTER Management	Moderate	Long Term	Site	**Medium**	Possible (TSF) Unlikely (Slimes Dams)	**Medium (TSF)** **Low (Slimes Dams)**	-	High

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 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'/'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**	**Compliance with Standards**
For the purposes of the current discussion, the Pollution Control Dams, Process Water Dams, Return Water Dams, Drinking Water Dam, and the Sewerage Plant Sludge Drying Beds will collectively be referred to as 'Dam Features'. **Measures 1: Soil Contamination:Removed 'Dam Features':**The majority of the 'Dam Features' will be removed/'rehabilitated as follows: De-water the 'Dam Features' by means of evaporation, and if necessary pumping and purification. Scrape up the sediments on the base/walls of the 'Dam Features', and dispose of in the TSF. Remove imported concrete/stone/rock walls and dispose of in the opencast pit if potentially non-polluting, or in the TSF if potentially polluting. Push the walls of the 'Dam Features' into the void of the dam, thereby achieving a relatively level surface that approximates the surrounding landscape. Spray water for dust suppression where necessary when working with machinery. Haul trucks and vehicle traffic must obey speed limits in order to reduce the amount of blown dust; Tarpaulin cover over haul truck bins to limit dust. The decision regarding the necessity for the placement of a compacted-'remoulded' vertic soil seal; overlying an impermeable membrane; and underlying the vertic 'topsoil' material on top of the removed/'rehabilitated' 'Dam Features' will be determined by the pollution potential of the re-graded features (refer to relevant Specialist Study Report). Construct a seal layer (compacted-'re-moulded' soil layer) directly overlying potentially highly-polluting rehabilitated features only.	**Decommissioning (Closure) Supervision and Timing:** Immediately during Decommissioning (conduct a Contaminated Land Assessment of the entire property, if not already completed during Operational phase), Daily where necessary (spraying of water when operating machinery and haul trucks), Continuously (speed limits and tarpaulin haul truck bin cover), **Daily-Weekly supervision** during Decommissioning phase ('Dam Features': de-water, scrape up sediments, remove imported concrete/stone/rock, push the	Chamber of Mines Guidelines and Soil Scientist

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	walls into the dam void, re-grade, rip compacted surfaces only, pick up loose rocks, establishment of a compacted-'re-moulded' vertic soil seal overlying potentially polluting features only, 'topsoiling', soil sampling, ameliorate/fertilise soils, mow/spread mature 'seeded' grass, thereafter re-vegetation where necessary), Quarterly (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 accordingly, and release back to the environment-refer to Groundwater Specialist Report).	

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 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 'Dam Features': The End Land Use of the Removed 'Dam 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/'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 'Topsoiling' depth >= 25 cm (Chamber of Mines Grazing Capability Class depth standard), but preferably more (>= 60 cm – Arable Capability Class depth standard). Removed 'Dam Features': The End Land Capability of the Removed 'Dam Features' will be Grazing or Arable in terms of topsoiling depth; but may be downgraded to Industrial due to potential 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 Capability 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.								
Impact AFTER Management	Moderate	Long Term	Site (Removed) Local (Permanent)	**Medium**	Possible	**Medium**	-	High

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 poor 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 'topsoiling' exercise; due to further machinery handling of previously stockpiled 'topsoil' material [Removed]. 5. Land Use: Achieved/Maintenance of stated End-Land-Use of Extensive Grazing [Removed]. 6. Land Capability: 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**	**Compliance with Standards**
In the case of water abstraction pipelines and pump stations, remove and sell-off the aforementioned, and then level or remove the earth bund walls, as the method of their original placement applies. Thereafter, sample, fertilise and re-vegetate the bare areas utilising the procedure recommended for the 'Drain Features' hereafter. **For the purposes of the current discussion, the canals, drains and associated berms will collectively be referred to as 'Drain Features'. These will either be Removed [closed and 'rehabilitated] or Permanent [those that remain in perpetuity]. The vast majority of these will be Removed during the Decommissioning phase.** **Measures 1: Soil Contamination: Removed 'Drain Features':** The vast majority of the 'Drain Features' will be removed/'rehabilitated as follows: Scrape up the sediments on the base/walls of the 'Drain Features' (including those dredged and incorrectly deposited on the berms), and dispose of in the TSF. Remove imported concrete/stone/rock walls in some canals and dispose of in the opencast pit if potentially non-polluting, or in the TSF if potentially polluting. Push the adjacent 'topsoil' berms (if any) into the void of the drains/canals, or alternatively source soil from the 'topsoil' stockpiles, thereby achieving a relatively level surface that approximates the surrounding landscape. Spray water for dust suppression where necessary when working with machinery. Haul trucks and vehicle traffic must obey speed limits in order to reduce the amount of blown dust; Tarpaulin cover over haul truck bins to limit dust. **Permanent 'Drain Features':** A number of the 'Drain Features' 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. 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	**Decommissioning (Closure) Supervision and Timing:** Immediately during Decommissioning (conduct a Contaminated Land Assessment of the entire property, if not already completed during Operational phase), Daily where necessary (spraying of water when operating machinery and haul trucks), Continuously (speed limits and tarpaulin haul truck bin cover), **Daily-Weekly supervision** during Decommissioning phase ('Drain Features': scrape up sediments, remove imported concrete/stone/rock, push the adjacent berms into the drain/canal void, re-grade, rip compacted surfaces only, pick up loose rocks, establishment of a compacted-'re-moulded' vertic soil seal overlying potentially polluting features only, 'topsoiling', soil sampling, ameliorate/fertilise soils, mow/spread	Chamber of Mines Guidelines and Soil Scientist

features (e.g. previous 'Dam Features' footprints). The aforementioned will limit 'clean' water run-off 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 re-graded (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: T**he 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	mature 'seeded' grass, thereafter re-vegetation where necessary), 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 accordingly, and release back to the environment-refer to Groundwater Specialist Report).	

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 'Drain Features': The End Land Use of the Permanent 'dirty' and 'clean' drains/canals that will remain in perpetuity will be Industrial. The End Land Use of the Permanent 'topsoil' berms (adjacent to the drains/canals) that will remain in perpetuity will be Extensive Grazing, provided that the berm side-slopes are < 6.4 degrees / 11.2 % percentage grade, in order to be adequately '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 'Topsoiling' depth >= 25 cm (Chamber of Mines Grazing Capability Class depth standard), but preferably more (>= 60 cm – Arable Capability Class depth standard). Removed 'Drain Features': The End Land Capability of the Removed 'Drain Features' will be Grazing or Arable in terms of topsoiling depth; but may be downgraded to Industrial due to potential Soil Contamination in the case of the 'dirty' Removed 'Drain Features', the quantification of the aforementioned pending the completion of a Contaminated Land Assessment (refer to Soil Contamination). Permanent 'Drain Features': The End Land Capability of the Permanent 'clean' and 'dirty' drains/canals that will remain in perpetuity will be Industrial. The End Land Capability of the Permanent 'topsoil' berms (adjacent to the drains/canals) that will remain in perpetuity will be Extensive Grazing, provided that the berm side-slopes are < 6.4 degrees / 11.2 % percentage grade, in order to be adequately 'topsoiled'/re-vegetated.								
Impact AFTER Management	Minor	Long Term	Site (Removed) 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 Quality, 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 water-tables 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 Implementation	Compliance with Standards
Measures 1: Soil Contamination: Measures 1a. Dust: Spray water for dust suppression where necessary when working with machinery. Haul trucks and vehicle traffic must obey speed limits in order to reduce the amount of blown dust; Tarpaulin cover over haul truck bins to limit dust. Re-vegetate the entire 'rehabilitated' Opencast area in order to limit run-off and dust (refer to Measures 5-Land Use). Measures 1b. Run-off: Maintain/establish the low vegetated 'topsoil' berm that exists around the outer boundary of the opencast (rock dumps/open void) footprint area, the aforementioned functioning to intercept 'dirty' water rainfall run-off derived from the opencast area. In areas where a 'soft's (weathering rock and fines) berm presently exists instead of a 'topsoil' berm, the former must be removed and replaced with the latter. Re-vegetate the entire 'rehabilitated' Opencast area in order to limit run-off and dust (refer to Measures 5-Land Use). Measures 1b. Leaching: 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' layers.** Measures 1d. Order of Horizons: Ideally from the surface: - Vertic A-horizon 'topsoil'; - 'Soft's material (may be accessed by plant roots); - Hard overburden rock and lime rich materials	**Decommissioning (Closure) Supervision and Timing:** Immediately during Decommissioning (conduct a Contaminated Land Assessment of the entire property, if not already completed during Operational phase), **Daily-Weekly supervision** during Decommissioning phase – commencing Immediately (scrape up and remove rock/mixed materials/waste dumps and stockpiles, as well as the historical underlying layers in the various Infrastructure areas; and sell or dispose of in the TSF/Slimes Dams/Opencast pit as	Chamber of Mines Guidelines and Soil Scientist

('breaker' layer to the upward capillary movement of polluted/acid water; lime will neutralize Acid Rock/Mine Drainage to certain extent); and - 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 pollution / ARD contaminating the overlying 'topsoil' layers by capillary action. Measures 1e. 'Waste': Do not dispose of potentially polluting 'waste' materials from the 'Infrastructure' area in the Opencast void, because such materials will impact the groundwater-table. Such materials must be disposed of in an appropriate facility (e.g. TSF or Slimes Dumps). **Only materials determined to be relatively potentially non-polluting (low pollution potential) may currently be disposed of in the void of the Opencast pit. Unfortunately, it is probable that potentially polluting materials were historically buried in this area. However, the location/volume of such materials is unknown.** Do not utilise 'dirty' 'topsoil' that was historically (during stockpiling) mixed with potentially polluting 'waste' materials. Rock dumps/stockpiles (Opencast area, Morula Mining), Mixed Materials stockpiles (Alloys Smelting Plant Facilities), and Waste (HMS and CRP waste, OB Plant fines waste, OB Plant coarse waste): Remove rock/mixed materials dumps/stockpiles; and Scrape up and remove the generally thick (> 40cm - > 100 cm) historical underlying layer that is spread extensively throughout these processing and stockpiling areas, exposing the underlying *in-situ* soils (when present). Sell off those materials for which there is a market. Transport (haul truck) and dispose of the remaining aforementioned materials in the void of the Opencast pit provided that they are potentially non-polluting. The same applies to the HMS and CRP waste, OB Plant fines waste, and OB Plant coarse waste materials/areas. Re-grade, 'topsoil', sample, fertilise, and re-vegetate the footprints of the aforementioned areas in the various Infrastructure areas. Wash residual 'wastes' from elsewhere off the machinery before utilising the machinery for transportation of 'topsoil' or rehabilitation '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 potential pollution sources) and 'dirty' (intercepts 'dirty' water from polluted areas) storm water intercept canals/drains/berms, that may remain in perpetuity downslope of the Opencast area. The aforementioned will limit 'clean' and 'dirty' water run-off and seepage derived from elsewhere from entering the filled (buried) Opencast pit voids. 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:** 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	appropriate depending on pollution potential), Daily where necessary (spraying of water when operating machinery and haul trucks), Continuously (speed limits and tarpaulin haul truck bin cover), **Weekly supervision** during Decommissioning phase – commencing Immediately (backfill the opencast pit voids, establish a freely draining positive [convex] final landscape without ridges/hollows, re-grade, rip compacted surfaces only, pick up loose rocks, 'topsoiling', soil sampling, ameliorate/fertilise soils, mow/spread mature 'seeded' grass, thereafter re-vegetation where necessary), Quarterly (drainage features-'dirty'/'clean' drains/canals/berms-monitor and maintain-repair leaks, clear blockages, remove vegetation, remove siltation, dredging), Periodically (monitor leached contamination 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-refer to Groundwater Specialist Report).	

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' layers. **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 run-off, 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 effectively 'topsoiled'/re-vegetated either. Such areas must be re-sloped to approximately 16.0 degrees if possible, and thereafter re-vegetated using ecological restoration principles and phytoremediation. No grazing or burning allowed in such areas, either currently or in the future. The End Land Use of the three rehabilitated areas (last three Aspects in the list) currently meets the standard (moderate-high basal cover) required for the stated end-land use of Extensive Grazing. **Measures 6: Land Capability:** The stated End Land Capability for the rehabilitated HERNIC areas in general is the 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). The End Land Capability of the Grazing Capability class depth standard will easily be achieved by 'topsoiling' in the majority of the Opencast area. The End Land Capability of the limited steep to very steep sections of the Opencast area will remain Mining (i.e. Non-Grazing capability class), given that these slopes will consequently be non- or poorly-'topsoiled'/vegetated. The End Land Capability in the three rehabilitated areas (last three Aspects in the list) currently meets the 'topsoiling' depth standard (50-60cm, 30-50cm, and 20-30cm respectively) required for the post-disturbance Grazing Capability class.									
Impact AFTER Management	'Topsoiled Gentle-Moderate Final Slopes: Moderate	Long Term	Site	**Medium**	Definite	**Medium**	-	High	
	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 Implementation**		**Compliance with Standards**	
Measures 1: Soil Distribution: Subsided Areas: A sufficient safety factor (leaving un-mined pillars) was built into the underground design. Thus surface subsidence is unlikely. Measures for subsided areas include the following: Re-grade (re-slope) to a slope of <= 6.4 degrees (11.2 % percentage grade) [for vertic broad soil group that overlies the underground mining areas], in order to re-establish a free draining final topography. The ideal aim (usually not entirely possible) is to achieve the pre-subsidence slope grade, slope shape (contours), drainage density and drainage pattern. Limited 'topsoiling' (vertic 'topsoil') and re-vegetation (locally indigenous grasses) may be necessary in order to promote the free flow of rainfall run-off and limit erosion. Limited 'topsoil' stockpiles should have been held in reserve for use in repair work during the operational, closure and post-closure phases. 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. The aforementioned will limit 'clean' and 'dirty' water run-off and seepage derived from elsewhere from entering the subsided areas. Decline Shafts: Plug the surface of the shaft with concrete; re-grade (re-slope) the surface where necessary; establish a freely draining positive [convex] final landscape without ridges/hollows; rip compacted surfaces only; pick up loose rocks; 'topsoiling'; soil sampling; ameliorate/fertilise soils; mow/spread mature 'seeded' grass; thereafter re-vegetation where necessary.					Decommissioning phase (un-mined pillars must remain intact, and not become mined in order to optimise the underground operation at a later stage such as during surface decommissioning), **Daily-Weekly supervision** – Commencing amelioration Immediately after subsidence whether during the Operational, Closure, or Post-Closure phases of the project (operations include: re-grading/'topsoiling' where necessary/re-vegetation), Quarterly (drainage features-'dirty'/'clean' drains/canals/berms-monitor and maintain-repair leaks, clear blockages, remove vegetation, remove siltation, 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.					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	
Measures 3: Land Capability: Subsided Areas: Re-grading and limited 'topsoiling' in order to re-establish a free draining final topography. Decline Shafts: The stated End Land Capability for the rehabilitated HERNIC areas in general is the Chamber of Mines Grazing Capability Class. Thus					Ameliorate Immediately after subsidence whether during the Operational, Closure, or Post-Closure phases of the project		Chamber of Mines Guidelines	

‘Topsoiling’ depth >= 25 cm (Chamber of Mines Grazing Capability Class depth standard), but preferably more (>= 60 cm – Arable Capability Class depth standard). The End Land Capability class will be achieved by ‘topsoiling’ appropriately.					(operations include: re-grading/’topsoiling’ where necessary/re-vegetation)			
Subsided Areas - General Information: Areas of underground mining (MG1- and MG2-chromite layers may be relevant) could be unstable, and particularly so when the mining depth is relatively close to the surface. Underground mining may also exist at the non-HERNIC owned Crocodile Mine. In the current area the probability is considered negligible that underground mining will affect the surface in the long term. Nevertheless, the method for rehabilitating subsided areas was provided for information purposes. **Mitigation Measures are equally applicable to the Operational, Closure, and Post-Closure phases of the project, the aforementioned since subsided areas must be attended to immediately when they occur.**					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)		Authors notes	
Impact AFTER Management	Minor	Long Term	Site	**Medium**	Unlikely	**Low**	-	High

<table>
<tr><td colspan="9">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].</td></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Moderate</td><td>Medium Term</td><td>Site</td><td>Medium</td><td>Definite</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">For the purposes of the current discussion, the ‘Topsoil’ Stockpile will be discussed from the perspectives of Removed (utilised during Decommissioning phase) and Remaining (not currently required).
Measures 1: Soil Contamination: Remaining: The Remaining excess ‘topsoil’ will provide provision for use in repair work during the post-closure phase. The ‘topsoil’ stockpile must not be allowed to become contaminated; by means of the continuation of the following measures: Do not deposit contaminated ‘waste’ materials on the ‘clean’ ‘topsoil’ stockpile. A separate ‘dirty’ ‘topsoil’ stockpile may be developed for soils that were previously (before stripping) contaminated with ‘dirty’ water (or ‘waste’). ‘Waste’ must be identified/removed from the stockpile before utilising the material for ’topsoiling’ purposes. Spray water for dust suppression where necessary when working with machinery. The spraying of water for dust suppression in other developed areas (as recommended) will limit dust pollution of the ‘topsoil’ stockpile. The spraying of water for dust suppression will not be required on the pile since the stockpiled vertic topsoils are not susceptible to wind erosion. Haul trucks and vehicle traffic must obey speed limits in order to reduce the amount of blown dust; Tarpaulin cover over haul truck bins to limit dust. 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. The aforementioned will limit ‘clean’ and ‘dirty’ water run-off and seepage derived from elsewhere from entering the stockpile areas. Removed: Wash residual ‘wastes’ from elsewhere off the machinery before utilising the machinery for transportation of ‘topsoil’ or rehabilitation ‘topsoiling’ purposes.
Measures 2: Soil Distribution: Remaining: Avoid unnecessary disturbance of any underlying/surrounding in-situ soils that may already be present at the ‘topsoil’ stockpile sites. One of the rehabilitation objectives is to restore Soil Distribution to some measure by the process of ‘topsoiling’ the footprints of Removed or Permanent features.
Measures 3: Soil Erosion: Remaining: The previously established slope of the stockpile will have been altered, while the vegetative cover will have been removed due to the removal of ‘topsoil’</td><td colspan="2">Decommissioning (Closure) Supervision and Timing:

Daily when necessary (wash machinery utilised for transportation and spreading of ‘topsoil’ material),

Daily where necessary (spraying of water when operating machinery and haul trucks),

Continuously (speed limits and tarpaulin haul truck bin cover),

Daily-Weekly supervision during Decommissioning phase – commencing Immediately after removing required ‘topsoil’ from ‘topsoil’ stockpile (soil sampling, ameliorate/fertilise soils, mow/spread mature ‘seeded’ grass),

Biannually (erosion and vegetative monitoring: spring before- and autumn after- the rains),

Quarterly (drainage features-‘dirty’/’clean’ drains/canals/berms-monitor and maintain-repair leaks, clear blockages, remove vegetation, remove siltation,</td><td colspan="2">Chamber of Mines Guidelines and Soil Scientist</td></tr>
</table>

material for rehabilitation 'topsoiling' purposes elsewhere.Thus, re-establishing reduced slopes (<= 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'.	dredging).	
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-Made Features Areas to the following land capability classes (*albeit* to a lower production potential): - Wilderness ('topsoiling' depth: 0.15m) = 449 910m^3,		Authors notes

- Grazing ('topsoiling' depth: 0.25m) = 749 850m^3, or - Arable ('topsoiling' depth: 0.60m) = 1 799 640m^3. Given that 16.87 ha of 'topsoil' 'stockpiles' (23 dumps: 11.18 ha; 16 piles: 2.40 ha; and 11 banks: 3.29 ha) exist in the survey area, and assuming an average stockpile height of 2.5m (estimate since height was not measured), then approximately **421 750m^3 of previously 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 class depth standards respectively.** The stated End Land Capability for HERNIC is planned to be the Chamber of Mines Grazing Capability class. Thus stockpiled 'topsoil' is in critically short supply and must thus be stripped elsewhere on the property and transported to where it is required. For further details regarding the aforementioned, refer to the stripping method discussed in the last paragraph of Section 8.2.11 (Soil Utilisation [Stripping] Guide).								
Impact AFTER Management	Minor	Short Term	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.								
	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 Standards**	
Measure 1: Relevant engineers to ensure that the Pelletizing and Sintering Plants infrastructure is decommissioned and removed from site as planned.					Decommissioning Phase		No	
Impact AFTER Management	Minor	Short 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.								
	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 Standards**	
Measure 1: Relevant engineers to ensure that the Furnaces infrastructure is decommissioned and removed from site as planned.					Decommissioning 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 for Implementation		Compliance with Standards	
Measure 1: Responsible personnel to inspect the Diesel Fuel Tanks and Collection Sumps for evidence of potential spillages / leaks. (Source Control Measure)					Continuously		No	
Measure 2: Any leaks and spillages are to be reported to the relevant personnel, after which the area is to be cleaned up accordingly. (Source Control Measure)					Immediately. Within 1 day of recorded leak / 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 Period for Implementation		Compliance 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)					Continuously		Yes (Water Use Licence)	
Measure 2: Monitor & report the quality (quarterly) and quantity (monthly) of water used for dust suppression. (Source Control Measure)					Quarterly and Monthly		Yes (Water Use Licence)	
Measure 3: Continue monitoring the groundwater resource quality. (Resource Directed Measure)					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 for Implementation**		**Compliance with Standards**	
Measure 1: Drill and construct groundwater monitoring boreholes within the rehabilitated opencast pits once backfilled with Waste Rock and shaped at the surface, to monitor the quality of the water in the rehabilitated pit. (Source Control Measure)					Immediately after rehabilitation		No	
Measure 2: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the rehabilitated opencast pits. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: 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 (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 for Implementation**		**Compliance with Standards**	
Measure 1: Drill and construct groundwater monitoring boreholes within the rehabilitated opencast pits once backfilled with OB Plant Fines, to monitor the quality of the water in the rehabilitated pit. (Source Control Measure)					Immediately after rehabilitation		No	
Measure 2: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the rehabilitated opencast pits. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: 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 (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**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Moderate	Medium Term	Local	**Medium**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Drill and construct groundwater monitoring boreholes within the rehabilitated opencast pits once backfilled with OB Plant Fines, to monitor the quality of the water in the rehabilitated pit. (Source Control Measure)					Immediately after rehabilitation		No	
Measure 2: Maintain the water level in the pit at depths below the groundwater level depths within the adjacent aquifers. (Source Control Measure)					Continuously		No	
Measure 3: Monitor groundwater resource quality at dedicated weathered zone monitoring boreholes adjacent to the rehabilitated opencast pits. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water 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 (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 authorised volume of groundwater from each of the 3 authorised abstraction boreholes. (Resource Directed Measure)					Continuously		Yes (Water Use Licence)	
Measure 2: Optimise the abstraction of groundwater from each of the 3 boreholes so that the daily abstraction volumes remain consistent and do not fluctuate. (Resource Directed Measure)					Continuously		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**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Moderate +	Long Term	Local	**Medium**	Definite	**Medium**	+	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Optimise the abstraction of groundwater from each of the 3 boreholes so that the daily abstraction volumes remain consistent and do not fluctuate. (Resource Directed Measure)					Continuously		No	
Measure 2: Abstract the authorised volume of groundwater from each of the 3 authorised abstraction boreholes. (Resource Directed Measure)					Continuously		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 applicable.	
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					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Close transport trucks with tarpaulin sheet during transport.					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-off from capped portion of dam via stormwater channel into HH PCD.					Construction 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 for Implementation**		**Compliance with Standards**	
Measure 1: Divert surface run-off from capped portion of dam via stormwater channel into HH PCD.					Construction Phase		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-off from re-vegetated portion of dam into natural environment.					Construction Phase		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.								
	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 dirty waste cover layers & dispose in open cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Ripping to minimum 150mm depth of all hard surfaces and discing of abandoned surfaces.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor surface runoff free draining and runoff quality.					Annually during Decommissioning Phase		Water Use Licence water quality	
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.								
	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 slag waste cover layers and polluted soil & dispose in open cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: All sumps, CRP PCD, pressure pipe lines, tanks & infrastructure to be demolished, dismantled and removed.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 3: Ripping to minimum 150mm depth of all hard surfaces and discing of abandoned surfaces.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Concrete SW Drains and receiving SW PCD2s to remain & maintained					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 – 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 stockpiles (slag & waste slag) sell and/or dispose in open cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Dismantle Demolish and removed Plant/Process infrastructure					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 3: Ripping to minimum 150mm depth of all hard surfaces and levelling with discing of abandoned surfaces.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Concrete SW Drains and receiving SW PCD2s to remain & maintained					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 – 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**		**Compliance with Standards**	
Measure 1: Clean-up of all dirty areas by removal of coarse and fine slag and waste slag material stockpiles.					Decommissioning Phase		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.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)	
Measure 3: Monitor runoff water quality in SW PCD2					Decommissioning Phase		Water Use Licence water quality	
Measure 4: Remove dam liner and backfill & grade surface					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**	**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: Recycle process water to TSF or allow to evaporate.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Remove all sediments and silts from the CRP RWD when dry and dispose at TSF					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Demolish concrete dam 1m below n.g.l. and dispose at open cast. Backfill to n.g.l.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Impact AFTER Management	Minor	Short term	Local	**Low**	Unlikely	**Low**	-	High

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 areas by removal of coarse and fine slag and waste slag material stockpiles.					Decommissioning Phase		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.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)	
Measure 3: Demolish concrete SW drains and silt traps 1m below surface and backfill with soil from berms.					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: 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 activities. Clean-up yard by removal of coarse and fine slag and waste slag materials and stockpiles.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Re-instate natural surfaces by dismantling & demolishing plant infrastructure.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas. Local surface gradients >5% install contour berms 1m high and 1-2% flow gradient.					Decommissioning 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: 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					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Abandon all screening activities. Clean-up yard by removal of coarse and fine slag and waste slag materials and stockpiles.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Re-instate natural surfaces by dismantling & demolishing plant infrastructure.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas. Local surface gradients >5% install contour berms 1m high and 1-2% flow gradient.					Decommissioning 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: 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 materials from plant infrastructure & buildings and remove from site.					Decommissioning Phase		DME Mine Rehabilitation Requirements	
Measure 2: Demolish and clear civil services, infrastructure and concrete paved surfaces and dispose at Open Cast.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas. Local surface gradients >5% install contour berms 1m high and 1-2% flow gradient.					Decommissioning 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: 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**		**Compliance with Standards**	
Measure 1: Old Slimes Dams removal and clearing to be completed first.					Prior to Decommissioning Phase		DME Mine Rehabilitation Requirements	
Measure 2: Monitor groundwater quality to confirm water quality complying.					Prior to Decommissioning Phase		WUL requirements	
Measure 3: Demolish treatment dams 1m below surface and backfill with soil from existing topsoil stockpiles.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Reinstate surface to be free draining and vegetate.					Decommissioning 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

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**	
Measure 1: Clean-up yard by removal of fine slag sand stockpiles.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Re-instate natural surfaces by dismantling & demolishing plant infrastructure.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas.					Decommissioning 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: 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, demolish concrete sumps and plinths 1m below n.g.l.					Decommissioning Phase		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.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)	
Measure 3: SW PCD 2 and canal system to be maintained until area has been rehabilitated.					Ultimate stage 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	**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 tanks and moveable transport infrastructure from area.					Decommissioning Phase		DME 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 services, infrastructure and concrete paved surfaces with plinths and dispose at Open Cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Re-instate free draining surfaces by grading level unevenness, ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas..					Decommissioning 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

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.								
	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: Allow intercepted water to evaporate. . Use water for dust suppression and vegetation to establish. Excess water to be pumped to TSF for evaporation.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Remove SW PCD 2 once upslope catchment area has been rehabilitated. Remove membrane liner and backfill basin depression with soil from walls and adjacent basin excavation stockpiles. Level & grade surface and vegetate					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: 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 materials from plant infrastructure & buildings sell and or remove from site.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Demolish and clear services, infrastructure and concrete paved surfaces and dispose at Open Cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas. Local surface gradients >5% install contour berms 1m high and 1-2% flow gradient.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)	
Measure 4: Allow intercepted water from SW PCD 1A and 1B to evaporate. . Use water for dust suppression and vegetation to establish. Excess water to be pumped to TSF for evaporation.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 5: Remove SW PCD 1A & 1B once upslope catchment area has been rehabilitated. Remove membrane liner and backfill basin depression with soil from walls and available clean material stockpiles. Level & grade surface and vegetate					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 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 for Implementation**		**Compliance with Standards**	
Measure 1: Dismantle, Recover materials from plant infrastructure & buildings sell and or remove from site.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Demolish and clear services, infrastructure and concrete paved surfaces to a depth of 1m below n.g.l. and dispose at Open Cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas. Local surface gradients >5% install contour berms 1m high and 1-2% flow gradient.					Decommissioning 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: 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.								
	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 services, infrastructure and concrete paved surfaces to a depth of 1m below n.g.l. and dispose at Open Cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Re-instate free draining surfaces, backfilling local depressions and ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas. Local surface gradients >5% install contour berms 1m high and 1-2% flow gradient.					Du Decommissioning 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: 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**	Possible	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Demolish and clear services, infrastructure and concrete paved surfaces to a depth of 1m below n.g.l. and dispose at Open Cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Remove and clear all materials stockpiles by selling or dispose to open cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces, backfilling local depressions and ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas. Local surface gradients >5% install contour berms 1m high and 1-2% flow gradient.					Decommissioning 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: 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 infrastructure, demolish services and concrete plinths & foundations to a depth of 1m below n.g.l. and dispose at Open Cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Remove and clear all materials, waste and slag stockpiles and dispose to open cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces, backfilling local depressions and ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas. Local surface gradients >5% install contour berms 1m high and 1-2% flow gradient.					Decommissioning 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: 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**		**Compliance with Standards**	
Measure 1: Remove plant & processing infrastructure, demolish services and concrete plinths & foundations to a depth of 1m below n.g.l. and dispose at Open Cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Remove and clear all dirty surfaces and dispose to open cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: PGM Platform material should be used to backfill PCD basins and excess for open cast rehabilitation.					Decommissioning Phase			
Measure 4: Re-instate free draining surfaces, ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas.					Decommissioning 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: 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 with Standards**	
Measure 1: Use stockpiles (Mixed Material, Slag & Arising's) to rehabilitated open cast by backfilling.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Remainder of stockpiles to be consolidated and shaped to stable side slopes and minimised footprints.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: SW PCD 3 to be maintained to intercept runoff from the remainder of stockpile footprints.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Install additional clean water diversion berms and drains to reduce affected area containing these remnants of stockpiles.					Decommissioning 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 for Implementation**		**Compliance with Standards**	
Measure 1: Allow intercepted water to evaporate. . Extract water for dust suppression and vegetation to establish. Excess water to be pumped to TSF for evaporation.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Remove SW PCD 3 once upslope catchment area has been rehabilitated and intercepted runoff demonstrates to meet quality standards. Remove membrane liner and backfill basin depression with soil from walls and adjacent basin excavation stockpiles. Level & grade surface and vegetate					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: 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**	
Measure 1: Maintain and monitor site including access control and warning signage on surrounding security fence.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor liner condition, water level & water quality in RWD.					Decommissioning Phase		Class A liner performance	
Measure 3: Monitor groundwater quality to confirm liner efficiency.					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.					Decommissioning Phase		Class A liner performance	
Measure 2: Monitor & maintain clean runoff diversion drains directing runoff away from RWD					Decommissioning Phase		Effectiveness of Diversion to Reg No. GN 704 (National Water Act, 1998 (Act No.36 Of 1998)	
Measure 3: Only old seep drains from capped HH Slimes Dam to discharge to RWD.					Pre Decommissioning Phase		National Norms & Standards for disposal of waste 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 surfaces of all ore or rock materials and dispose at opencast					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Dismantle, demolish all build infrastructure & foundations to 1m below n.g.l. clearing surfaces and remove.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas.					Decommissioning 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 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 dams with base foundations to 1m below n.g.l. clearing surfaces and remove.					Decommissioning Phase		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					Decommissioning 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	**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: Complete water treatment process. Empty treated water from Storage Dams and use for dust suppression and watering of vegetation					Decommissioning Phase		DME Mine Rehabilitation Requirements 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 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: Dismantle, uninstall and remove all pipe systems. Demolish and remove concrete plinth up to 1m below n.g.l.					Decommissioning Phase		DME 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.								
	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, demolish all build infrastructure & foundations to 1m below n.g.l. clearing surfaces and remove.					Decommissioning Phase		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.					Decommissioning 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: 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 beds and demolish concrete beds. Dispose concrete at Open Cast.					Decommissioning Phase		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.					Decommissioning 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: 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: Complete crushing and selling of waste rock.					Decommissioning Phase		DME Mine Rehabilitation Requirements	
Measure 2: Clear remainder of waste rock and dispose at Open Cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas.					Decommissioning 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: 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 Implementation**		**Compliance with Standards**	
Measure 1: Complete crushing and selling of waste rock.					Decommissioning Phase		DME Mine Rehabilitation Requirements	
Measure 2: Clear remainder of waste rock and dispose at Open Cast.					Decommissioning Phase		DME Mine Rehabilitation Requirements	
Measure 3: Remove all crushing plant from site. Demolish all concrete plinths and basis.					Decommissioning Phase		DME Mine Rehabilitation Requirements	
Measure 4: Level stockpile isolation berms.					Decommissioning Phase		DME Mine Rehabilitation Requirements	
Measure 5: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas.					Decommissioning 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 Dams to be decommissioned as indicated. Upslope catchment and SW drains to be rehabilitated as indicated.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Allow intercepted water to evaporate. . Use water for dust suppression and vegetation to establish. Excess water to be pumped to TSF for evaporation.					Up to Ultimate stage of decommissioning		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Remove membrane liner and backfill basin depression with soil from walls and adjacent basin excavation stockpiles. Level & grade surface and vegetate.					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: 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.								
	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: Allow intercepted water to evaporate. . Use water for dust suppression and vegetation to establish. Excess water to be pumped to TSF for evaporation.					Up to Ultimate stage of decommissioning		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Remove membrane liner and backfill basin depression with soil from walls and adjacent basin excavation stockpiles. Level & grade surface to be free draining and vegetate.					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: 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	Long Term	Local	**Medium**	Possible	**Low**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Remnants of fines to be worked into back fill layers in Open Cast. No pockets or small voids to exist during backfilling that would cause eventual surface depressions.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Open cast to be backfilled, surface profiled, topsoiled and vegetated as indicated.					Decommissioning 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.								
	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: Coarse waste to be worked into bottom zone during backfilling of Open Cast. No pockets or small voids to exist during backfilling that would cause eventual surface depressions.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Open cast to be backfilled, surface profiled, topsoiled and vegetated as indicated.					Decommissioning Phase		DME 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 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 penstocks (Beaching Profile) with day walls to provide for freeboard. Penstocks to be used for crest drainage.					Decommissioning Phase		Minimum Requirements for Waste Disposal by Landfill, DWA, 1998.	
Measure 2: Rehabilitate crest by covering with a turf layer of 450mm followed with 200mm topsoil (GLB+ Landfill capping standard)					Decommissioning Phase		Minimum Requirements for Waste Disposal by Landfill, DWA, 1998.	
Measure 3: Side slopes of TSF to be erosion protected (soil saver product and soiled filled geocells) and vegetated.					Decommissioning Phase		Minimum Requirements for Waste Disposal by Landfill, DWA, 1998.	
Measure 4: Monitor water quality in RWD and remove dam when quality complies with norms. Rehabilitation of RWD to be similar to SW PCD rehabilitation.					Decommissioning Phase		WUL water quality limits	
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.								
	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 penstocks (Beaching Profile) with day walls to provide for freeboard. Penstocks to be used for crest drainage.					Decommissioning Phase		Minimum Requirements for Waste Disposal by Landfill, DWA, 1998.	
Measure 2: Rehabilitate crest by covering with a turf layer of 450mm followed with 200mm topsoil (GLB+ Landfill capping standard)					Decommissioning Phase		Minimum Requirements for Waste Disposal by Landfill, DWA, 1998.	
Measure 3: Side slopes of TSF to be erosion protected (soil saver product and soiled filled geocells) and vegetated.					Decommissioning Phase		Minimum Requirements for Waste Disposal by Landfill, DWA, 1998.	
Measure 4: Monitor water quality in RWD and remove dam when quality complies with norms. Rehabilitation of RWD to be similar to SW PCD rehabilitation.					Decommissioning Phase		WUL water quality limits	
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: Water in PWDs and OB Dam should be isolated and left to evaporate.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 2: PWD and OB Dam liners should be removed and basins backfilled with wall soils.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 3: Plant SW PCD 1A & 1B and feeding SW drains to be left until upslope Area A4 has been cleared, rehabilitated and stabilized..					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 4: SW PCD 1A & 1B water to be used for dust suppression and irrigation of the upslope verges. Excess water left to evaporate or pumped to TSF for evaporation.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 5: Demolish silt traps and bury in dam basin prior to backfill.					Up to Ultimate stage of decommissioning		Approved Rehabilitation Objectives	
Measure 6: Remove SW PCD 1A & 1B once upslope catchment area has been rehabilitated. Remove membrane liner and backfill basin depression with soil from walls and available clean material stockpiles. Level & grade surface and vegetate					Up to Ultimate stage of decommissioning		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 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: Isolate PWD and OB Dams from any runoff.								
Measure 2: Water in PWDs and OB Dam should be isolated and left to evaporate.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 3: PWD and OB Dam liners should be removed and basins backfilled with wall soils.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 4: Plant SW PCD 1A & 1B and feeding SW drains to be left until upslope Area A4 has been cleared, rehabilitated and stabilized..					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 5: SW PCD 1A & 1B water to be used for dust suppression and irrigation of the upslope verges. Excess water left to evaporate or pumped to TSF for evaporation.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 6: Demolish silt traps and bury in dam basin prior to backfill.					Up to Ultimate stage of decommissioning		Approved Rehabilitation Objectives	
Measure 7: Remove SW PCD 1A & 1B once upslope catchment area has been rehabilitated. Remove membrane liner and backfill basin depression with soil from walls and available clean material stockpiles. Level & grade surface and vegetate					Up to Ultimate stage of decommissioning		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	Minor	Short Term	Local	**Low**	Possible	**Low**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Plant SW drains to be maintained until upslope Area A4 has been cleared, rehabilitated and stabilized..					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 2: Plant SW PCD 1A & 1B and feeding SW drains to be left until upslope Area A4 has been cleared, rehabilitated and stabilized.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 3: SW PCD 1A & 1B water to be used for dust suppression and irrigation of the upslope verges. Excess water left to evaporate or pumped to TSF for evaporation.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 4: Remove SW PCD 1B once upslope catchment area has been rehabilitated. Remove membrane liner and backfill basin depression with soil from walls and available clean material stockpiles. Level & grade surface and vegetate					Up to Ultimate stage of decommissioning		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: 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 maintained until upslope Area A4 has been cleared, rehabilitated and stabilized..					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 2: Plant SW PCD 1A & 1B and feeding SW drains to be left until upslope Area A4 has been cleared, rehabilitated and stabilized.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 3: SW PCD 1A & 1B water to be used for dust suppression and irrigation of the upslope verges. Excess water left to evaporate or pumped to TSF for evaporation.					Decommissioning Phase		Approved Rehabilitation Objectives	
Measure 4: Remove SW PCD 1B once upslope catchment area has been rehabilitated. Remove membrane liner and backfill basin depression with soil from walls and available clean material stockpiles. Level & grade surface and vegetate					Up to Ultimate stage of decommissioning		DME 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 maintained until all upslope areas have been cleared, rehabilitated and are stabilize in terms of erosion vulnerability.					Up to Ultimate stage of decommissioning		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Demolish concrete SW drains and silt traps 1m below surface and backfill with soil from berms or borrow stockpiles.					Up to Ultimate stage of decommissioning		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas.					Decommissioning 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 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.								
	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 maintained until all upslope areas have been cleared, rehabilitated and are stabilize in terms of erosion vulnerability.					Up to Ultimate stage of decommissioning		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Demolish concrete SW drains and silt traps 1m below surface and backfill with soil from berms or borrow stockpiles.					Up to Ultimate stage of decommissioning		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas.					Decommissioning 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 for Implementation**		**Compliance with Standards**	
Measure 1: Demolish concrete silt trap, manholes, RC bays and RC floors and dispose at Open Cast or landfill site.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Reclaim SW pipe system and remove from site.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Backfill PCD 4 and level surface.					Decommissioning Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Re-instate free draining surfaces by ripping to minimum 150mm depth of all hard surfaces and discing. Follow natural contours. Vegetate areas.					Decommissioning 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**	
Measure 1: Monitor & maintain surface cover soil and vegetation.					Decommissioning 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**	**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 beds and demolish concrete beds and Treatment Plant. Dispose concrete at Open Cast.					Decommissioning Phase		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.					Decommissioning 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

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**	Possible	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Ensure that during dewatering of dam, no spillage or discharge of dirty water into the surrounding environment occurs and that all dirty water is contained and treated to the relevant standards prior to discharge.					Construction Phase		South African National Standard (SANS) 241:2011 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 floral 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 treated at an appropriate and licensed waste disposal site.					Construction 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.								
	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-vegetation is performed according to a specialist rehabilitation plan and that indigenous and endemic species are used for re-vegetation.					Construction Phase		Rehabilitation Plan	
Measure 2: Monitor re-vegetation efforts to ensure efficiency of rehabilitation and determine whether alien species are controlled.					Annually during Operational 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	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 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 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 slimes dam is adequately rehabilitated and capped to ensure that no seepage or discharge occurs.					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 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.					Decommissioning Phase		Rehabilitation 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

<table>
<tr><th colspan="9">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</th></tr>
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<tr><td>Impact BEFORE Management</td><td>Moderate</td><td>Long Term</td><td>Local</td><td>Medium</td><td>Possible</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Ensure that during removal of slimes, no spillage or discharge of slimes into the surrounding environment occurs.</td><td colspan="2">Decommissioning Phase</td><td colspan="2">Waste License and Water Use License</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Medium Term</td><td>Local</td><td>Low</td><td>Unlikely</td><td>Low</td><td>-</td><td>High</td></tr>
</table>

<table>
<tr><th colspan="9">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</th></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Moderate</td><td>Long Term</td><td>Local</td><td>Medium</td><td>Possible</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Ensure that the slimes dam is adequately rehabilitated and capped to ensure that no seepage or discharge occurs.</td><td colspan="2">Decommissioning Phase</td><td colspan="2">Surface Water Balance Report, Waste License and Water Use License</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Medium Term</td><td>Local</td><td>Low</td><td>Unlikely</td><td>Low</td><td>-</td><td>High</td></tr>
</table>

<table>
<tr><th colspan="9">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</th></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Moderate</td><td>Long Term</td><td>Local</td><td>Medium</td><td>Possible</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Ensure that demolition and removal of infrastructure does not encroach upon remaining natural vegetation.</td><td colspan="2">Decommissioning Phase</td><td colspan="2">Rehabilitation Plan.</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Medium Term</td><td>Local</td><td>Low</td><td>Unlikely</td><td>Low</td><td>-</td><td>High</td></tr>
</table>

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 dewatering of dam, no spillage or discharge of dirty water into the surrounding environment occurs and that all dirty water is contained and treated to the relevant standards prior to discharge.					Construction Phase		South African National Standard (SANS) 241:2011 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.								
	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 treated at an appropriate and licensed waste disposal site.					Construction 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-vegetation is performed according to a specialist rehabilitation plan and that indigenous and endemic species are used for re-vegetation.					Construction Phase		Rehabilitation Plan	
Measure 2: Monitor re-vegetation efforts to ensure efficiency of rehabilitation and determine whether alien species are controlled.					Construction 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

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.								
	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 dewatering of dam, no spillage or discharge of dirty water into the surrounding environment occurs and that all dirty water is contained and treated to the relevant standards prior to discharge.					Construction Phase		South African National Standard (SANS) 241:2011 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 treated at an appropriate and licensed waste disposal site.					Construction 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: 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 rehabilitation is performed according to a specialist rehabilitation plan and that indigenous and endemic species are used for re-vegetation.					Construction Phase		Rehabilitation Plan	
Measure 2: Monitor re-vegetation efforts to ensure efficiency of rehabilitation and determine whether erosion is controlled.					Construction 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 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 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								
	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 slimes dam is adequately rehabilitated and capped to ensure that no seepage or discharge occurs.					Decommissioning Phase		Surface Water Balance Report, Waste License and Water Use License	
Impact AFTER Management	Minor	Long Term	Site	**Medium**	Unlikely	**Low**	-	High

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					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Ensure that demolition and removal of infrastructure does not encroach upon or affect any freshwater features.					Decommissioning Phase		Rehabilitation 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 Implementation**		**Compliance with Standards**	
Measure 1: Ensure that ongoing maintenance of the groundwater treatment plant and its associated infrastructure takes place to prevent failure.					Decommissioning Phase		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 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 Water Use License	
Measure 2: Ensure that the slimes dam is adequately rehabilitated and capped to ensure that no seepage or discharge occurs.					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 Implementation**		**Compliance with Standards**	
Measure 1: Ensure that during dewatering of dam, no spillage or discharge of dirty water into the surrounding environment occurs and that all dirty water is contained and treated to the relevant standards prior to discharge.					Decommissioning Phase		South African National Standard (SANS) 241:2011 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 removal of contaminated sediment, no spillage or discharge of sediment into the surrounding environment occurs and that all contaminated sediment is treated at an appropriate and licensed waste disposal site.					Decommissioning 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 for Implementation**		**Compliance with Standards**	
Measure 1: Ensure that re-vegetation is performed according to a specialist rehabilitation plan and that indigenous and endemic species are used for re-vegetation.					Decommissioning Phase		Rehabilitation Plan	
Measure 2: Monitor re-vegetation efforts to ensure efficiency of rehabilitation and determine whether alien species are controlled.					Decommissioning Phase		NEMBA (Act 10 of 2004): Alien and Invasive Species 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**	**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: Manage site access and control movement on site					Decommissioning Phase		-	
Measure 2: Dust Suppression					Decommissioning Phase		-	
Impact AFTER Management	Minor	Medium Term	Site	**Low**	Possible	**Low**	-	High

ACTIVITY: Infrastructure/Stockpiles/Materials – ASPECT: Excavation Work – 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					Decommissioning 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**	**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					Decommissioning Phase		-	
Impact AFTER Management	Minor	Medium Term	Site	**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 Implementation**		**Compliance with Standards**	
Measure 1: Manage Vehicle fleet and movement of vehicles on site					Decommissioning Phase		-	
Measure 2: Limit the use of vehicles in poorly ventilated areas					Decommissioning Phase		-	
Measure 3: Plan routes in such a manner as to allow for exhaust fumes to disperse sufficiently and not to affect air quality to the extent whereby exceedences of standards could occur					Decommissioning Phase		-	
Measure 4: Consider alternative options to vehicles with combustion engines					Decommissioning 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
Management Measures					**Time Period for Implementation**		**Compliance with Standards**		
Measure 1: The implementation of a quarterly noise monitoring programme for 2 years, if noise levels are a concern at receptors implement Measure 2 and 3. **Measure 2:** A noise emission audit to determine the source of significant noises. **Measure 3:** Study to define potential mitigation measures that could reduce noise levels as well as the potential effectiveness of the measures.					Within a year, to be completed within 2 years after implementation.		SANS 10103:2008 (Urban)		
Impact AFTER Management (Effectiveness of mitigation measures will depend on the mitigation 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 – 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	Moderate	Medium Term	Site/Local	**Medium**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Dust Suppression.					Decommissioning Phase		Air 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.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	Site/Local	**Medium**	Definite	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Dust Suppression.					Decommissioning Phase		Air Quality Report	
Impact AFTER Management	Minor	Medium Term	Site/Local	**Low**	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**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Particulate Emissions Management.					Duration of Life Cycle Phase		Relevant Specialist Reports	
Impact AFTER Management	Minor	Medium Term	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**		**Compliance with Standards**	
Measure 1: Formulate and implement an alternative land-use and rehabilitation plan.					Medium 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								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Minor	Long Term	Site	**Medium**	Possible	**Medium**	-	Medium
Measure 1: As per surface and groundwater specialist reports.					Long Term		Water quality 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**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Major	Long Term	Local	**High**	Possible	**High**	-	Medium
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Fence in potentially dangerous areas.					Medium Term		MPRDA -Closure Plans	
Measure 2: Raise awareness amongst communities regarding the dangers of the closed site.					Medium Term		MPRDA -Closure Plans	
Measure 3: Develop an alternative land-use plan well in advance of the closure of the mine.					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								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Major	Long Term	Site	**High**	Unlikely	**Medium**	-	Medium
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Heritage Management Plan					Post Closure 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

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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					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								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**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 measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
Impact AFTER Management	Minor	Short term	Site	**Low**	Unlikely	**Low**	-	High

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
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
Impact AFTER Management	Minor	Short term	Site	**Low**	Unlikely	**Low**	-	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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
Impact AFTER Management	Minor	Short term	Site	**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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
Impact AFTER Management	Minor	Short term	Site	**Low**	Unlikely	**Low**	-	High

ACTIVITY: Finished Product 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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
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	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**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 measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance 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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
Impact AFTER Management	Minor	Short term	Site	**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**	**SIGNIFICANCE**	**+/-**	**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 measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
Impact AFTER Management	Minor	Short term	Site	**Low**	Unlikely	**Low**	-	High

ACTIVITY: Two Historic Slimes Dams – 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 Implementation**		**Compliance with Standards**	
Measure 1: All decommissioning measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
Impact AFTER Management	Minor	Short term	Site	**Low**	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								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**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 measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
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**	**SIGNIFICANCE**	**+/-**	**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 measures to be implemented and completed					2-5 years		-	
Measure 2: Aftercare Maintenance and Monitoring					2-5 years		-	
Impact AFTER Management	Minor	Short term	Site	**Low**	Unlikely	**Low**	-	High

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 transportation of 'topsoil' or rehabilitation 'topsoiling' purposes.	**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. 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.	Annually-autumn after the rains (soil erosion and vegetative monitoring and amelioration).	Chamber of Mines Guidelines and Authors opinion
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 for the rehabilitated HERNIC areas in general is the 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 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	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: Monitor the quality of the water in the rehabilitated pit. (Source Control Measure)					Immediately after rehabilitation		No	
Measure 2: Monitor groundwater resource quality and groundwater levels at dedicated weathered zone monitoring boreholes adjacent to the rehabilitated opencast pits. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: Abstract water from the rehabilitated pit to maintain the pit water level at an elevation below that of the natural groundwater levels if the pit water quality does not meet the resource quality objectives. The abstracted pit water will need to be treated before being released into the environment if the pit water quality does not meet the resource quality objectives. (Source Control Measure)					Immediately if/when identified.		Yes (National Water Act)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated monitoring boreholes adjacent to the pit 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 (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 for Implementation**		**Compliance with Standards**	
Measure 1: Monitor the quality of the water in the rehabilitated pit. (Source Control Measure)					Immediately after rehabilitation		No	
Measure 2: Monitor groundwater resource quality and groundwater levels at dedicated weathered zone monitoring boreholes adjacent to the rehabilitated opencast pits. (Resource Directed Measure)					Quarterly (or as specified in the amended WUL).		Yes (Water Use Licence)	
Measure 3: Abstract water from the rehabilitated pit to maintain the pit water level at an elevation below that of the natural groundwater levels if the pit water quality does not meet the resource quality objectives. The abstracted pit water will need to be treated before being released into the environment if the pit water quality does not meet the resource quality objectives. (Source Control Measure)					Immediately if/when identified.		Yes (National Water Act)	
Measure 4: Any adverse trends in the groundwater quality recorded from the dedicated monitoring boreholes adjacent to the pit 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 (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 groundwater monitoring data to identify the areas in which groundwater remediation is required and in which groundwater abstraction for remediation is required post closure. (Resource Directed Measure)					At Closure		No	
Measure 2: Only abstract the authorised volume of groundwater from each of the authorised abstraction boreholes as part of the post closure groundwater remediation plan (if required at that stage). (Resource Directed Measure)					Continuously		Yes (Water Use Licence)	
Measure 3: Optimise the abstraction of groundwater from each of the selected and authorised boreholes so that the daily abstraction volumes remain consistent and do not fluctuate. (Resource Directed Measure)					Continuously		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 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 closure. (Resource Directed Measure)					At Closure		No	
Measure 2: Optimise the abstraction of groundwater from each of the selected and authorised boreholes so that the daily abstraction volumes remain consistent and do not fluctuate. (Resource Directed Measure)					Continuously		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	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Impact BEFORE Management	Moderate	Medium	Local	**Medium**	Possible	**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 closure (if required). (Resource Directed Measure)					At Closure		No	
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 trends in the groundwater quality exist. (Resource Directed Measure)					Continuously after Closure		Yes (National Water Act)	
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 for Implementation**		**Compliance with Standards**	
Measure 1: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Only selected internal roads to exist for access and maintenance.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surface runoff pattern & erosion gulleys. Repair & maintain. Soil surfaces to be stable no depressions.					Post Closure Phase		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.								
	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 decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Only selected internal roads to exist for access and maintenance.					Post Closure Phase		Approved Rehabilitation Objectives	
Measure 3: Monitor restored surface runoff pattern & erosion gulleys. Repair & maintain. Soil surfaces to be stable no depressions.					Post Closure Phase		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 for Implementation**		**Compliance with Standards**	
Measure 1: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surface runoff pattern. Check for Erosion gulleys. Repair & maintain.					Post Closure Phase		DME 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 for Implementation**		**Compliance with Standards**	
Measure 1: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surface runoff pattern. Check for Erosion gulleys. Repair & maintain.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: No ponding of surface water to exist. Soil surfaces to be stable no depressions					Post Closure Phase		DME 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 decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surface runoff pattern. Check for Erosion gulleys. Repair & maintain.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: No ponding of surface water to exist. Soil surfaces to be stable no depressions.					Post Closure 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.								
	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 decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces. Check for Erosion gulleys. Repair & maintain.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Confirm that concrete SW drains and silt traps 1m below surface and backfill with soil from berms has been completed and surfaces are stable.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Impact AFTER Management	Minor	Short Term	Local	**Low**	Unlikely	**Low**	-	High

<table>
<tr><th colspan="9">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.</th></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Minor</td><td>Long Term</td><td>Local</td><td>Medium</td><td>Possible</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Confirm all coarse slag stockpiles are removed</td><td colspan="2">Pre Post Closure Phase</td><td colspan="2">DME Mine Rehabilitation Requirements
Approved Rehabilitation Objectives</td></tr>
<tr><td colspan="5">Measure 2: PCD2 water quality meets WUL standard.</td><td colspan="2">Pre Post Closure Phase</td><td colspan="2"></td></tr>
<tr><td colspan="5">Measure 3: Monitor decommission and closure phase measures & confirm completion. PCD 2 rehabilitated.</td><td colspan="2">Post Closure Phase</td><td colspan="2">DME Mine Rehabilitation Requirements
Approved Rehabilitation Objectives</td></tr>
<tr><td colspan="5">Measure 4: Monitor restored surfaces. Check for Erosion gulleys. Repair & maintain surface and vegetation.</td><td colspan="2">Post Closure Phase</td><td colspan="2">DME Mine Rehabilitation Requirements
Approved Rehabilitation Objectives</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Short Term</td><td>Local</td><td>Low</td><td>Unlikely</td><td>Low</td><td>-</td><td>High</td></tr>
</table>

<table>
<tr><th colspan="9">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.</th></tr>
<tr><td></td><td>Magnitude</td><td>Duration</td><td>Scale</td><td>Consequence</td><td>Probability</td><td>SIGNIFICANCE</td><td>+/-</td><td>Confidence</td></tr>
<tr><td>Impact BEFORE Management</td><td>Minor</td><td>Long Term</td><td>Local</td><td>Medium</td><td>Possible</td><td>Medium</td><td>-</td><td>High</td></tr>
<tr><td colspan="5">Management Measures</td><td colspan="2">Time Period for Implementation</td><td colspan="2">Compliance with Standards</td></tr>
<tr><td colspan="5">Measure 1: Monitor decommission and closure phase measures & confirm completion. Remnants to be all removed.</td><td colspan="2">Post Closure Phase</td><td colspan="2">DME Mine Rehabilitation Requirements
Approved Rehabilitation Objectives</td></tr>
<tr><td colspan="5">Measure 2: Monitor restored surfaces to be graded and clean. Check for Erosion gulleys. Repair & maintain.</td><td colspan="2">Post Closure Phase</td><td colspan="2">DME Mine Rehabilitation Requirements
Approved Rehabilitation Objectives</td></tr>
<tr><td>Impact AFTER Management</td><td>Minor</td><td>Short Term</td><td>Local</td><td>Low</td><td>Unlikely</td><td>Low</td><td>-</td><td>High</td></tr>
</table>

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**		**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 Requirements	
Measure 2: Monitor groundwater quality to confirm water quality is compliant.					Prior to Post Closure Phase		WUL requirements	
Measure 3: If Measure 1 & 2 proofs positive. Demolish treatment dams 1m below surface and backfill with soil from existing topsoil stockpiles.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 5: Monitor restored surfaces. Check for stable soil surface. Repair & maintain.					Post Closure Phase		DME 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.								
	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 decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable no depressions					Post Closure Phase		DME 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: 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: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable no depressions.					Post Closure Phase		DME 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 for Implementation**		**Compliance with Standards**	
Measure 1: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable no depressions.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor all surfaces to be clean no polluted soils.					Post Closure 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. 2 – ASPECT: Storage of Run-off Water – IMPACT 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**	Possible	**Medium**	-	High
Management Measures					**Time Period for Implementation**		**Compliance with Standards**	
Measure 1: PCD2 and feeding SW canals to be rehabilitated if water quality has been proven to comply with WUL limits.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable no depressions.					Post Closure Phase		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: PCD1A &1B and feeding SW canals to be rehabilitated if water quality has been proven to comply with WUL limits.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable no depressions.					Post Closure Phase		DME 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 for Implementation**		**Compliance with Standards**	
Measure 1: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable no depressions.					Post Closure Phase		DME 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.								
	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: PCD1A &1B and feeding SW canals to be rehabilitated if water quality has been proven to comply with WUL limits.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions.					Post Closure Phase		DME 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.								
	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: PCD1A &1B and feeding SW canals to be rehabilitated if water quality has been proven to comply with WUL limits.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions.					Post Closure 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 for Implementation**		**Compliance with Standards**	
Measure 1: PCD1A &1B and feeding SW canals to be rehabilitated if water quality has been proven to comply with WUL limits.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions.					Post Closure Phase		DME 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	**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: PCD1A &1B and feeding SW canals to be rehabilitated if water quality has been proven to comply with WUL limits.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions.					Post Closure 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 for Implementation**		**Compliance with Standards**	
Measure 1: Surplus stockpiles to be consolidated and shaped to stable side slopes and minimised footprints. Confirm opencast void backfilled.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: SW PCD 3 to be maintained to intercept runoff from the remainder of stockpile footprints. Monitor water quality to comply with WUL standards.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions.					Post Closure 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 for Implementation**		**Compliance with Standards**	
Measure 1: PCD3 and feeding SW canals to be rehabilitated if water quality has been proven to comply with WUL limits.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions. Vegetation should have established.					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 for Implementation**		**Compliance with Standards**	
Measure 1: Monitor water quality in RWD. RWD can be rehabilitated similar to all PCDs once the water quality has complying with WUL water standards for 5 consecutive years.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor water level in RWD and there should be no signs of spilling. Only previous subsurface decant and seepage drains should discharge into the RWD. No surface water to discharge into RWD.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable and vegetated.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: All side slopes and fill material at the Slimes Dam should be intact.					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: 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 quality in RWD. RWD can be rehabilitated similar to all PCDs once the water quality has complying with WUL water standards for 5 consecutive years.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor water level in RWD and there should be no signs of spilling. Only previous subsurface decant and seepage drains should discharge into the RWD. No surface water to discharge into RWD.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable and vegetated.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: All side slopes and fill material at the Slimes Dam should be intact.					Post Closure Phase		DME 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 for Implementation**		**Compliance with Standards**	
Measure 1: Monitor water quality in RWD. RWD can be rehabilitated similar to all PCDs once the water quality has complying with WUL water standards for 5 consecutive years.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor water level in RWD and there should be no signs of spilling. Only previous subsurface decant and seepage drains should discharge into the RWD. No surface water to discharge into RWD.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable and vegetated.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: All side slopes and fill material also on crest at the Slimes Dam should be intact.					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 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: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions. Vegetation should have established.					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 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: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions. Vegetation should have established.					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 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	**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 decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions. Vegetation should have established.					Post Closure Phase		DME 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 decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions. Vegetation should have established.					Post Closure Phase		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 Phase		DME Mine Rehabilitation Requirements	
Measure 2: Surplus waste rock that can't be used at the open cast rehabilitation must be consolidated and shaped with stable side slopes					Post Closure Phase		DME Mine Rehabilitation Requirements	
Measure 3: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions. Vegetation should have established.					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 for Implementation**		**Compliance with Standards**	
Measure 1: Confirm all waste rock cleared and or processed.					Post Closure Phase		DME Mine Rehabilitation Requirements	
Measure 2: Surplus waste rock that can't be used at the open cast rehabilitation must be consolidated and shaped with stable side slopes					Post Closure Phase		DME Mine Rehabilitation Requirements	
Measure 3: Stockpile yard to be rehabilitated and berms spread as topsoil and backfill.					Post Closure Phase		DME Mine Rehabilitation Requirements	
Measure 4: Monitor decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 5: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions. Vegetation should have established.					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	**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 decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions. Vegetation should have established.					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: 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 decommission and closure phase measures & confirm completion					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surfaces and free draining pattern. Check for Erosion gulleys. Repair & maintain. Soil surfaces to be stable with no depressions. Vegetation should have established.					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: 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 decommission and closure phase measures & confirm completion					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Open Cast to be completely backfilled and shaped with a 150mm topsoil cover.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor Vegetation to have established with climax species.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Surfaces to be erosion gulley free and stable. Sheet flow free draining pattern to be demonstrated.					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 decommission and closure phase measures & confirm completion					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Open Cast to be completely backfilled and shaped with a 150mm topsoil cover.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor Vegetation to have established with climax species.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Surfaces to be erosion gulley free and stable. Sheet flow free draining pattern to be demonstrated.					Post Closure Phase		DME 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								
	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 decommission and closure phase measures & confirm completion					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Open Cast to be completely backfilled and shaped with a 150mm topsoil cover.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor Vegetation to have established with climax species.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Surfaces to be erosion gulley free and stable. Sheet flow free draining pattern to be demonstrated.					Post Closure 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.								
	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 decommission and closure phase measures & confirm completion					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Open Cast to be completely backfilled and shaped with a 150mm topsoil cover.					Pre Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor Vegetation to have established with climax species.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Surfaces to be erosion gulley free and stable. Sheet flow free draining pattern to be demonstrated.					Post Closure Phase		DME 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 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: Monitor water quality in RWD and remove dam when quality complies with norms. Rehabilitation of RWD to be similar to SW PCD rehabilitation.					Pre Post Closure Phase		WUL water quality limits	
Measure 2: Monitor crest area soil cover and drainage conditions towards penstocks.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor grass cover at crest and surrounding site.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Side slopes of TSF to be erosion gulley free. Vegetation on side slopes to be established. Soil cover to be stable.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 5: Upslope diversion earth canal should be in good condition without obstructions.					Post Closure Phase		DME 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.								
	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 in RWD and remove dam when quality complies with norms. Rehabilitation of RWD to be similar to SW PCD rehabilitation.					Pre Post Closure Phase		WUL water quality limits	
Measure 2: Monitor crest area soil cover and drainage conditions towards penstocks.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 3: Monitor grass cover at crest and surrounding site.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 4: Side slopes of TSF to be erosion gulley free. Vegetation on side slopes to be established. Soil cover to be stable.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 5: Upslope diversion earth canal should be in good condition without obstructions.					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.					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: 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: 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 or interception 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: 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: 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 or interception of runoff.					Post Closure Phase		DME 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: 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.								
	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 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 or interception of runoff.					Post Closure Phase		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, surface free draining and rehabilitated.					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor decommission and closure phase measures & 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 or interception of runoff.					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.								
	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					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surface. 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	
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**	**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					Post Closure Phase		DME Mine Rehabilitation Requirements Approved Rehabilitation Objectives	
Measure 2: Monitor restored surface. Check for Erosion gulleys. Check soil and grass cover. Repair & maintain. Soil surfaces to be even, stable & no depressions.					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								
	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 decommissioned infrastructure as per the conditions of the EMP, waste license and water use license for any seepage which may affect floral habitat.					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					**Time Period for Implementation**		**Compliance 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.					Annually for 5 years Post Closure		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

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								
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 decommissioned infrastructure as per the conditions of the EMP, waste license and water use license for any seepage which may affect faunal habitat.					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					**Time Period for Implementation**		**Compliance 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.					Annually for 5 years Post Closure		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

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 decommissioned infrastructure as per the conditions of the EMP, waste license and water use license for any seepage which may affect freshwater habitat.					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.								
	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 rehabilitation efforts for a period of 5 years post-closure in order to manage any erosion which may arise.					Annually for 5 years Post Closure		Rehabilitation 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								
	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 decommissioned infrastructure as per the conditions of the EMP, waste license and water use license for any seepage which may affect aquatic habitat.					Post Closure 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

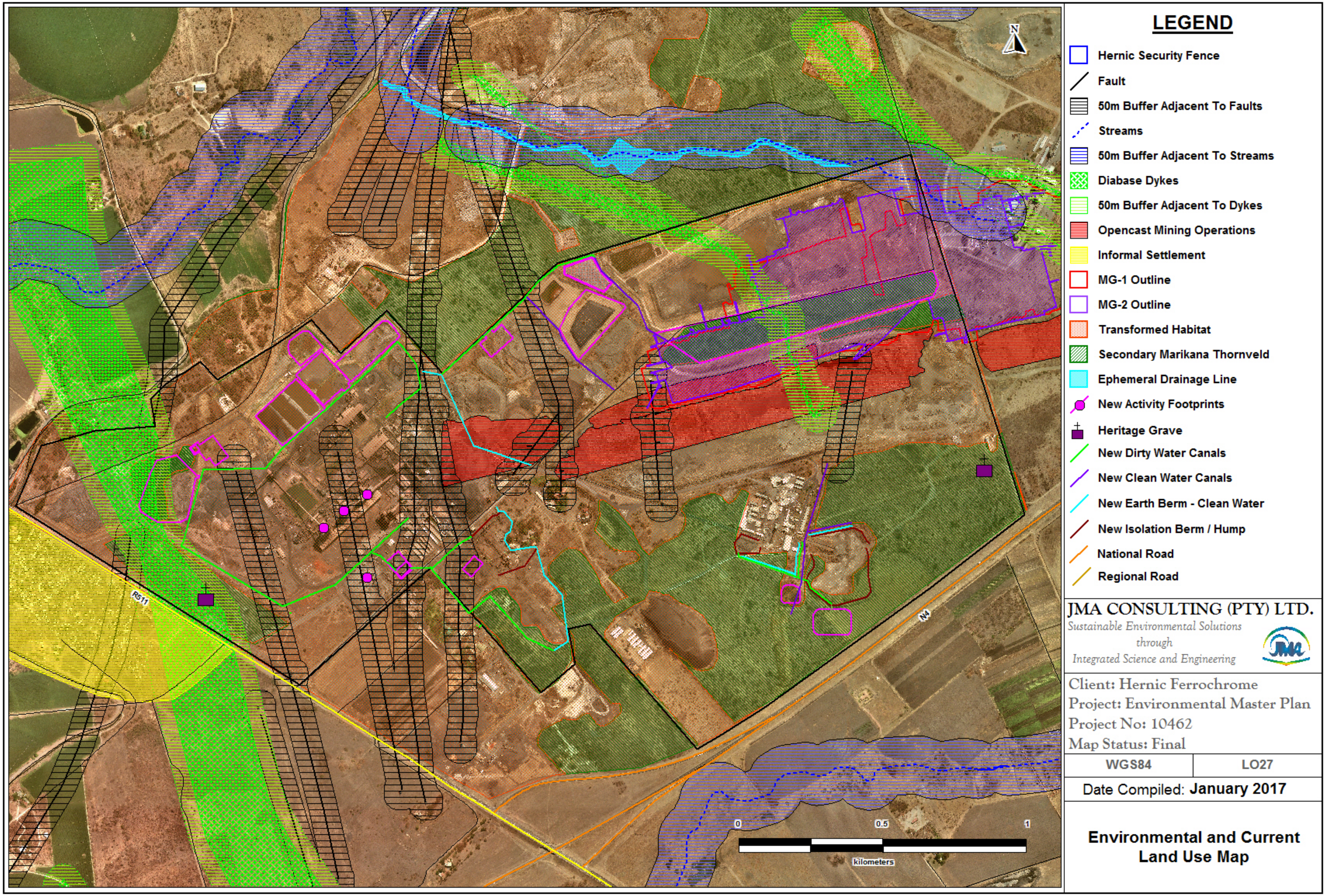
No Significant Noise Related Impacts identified/expected during the Post Closure Phase.

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


R511
N4
LEGEND
Hernic Security Fence
Fault
50m Buffer Adjacent To Faults
Streams
50m Buffer Adjacent To Streams
Diabase Dykes
50m Buffer Adjacent To Dykes
Opencast Mining Operations
Informal Settlement
MG-1 Outline
MG-2 Outline
Transformed Habitat
Secondary Marikana Thornveld
Ephemeral Drainage Line
New Activity Footprints
Heritage Grave
New Dirty Water Canals
New Clean Water Canals
New Earth Berm - Clean Water
New Isolation Berm / Hump
National Road
Regional Road
JMA CONSULTING (PTY) LTD.
Sustainable Environmental Solutions
through
Integrated Science and Engineering
Client: Hernic Ferrochrome
Project: Environmental Master Plan
Project No: 10462
Map Status: Final
WGS84
LO27
Date Compiled: January 2017
0
0.5
1
kilometers
Environmental and Current
Land Use 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

Consulting

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

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Compiled for

HERNIC FERROCHROME

Hernic Ferrochrome (Pty) Ltd

TABLE OF CONTENTS

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
TPM	:	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 7*km* 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).

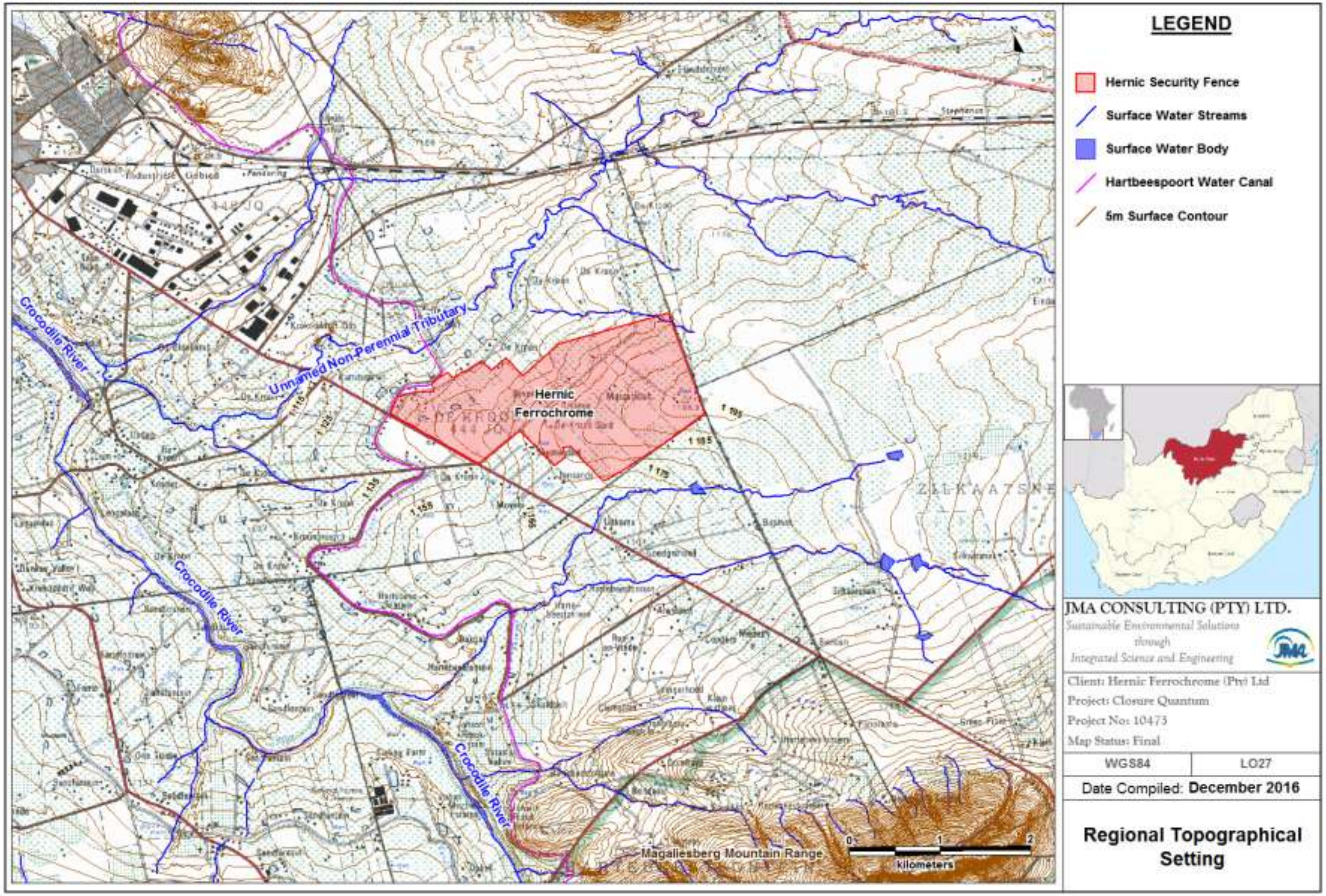


Figure 4.3(a): Regional Topographical Setting of Hernic Ferrochrome (Pty) Ltd

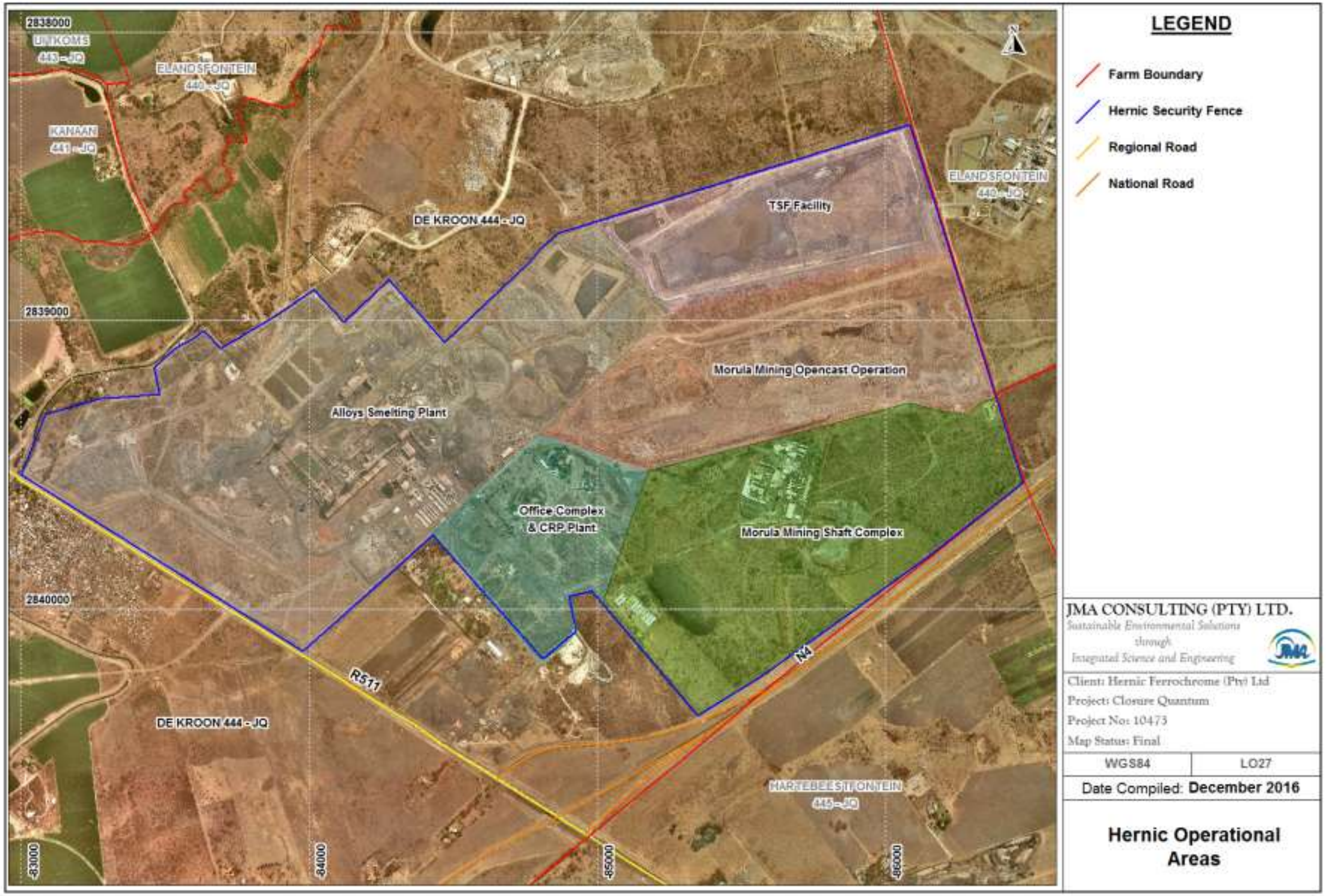


Figure 4.3(b): Operational Areas at Hernic Ferrochrome (Pty) Ltd

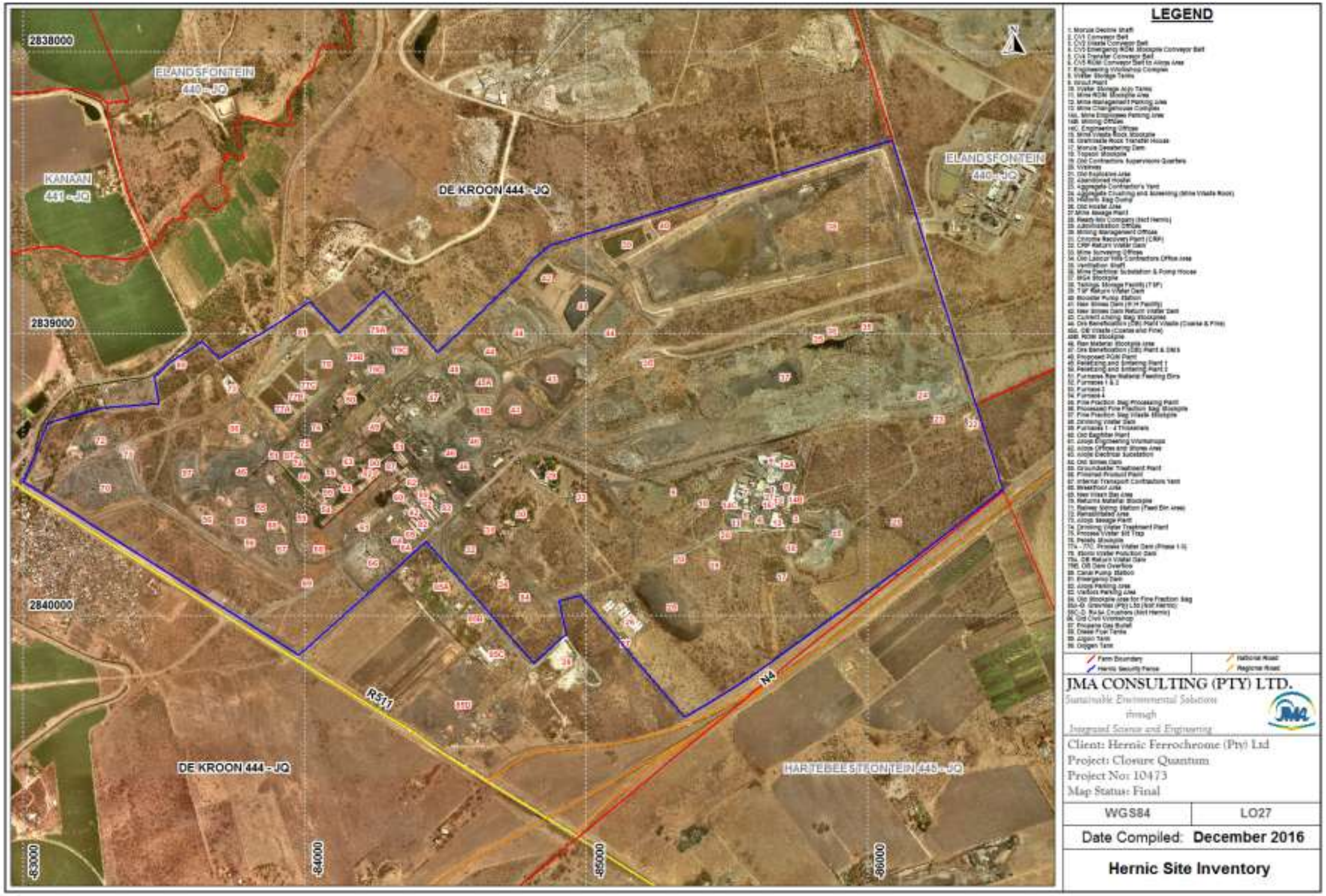


Figure 4.3(c): Site layout for Hernic Ferrochrome (Pty) Ltd with the Site Inventory

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

Farm and Portion	Deed	Size (ha)	Surface Owner	Mineral Owner
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

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 and3)
- 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 **next land user**. 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.

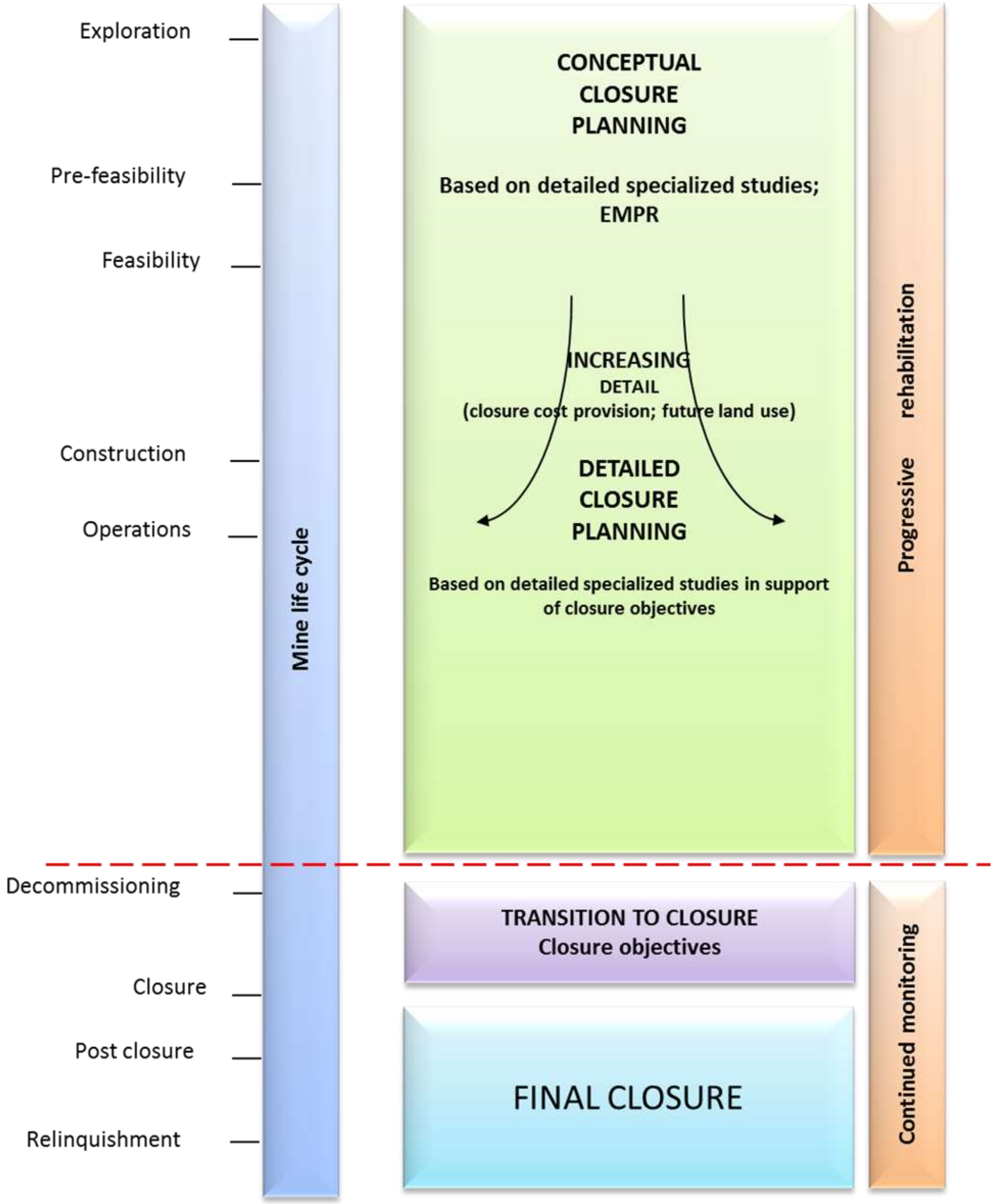


Figure 5(a): Closure methodology considering the various life cycles of the Mine Operation.

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 quantum for financial provision for closure

Confidence Level - Level of information	
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.**

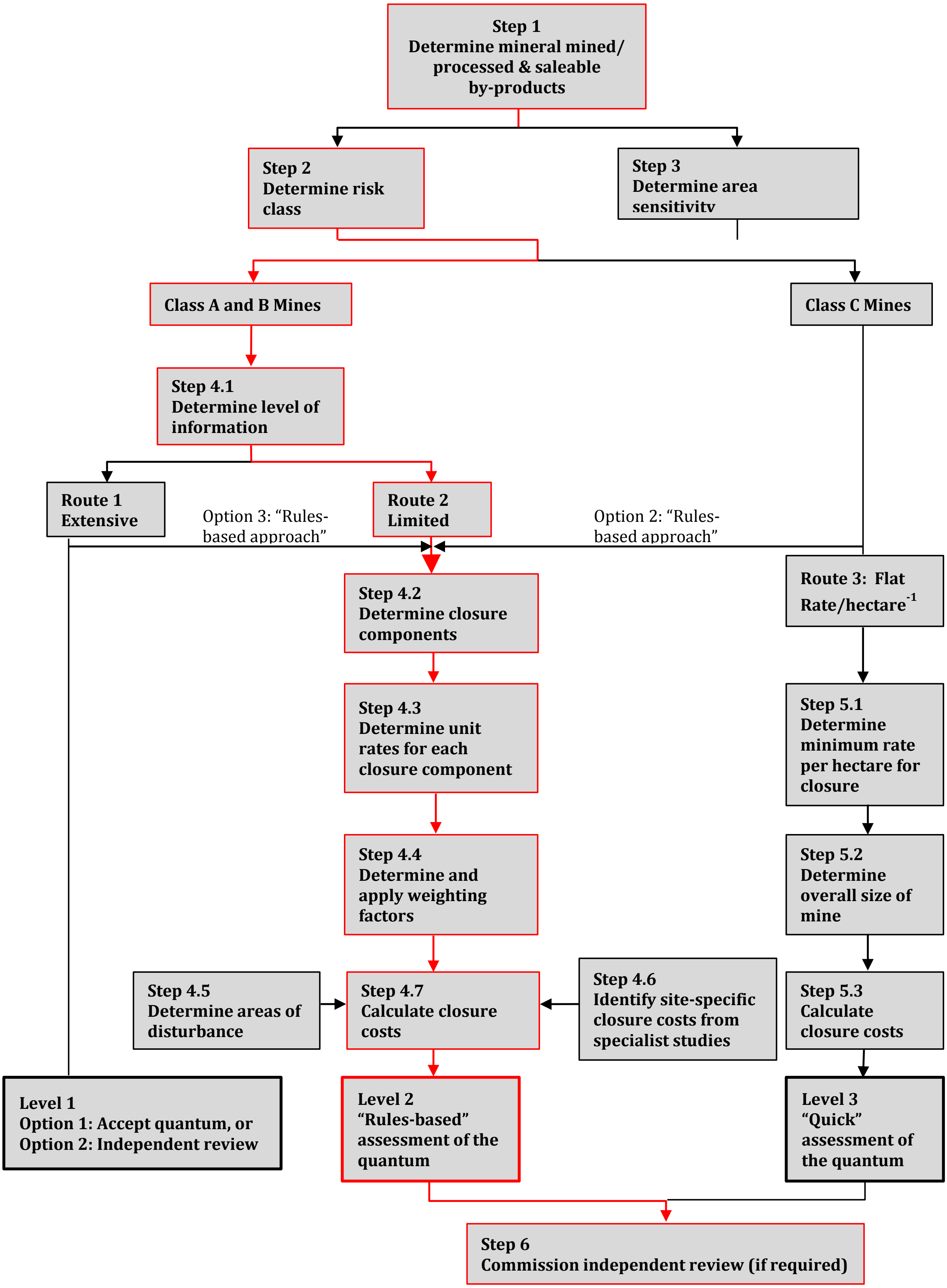
Based on available information (Section 10 Reference documentation) it was concluded that the Level of quantum information available is "Limited". In this case Step 1 to 5 will be followed.

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 risk class			
			Large Mine / Mine, mine waste, plant and plant waste		Small Mine	
Chrome	Sulphide	10 000	A	A	C	A
	Oxide	10 000	C	A	C	A

*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 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	**Sensitivity criteria**		
	Biophysical	**Social**	**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 6 - Opencast Rehabilitation:

COMPONENT 6	OPENCAST REHABILITATION			
	UNIT			MASTER RATE (2016)
	ha			R 193 216.59
	Multiplication factor			
Risk Class (A, B or C)	A	0.04	0.52	1.00
	B	0.04	0.52	1.00
	C	0.04	0.52	1.00
		Low	Medium	High
	Environmental Sensitivity			

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
	Multiplication factor			
Risk Class (A, B or C)	A	0.59	0.80	1.00
	B	0.55	0.76	0.90
	C	0.51	0.66	0.81
		Low	Medium	High
	Environmental Sensitivity			

Component 13 – Water Management:

COMPONENT 13	WATER MANAGEMENT			
	UNIT			MASTER RATE (2016)
	ha			R 39 962.07
	Multiplication factor			
Risk Class (A, B or C)	A	0.60	0.67	1.00
	B	0.41	0.60	0.67
	C	0.17	0.25	0.33
		Low	Medium	High
	Environmental Sensitivity			

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**.

Weighting factor 1 are applied to all closure components:

Nature of the Terrain/Accessibility	**Flat**	**Undulating**	**Rugged**
Weighting Factor 1	1.00	1.10	1.20

Flat: Generally flat over the mine area
Undulating: A mix of sloped and undulating areas within the mine area
Rugged: 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

Weighting factor 2 is applied to preliminary and general item only:

Proximity to urban area where goods and services are supplied	**Urban**	**Peri-urban**	**Remote**
Weighting Factor 2	1.00	1.05	1.10

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. CALCULATION FOR CLOSURE COST PROVISION

HERNIC FERROCHROME

REHABILITATION ESTIMATION COST

Mine:	HERNIC FERROCHROME PTY LTD		Location:	North West		
Evaluators:	JMA Consulting (Pty) Ltd		Date:	Feb-17		
			A	B	C	D	E=A*B*C*D
No	Description	Unit	Quantity	Master rate 2016	Multiplication 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**

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

1. 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)

4. 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)

Year		January	February	March	April	May	June	July	August	September	October	November	December	Ave. %
2005	%	3.0	2.6	3.0	3.4	3.3	2.8	3.4	3.9	4.4	4.0	3.4	3.6	3.4
2006	%	4.0	3.9	3.4	3.3	3.9	4.9	5.0	5.4	5.3	5.4	5.4	5.8	4.6
2007	%	6.0	5.7	6.1	7.0	6.9	7.0	7.0	6.7	7.2	7.9	8.4	9.0	7.1
2008	%	9.3	9.8	10.6	11.1	11.7	12.2	13.4	13.7	13.1	12.1	11.8	9.5	11.5
2009	%	8.1	8.6	8.5	8.4	8.0	6.9	6.7	6.4	6.1	5.9	5.8	6.3	7.1
2010	%	6.2	5.7	5.1	4.8	4.6	4.1	3.7	3.5	3.2	3.4	3.6	3.5	4.3
2011	%	3.7	3.7	4.1	4.2	4.6	5.0	5.3	5.3	5.7	6.0	6.1	6.1	5.0
2012	%	6.3	6.1	6.0	6.1	5.7	5.5	4.9	5.0	5.5	5.6	5.6	5.7	5.7
2013	%	5.4	5.9	5.9	5.9	5.6	5.5	6.3	6.4	6.0	5.5	5.3	5.4	5.8
2014	%	5.8	5.9	6.0	6.1	6.6	6.6	6.3	6.4	5.9	5.9	5.8	5.3	6.1
2015	%	4.4	3.9	4.0	4.5	4.6	4.7	5.0	4.6	4.6	4.7	4.8	5.2	4.6
2016	%	6.2	7.0	6.3	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 MASTER RATES TABLE FOR FINANCIAL PROVISION

No	Description	Unit	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
			Master rate	Master rate	Master rate	Master rate	Master rate	Master rate	Master rate	Master rate	Master rate	Master rate	Master rate	**Master rate**	**Master rate**
			Published 2004	3.4%	4.6%	7.1%	11.5%	7.1%	4.3%	5.0%	5.7%	5.8%	6.1%	4.6%	6.3%
1	Dismantling of processing plant and related structures (Including overland conveyors and power lines)	m^2	R 6.82	R 7.05	R 7.38	R 7.90	R 8.81	R 9.44	R 9.85	R 10.34	R 10.93	R 11.56	R 12.25	**R 12.82**	**R 13.63**
2(A)	Demolition of steel buildings and structures	m^2	R 95.00	R 98.22	R 102.79	R 110.07	R 122.76	R 131.52	R 137.18	R 144.03	R 152.20	R 160.97	R 170.70	**R 178.53**	**R 189.82**
2(B)	Demolition of reinforced concrete buildings and structures	m^2	R 140.00	R 144.75	R 151.48	R 162.20	R 180.90	R 193.82	R 202.15	R 212.26	R 224.30	R 237.21	R 251.56	**R 263.09**	**R 279.73**
3	Rehabilitation of access roads	m	R 17.00	R 17.58	R 18.39	R 19.70	R 21.97	R 23.54	R 24.55	R 25.77	R 27.24	R 28.80	R 30.55	**R 31.95**	**R 33.97**
4(A)	Demolition and rehabilitation of electrified railway lines	m	R 165.00	R 170.59	R 178.53	R 191.17	R 213.21	R 228.43	R 238.25	R 250.17	R 264.35	R 279.57	R 296.49	**R 310.07**	**R 329.69**
4(B)	Demolition and rehabilitation of non-electrified railway lines	m^2	R 90.00	R 93.05	R 97.38	R 104.27	R 116.29	R 124.60	R 129.96	R 136.45	R 144.19	R 152.49	R 161.72	**R 169.13**	**R 179.83**
5	Demolition of housing and/or administration facilities	m^2	R 190.00	R 196.44	R 205.58	R 220.13	R 245.51	R 263.04	R 274.35	R 288.07	R 304.40	R 321.93	R 341.41	**R 357.06**	**R 379.64**
6	Opencast rehabilitation including final voids and ramps	ha	R 96 700.00	R 99 978.13	R 104 627.11	R 112 034.71	R 124 952.32	R 133 873.91	R 139 630.49	R 146 612.01	R 154 924.91	R 163 846.01	R 173 758.69	**R 181 722.63**	**R 193 216.59**
7	Sealing of shafts, adits and inclines	m^3	R 51.00	R 52.73	R 55.18	R 59.09	R 65.90	R 70.61	R 73.64	R 77.32	R 81.71	R 86.41	R 91.64	**R 95.84**	**R 101.90**
8(A)	Rehabilitation of overburden and spoils	ha	R 66 400.00	R 68 650.96	R 71 843.23	R 76 929.73	R 85 799.73	R 91 925.83	R 95 878.64	R 100 672.57	R 106 380.71	R 112 506.46	R 119 313.10	**R 124 781.62**	**R 132 674.06**
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	R 82 700.00	R 85 503.53	R 89 479.44	R 95 814.59	R 106 862.01	R 114 491.96	R 119 415.11	R 125 385.87	R 132 495.25	R 140 124.77	R 148 602.31	**R 155 413.25**	**R 165 243.14**
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	R 240 200.00	R 248 342.78	R 259 890.72	R 278 290.98	R 310 377.93	R 332 538.92	R 346 838.09	R 364 179.99	R 384 829.00	R 406 988.74	R 431 611.56	**R 451 393.75**	**R 479 944.41**
9	Rehabilitation of subsided areas	ha	R 55 600.00	R 57 484.84	R 60 157.89	R 64 417.06	R 71 844.35	R 76 974.04	R 80 283.92	R 84 298.12	R 89 077.82	R 94 207.22	R 99 906.75	**R 104 485.81**	**R 111 094.54**
10	General surface rehabilitation	ha	R 52 600.00	R 54 383.14	R 56 911.96	R 60 941.32	R 67 967.86	R 72 820.76	R 75 952.05	R 79 749.66	R 84 271.46	R 89 124.09	R 94 516.10	**R 98 848.09**	**R 105 100.23**
11	River diversions	ha	R 52 600.00	R 54 383.14	R 56 911.96	R 60 941.32	R 67 967.86	R 72 820.76	R 75 952.05	R 79 749.66	R 84 271.46	R 89 124.09	R 94 516.10	**R 98 848.09**	**R 105 100.23**
12	Fencing	m	R 60.00	R 62.03	R 64.92	R 69.51	R 77.53	R 83.07	R 86.64	R 90.97	R 96.13	R 101.66	R 107.81	**R 112.75**	**R 119.89**
13	Water management	ha	R 20 000.00	R 20 678.00	R 21 639.53	R 23 171.61	R 25 843.29	R 27 688.50	R 28 879.11	R 30 323.06	R 32 042.38	R 33 887.49	R 35 937.68	**R 37 584.83**	**R 39 962.07**
14	2 to 3 years of maintenance and aftercare	ha	R 7 000.00	R 7 237.30	R 7 573.83	R 8 110.06	R 9 045.15	R 9 690.98	R 10 107.69	R 10 613.07	R 11 214.83	R 11 860.62	R 12 578.19	**R 13 154.69**	**R 13 986.72**
15	Specialist studies	Sum	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -	**R -**	**R -**

HERNIC FINANCIAL PROVISION

REHABILITATION ESTIMATION COST

Mine:	HERNIC FERROCHROME PTY LTD			Location:	North West		
Evaluators:	JMA Consulting (Pty) Ltd			Date:	Feb-17		
			A	B	C	D	E=A*B*C*D
No	Description	Unit	Quantity	Master rate 2016	Multiplication 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 (18º) 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 in-filled, 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 cut-and-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

The Regional Manager
Department of Mineral Resources
Private Bag A1
Klerksdorp
2570

31 May 2017

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)

1. Concerning the responsibility in terms of the Mineral and Petroleum Resources 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.

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) .... BR Betten ....

(2) .... Manguba Z. ....

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 Limited

102 Rivonia Rd	P O Box 786015
Sandton	Sandton
2196	2146

The Regional Manager
Department of Mineral Resources
Private Bag A1
Klerksdorp
2570

13 May 2013

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)

1. 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.

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

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GUARDRISK
TAILORED RISK SOLUTIONS

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) .... THEMBEKA MNGADI

(2) .... GRAEME HENDERSON

ADDRESS :
of Guarantor

115 West Street
Sandton
2196

P O Box 786015
Sandton
2146

DATE : 13 May 2013

PLEASE NOTE :

(1) 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

115 West Street
Sandton
Johannesburg
2196