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CIG/ENVSOL/22/PROJ/0058

Ndanganeni Colliery Mine Closure Strategy

Risk assessment

Middleburg, Mpumalanga Province

31 October 2022

Prepared for:

Lian Roos

Of

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QUALITY MANAGEMENT

Report Title	**Ndanganeni Colliery Risk Assessment Report**		
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DECLARATION OF INDEPENDENCE

CIGroup Environmental (Pty) Ltd, as the Environmental Solutions specialists, were appointed to conduct a Mine Closure Strategy according to the new GNR 1147 for Ndanganeni Mine near Middleburg in the Mpumalanga Province. CIGroup Environmental does not have a vested interest in the proposed activity proceedings, will not engage in and have no conflicting interest in the undertaking of the activity. CIGroup Environmental has provided all information at their disposal regarding the Closure Strategy, whether such information is favourable to the Client or not.

Jacques Harris
Operations Manager
CIGroup Environmental (Pty) Ltd

31 October 2022
Date

EXECUTIVE SUMMARY

The regulations pertaining to financial provision (GN R1147) under the NEMA set out the requirements for an applicant or holder of a right or permit to determine and make financial provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of prospecting, exploration, mining, or production operations.

GN R1147 now requires an applicant or holder of a right or permit to compile and annually review the following three documents:

1. A final rehabilitation plan;
2. An annual rehabilitation plan; and
3. An environmental risk assessment report.

This report deals with the environmental risk assessment which is also considered in the final and annual rehabilitation plan documents.

The objective of the environmental risk assessment report was to—

- ensure timeous risk reduction through appropriate interventions;
- identify and quantify the potential latent environmental risks related to post closure;
- detail the approach to managing the risks;
- quantify the potential liabilities associated with the management of the risks; and
- outline monitoring, auditing, and reporting requirements.

Latent and residual risks are specifically related to post mining impacts that occur at the site once rehabilitation has been completed.

The residual impacts identified for the Ndanganeni mine as required by NEMA General Notification (GN R1147) are described as follows:

- Loss of employment and loss of revenue for the employees, suppliers and surrounding communities has a social impact on the region;
- Leaving an open void because of the type of mining that took place could pose a safety risk to animals and humans;
- Potential ongoing pollution of surface water resources could affect aquatics and quality downstream of the mine; and

- Potential ongoing pollution of groundwater resources could affect quality downstream of mine.

The possible latent impacts identified for the Ndanganeni mine as required by NEMA General Notification (GN R1147) are described as follows:

- Heavy rainfall (Climate Change) events causing the erosion of the trenches and berms allowing for polluted water to the enter the environment; and
- Extreme drought conditions (Climate Change) can impact the rehabilitation of the mine's surface areas making it difficult to obtain the final land use.

It is recommended that Ndanganeni Colliery implement and continue to conduct monitoring on possible future risks. These monitoring studies should focus on:

- Surface water monitoring;
- Ground water monitoring;
- Wetland health; and
- Flora downstream of site.

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1 Introduction

1.1 Background

Ndanganeni Colliery produces approximately 1.45MT ROM annually and has established export and inland coal markets for its sized coal products. Exports are mainly done by utilising the Maputo Mozambique Corridor and customers that exports from South Africa's Richards Bay Coal Terminal (RBCT).

The current mining area comprises over 3 000 hectares in extent, is located on the Remaining Extent of Portion 11 (a Portion of Portion 9) and Portion 17 of the Remaining Extent of the Farm Kopermyn 435 JS and Portions 1, 3, 4, 5, 6, 7 and the Remaining Extent of the Farm Hartogshof 413 JS, Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province of South Africa. The site is located approximately 22 km southeast of Middelburg.

Ndanganeni Colliery is a holder of a mining right granted in terms of section 23 of the Mineral and Petroleum Resources Development Act, 2002 ("MPRDA"), in respect of coal, in, on and under the remaining extent of Portion 11 (a portion of Portion 9), Portion 17 the remaining extent of the Farm Kopermyn 435 JS, Portions 1, 3, 4, 5, 6, 7 and the remaining extent of the Farm Hartogshof 413 JS, in the magisterial district of Middelburg, in the Mpumalanga province under Department of Mineral Resources ("DMR") reference number: MP 30/5/1/2/2/299 MR/ 10134 MR ("Kopermyn Mining Right").

Sumo Colliery SA (Pty) Ltd ("Sumo") previously held a mining licence no. 6/2000 issued in terms of section 9(1) of the Minerals Act on 15 September 2000, in respect of coal on Portion 12 and Portion 20 of the Farm Kopermyn 435 JS, in the magisterial district of Middelburg in the Mpumalanga province, measuring 88, 53 hectares in extent (the "Mining Licence"). Portion 23 was created by a subdivision that took place after the Mining Licence was issued in that, in any event, it forms part of the mining boundary authorised in terms of the Mining Licence, where coal washing activities, amongst others, are conducted.

Ndanganeni Colliery has applied to incorporate Portion 23 and 28 of the Farm Kopermyn 435JS into the Kopermyn Mining Right and Kopermyn EMP by way of amendment in terms section 102 of the MPRDA.

The section 102 EMP amendment in this regard has subsequently been granted on the 20th of May 2019 under the reference number MP 30/5/1/2/3/2/1 (10134) EM.

1.2 Locality

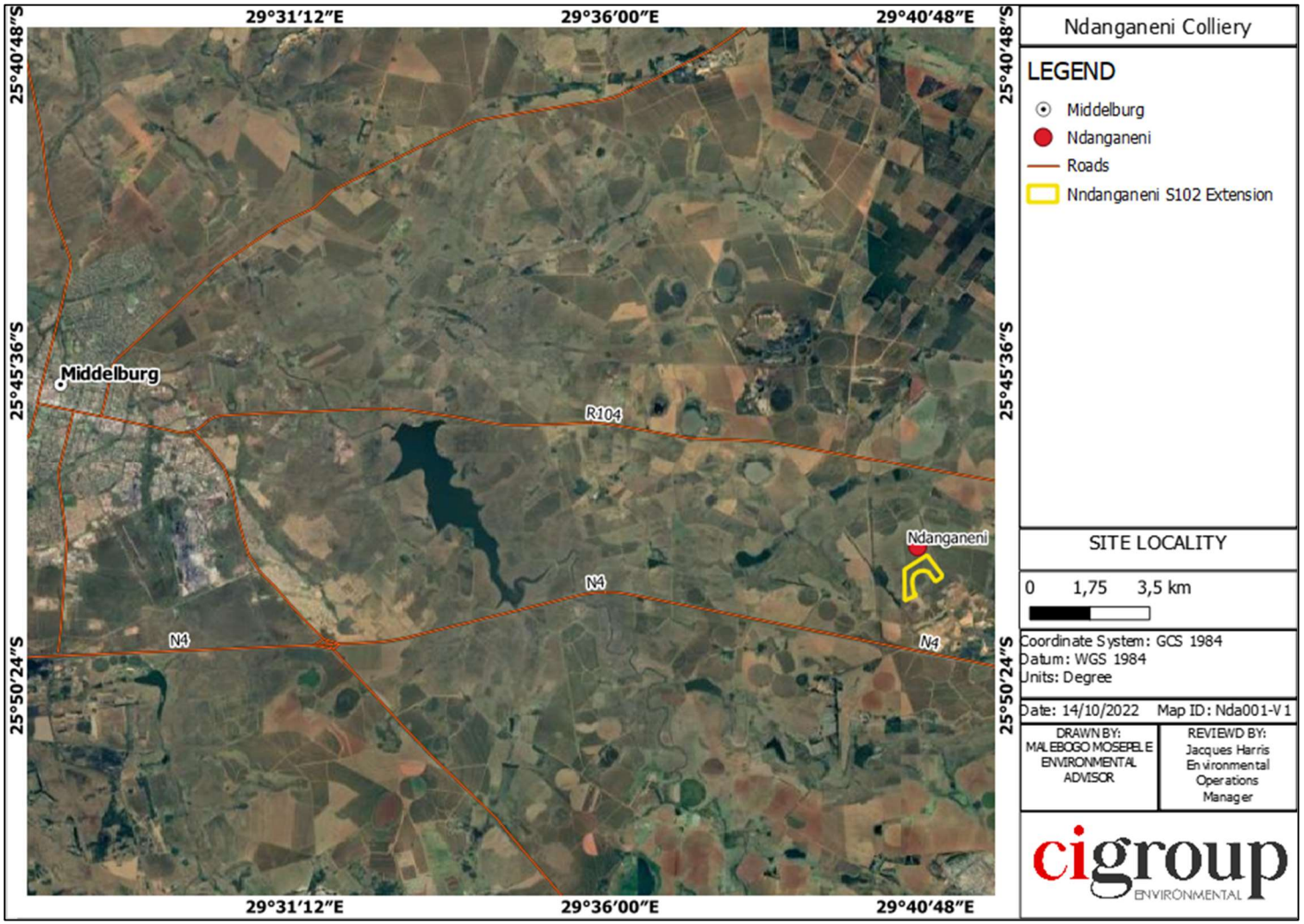


Figure 1.1 Mine Location

1.3 Mine Boundary

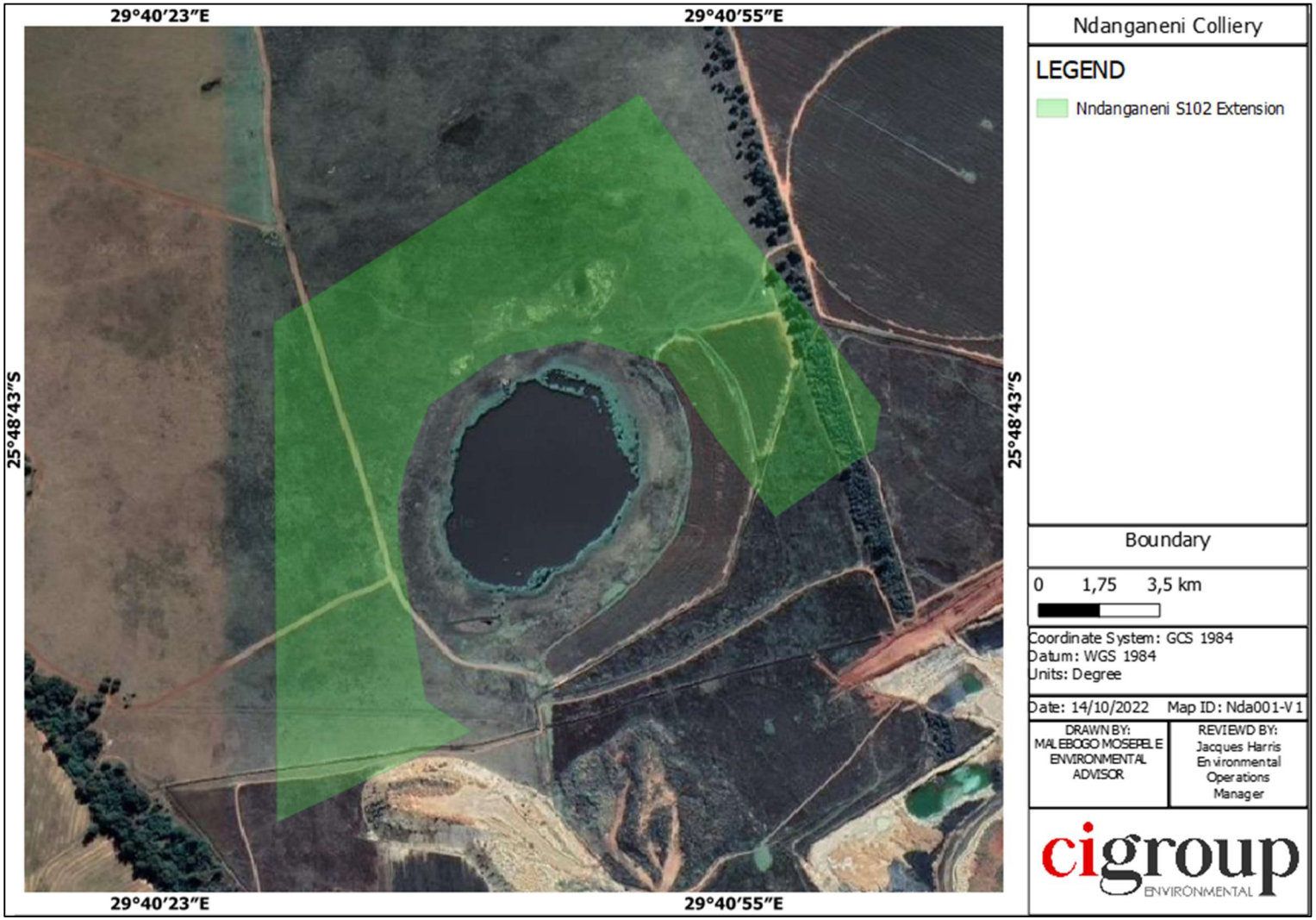


Figure 1.2 Mine boundary

1.4 General Mine Plan

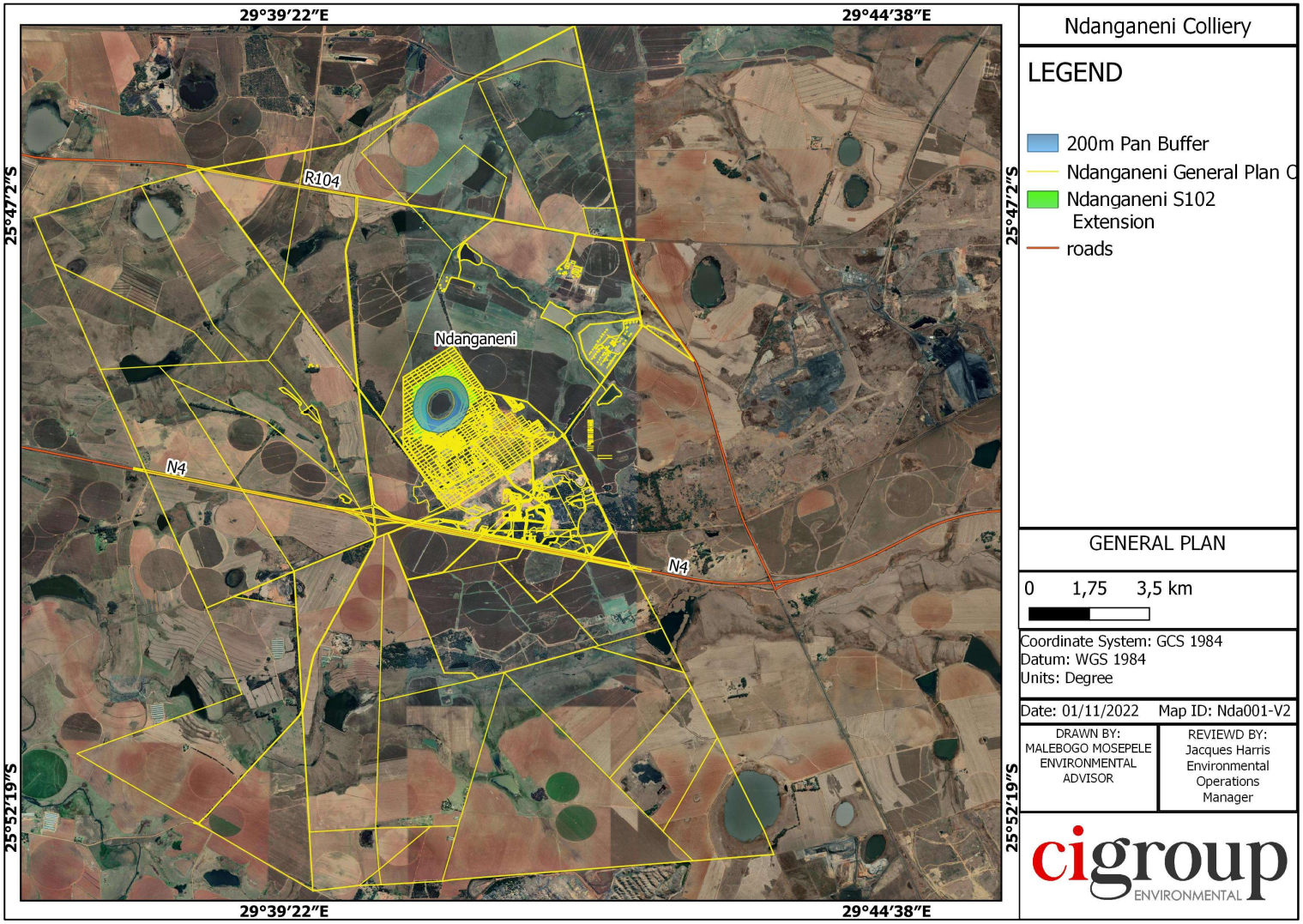


Figure 1.4 General Mine Plan

1.5 Scope of Work

The objective of the environmental risk assessment report is to—

- ensure timeous risk reduction through appropriate interventions;
- identify and quantify the potential latent environmental risks related to post closure;
- detail the approach to managing the risks;
- quantify the potential liabilities associated with the management of the risks; and
- outline monitoring, auditing, and reporting requirements.

1.6 Document requirements

The following sections is required in the document:

- details of the person or persons that prepared the plan;
- details of the assessment process used to identify and quantify the latent risks;
- risk management activities;
- costing, calculated using the current value of money and no discounting or net present value calculations included in the determination of the quantum of the liability; and
- monitoring, auditing, and reporting requirements, which must include requirements prior to the manifestation of the risk and impacts as well as those once the impacts resulting from the manifestation of the risk are realised, inclusive of the approach that will be taken to analyse monitoring results and how these results will be used to inform adaptive or corrective management and/or risk reduction activities.

2 Reference Sections

2.1 Independent Assessor

The details of the specialists responsible for preparing this report are contained in **Table 2.1** below. The CVs of the specialists are contained in **Appendix A**.

Table 2.1: Details of Specialist

Name	Title	Professional Registrations	Years of Experience
Jacques Harris	Environmental Group Manager	*Pri.Sci. Nat* (No: 400363/13)	25

Table 2.2 Specialist Experience

Country	Commodity	Company	Description	Date
Namibia	Zinc	Scorpion Zinc, NamZinc in association with Vendanta	Closure plan and closure cost assessment	2016
Malawi	Uranium	Paladin Energy Ltd	Closure strategy, plan, and financial liability	2018
Botswana	Diamond	GemDiamond	Closure strategy, plan, and financial liability	2019, 2018, 2017, 2016, 2015
Lesotho	Diamond	GemDiamond	Closure strategy, plan, and financial liability	2019, 2018, 2017, 2016, 2015
Mozambique	Coal	ENRC	Closure strategy, plan, and financial liability	2018, 2017
		Zambezi Coal	Closure strategy, plan, and financial liability	2018
South Africa	Quartz	Ferroglobe (Samquartz)	Closure strategy, plan, and financial liability	2019, 2018, 2017, 2016, 2015
	Manganese	Assmang Cato Ridge	Closure strategy, plan, and financial liability	2019, 2017, 2015, 2013, 2011
		ARM	Closure of 8 derelict mines and financial liability	2015
	Vanadium	Vametco	Closure and Rehabilitation Due Diligence	2019
	Platinum	Rustenburg Platinum Mine	Closure strategy, plan and financial liability Final landform design and water management	2016
		Two River Platinum	Closure strategy, plan, and financial liability	2015
		Anglo American, Bokoni Mine	Closure strategy, plan, and financial liability	2016
		Modikwa Platinum	Closure strategy, plan, and financial liability	2015
	Gold	Sibanye Gold, Burnstone	Rehabilitation Strategy and Implementation Plan	2017
		Sibanye Gold, Driefontein	Rehabilitation Strategy and Implementation Plan	2017
		Anglo Gold Ashanti, West Wits	Closure strategy, plan, and financial liability	2015
		CRG	Rehabilitation Strategy and Implementation Plan	2017
	Chrome	DeGrooteboom	Rehabilitation Strategy and Implementation Plan	2017
		Tharisa Chrome Mine	Rehabilitation Strategy and Implementation Plan	2017
		DwarsRivier	Rehabilitation Strategy and Implementation Plan	2016
	Coal	Kangra, Aasvoelkrans, Balgarthan, Bellengue, Leiden, Longridge, Maquassa East, Maquassa West, Mount Ngwibi, Mpisi, Nooitgesiend, Panbuilt, Rooipunt, Savmore North and South,	Rehabilitation Strategy and Implementation Plan Water Management closure liability	2018, 2017

		Taaibosh Spruit, Umgala, Utrecht, Zimbutu		
		Exxaro, Matla, Eloff, Belfast, Eerstelingsfontein. Glisa, Strathrae, Leeuwpan	Rehabilitation Strategy and Implementation Plan	2018, 2017, 2016, 2015, 2014
		Exxaro Coal, Forzando, Dorstfontein East, Dorstfontein North, Tumelo	Rehabilitation Strategy and Implementation Plan	2016, 2015, 2014
		Exxaro, Steincoalspruit	Full closure certificate	2015
		Buffalo Coal	Rehabilitation Strategy and Implementation Plan	2015, 2014
		Aviemore, Wesselsnek, Magdalena		
		Yzermyn	Closure Liability Due Diligence	2018
		Somkele	Rehabilitation Strategy and Implementation Plan	2016
		ZAC	Rehabilitation Strategy and Implementation Plan	2016

2.2 Legal Context

The General Notification 1147 (GN R1147) under NEMA according to the new legislation now requires an applicant or holder of a right or permit to compile and annually review the following three documents:

- A final rehabilitation plan;
- An annual rehabilitation plan; and
- An environmental risk assessment report.

A full set of legal requirements for closure and rehabilitation is found in **Appendix B** of this documentation.

2.3 Risk Assessment Process

The aim of the risk assessment approach is to identify possible risks associated with rehabilitation and closure which might be encountered during the closure and post closure phases. All the risks identified during this process are incorporated into the final rehabilitation, decommissioning and mine closure plan.

CIGroup Environmental used the risks assessment process detailed in **Appendix C** to identify the possible residual and latent risks associated with the Ndanganeni Colliery. **Appendix D** contain the risk classification of each risk identified.

3 Risk Assessment

3.1 Predicted Risks and Impacts

As part of the objectives of a risk assessment the process requires the analysis of key success factors and identification of stakeholders that could play a role in the closure strategy of a mining site.

3.1.1 Key success factors and stakeholder engagement

The key success factors and stakeholders identified for the Ndanganeni mining area with regards to the risks are listed below:

- Key success factors:
  - Obtaining approval for the Closure and Rehabilitation Process;
  - Reduce and remove any environmental degradation;
  - Reduce and remove any possible health and safety risks post closure;
  - Reduce and remove any possible water pollution;
  - Obtain the final land use requirements;
  - Have enough financial provision to ensure closure and rehabilitation; and
  - Follow all legislative requirements to ensure avoidance of time and cost delays.
- Stakeholders:
  - Ndanganeni Colliery management;
  - Ndanganeni Shareholders;
  - Employees;
  - Consultants;
  - Contractors;
  - Farmers of surrounding Coal Mines;
  - Communities of surrounding Coal Mines;
  - Affected and Interested Parties;
  - NGO's; and
  - National, Provincial, and municipal government departments.

3.1.2 Risk Categories

The standardised risk categories that were used in the analysis of the risks are shown in Table 3.1.

Table 3.1: Standardised risk categories

Risk Category	Risk Categories
1	Legislation
2	Air
3	Climate Change
4	Topography
5	Soil
6	Surface Water
7	Groundwater
8	Wetlands
9	Flora
10	Fauna
11	Avifauna
12	Aquatics
13	Geotechnical
14	Natural disasters
15	Societal
16	Health and Safety
17	Decommissioning
18	Closure
19	Rehabilitation
20	Care and Maintenance
21	Monitoring and Measurement

3.1.3 Project Risks, Risk Category and Existing Controls

The possible risks, the existing controls, and the risk treatment plan to mitigate the latent and residual risks that were identified are shown in Table 3.2.

Colour code:

- ***Extreme risk - Red***
- ***High risk - Purple***
- ***Moderate risk - Yellow***
- ***Low risk – Green***

Table 3.2 Risk Identification

Number	Rank	Risk Description (Event and Consequence OR Cause)	Category	Existing Controls	Risk Severity Before Treatment				
						Consequence		Likelihood	Risk Level Before Treatment
1	1	People will lose employment which will have a negative impact on families and their communities	Societal	Social and Labour Plan (SLP)	**4**	Major	**A**	Almost Certain	*Extreme*
2	2	Safety aspects on the mine, relates to people and animals and the possibility of fatalities.	Safety	Mine Health and Safety Plan Landform redesign	**4**	Major	**B**	Likely	*Extreme*
3	3	Safety risks around the pit lake areas that could cause casualties of animals and people and possible fatalities	Safety	Mine Health and Safety Plan Landform redesign	**4**	Major	**B**	Likely	*Extreme*
4	4	Suppliers will lose business which will have a negative impact on local business and on a regional scale	Societal	Social and Labour Plan (SLP) Supplier Management	**3**	Moderate	**A**	Almost Certain	*Extreme*
5	5	Surface water contamination degrading the water bodies downstream of mine resulting in further rehabilitation and a financial risk.	Surface Water	Surface water studies	**3**	Moderate	**B**	Likely	*High*
6	6	Groundwater contamination increasing as water rebound influencing downstream surface activities and groundwater supplies and resulting in a financial liability	Groundwater	Groundwater Model	**3**	Moderate	**B**	Likely	*High*
7	7	Heavy rainfall events causing the erosion of the trenches and berms allowing for polluted water to the enter the environment	Climate Change	None	**3**	Moderate	**B**	Likely	*High*
8	8	Extreme drought conditions prohibiting the growth of vegetation and resulting in poor rehabilitation	Climate Change	None	**3**	Moderate	**B**	Likely	*High*
9	9	Migration of mine workers after the mine has closed will negatively affect community structures	Societal	Social and Labour Plan (SLP) Supplier Management	**3**	Moderate	**B**	Likely	*High*
10	10	Not able to return quality of soil back to its natural soil quality impacting on the final land-use of the area	Soil	Surveyor quantities	**3**	Moderate	**B**	Likely	*High*
11	11	Wetland system downstream of the mine in danger to be impacted by mine closure reducing the quality of the wetland	Sensitive Landscapes	Wetland Monitoring	**3**	Moderate	**C**	Moderate	*High*

12	12	Redesign of the areas around the pits to represent the topography of pre-mining conditions could have a financial impact.	Topography	Surveyor quantities	**3**	Moderate	**C**	Moderate	*High*	
13	13	Care and maintenance process not followed, deteriorating the mine area, and resulting in a financial risk	Care and Maintenance	Care and Maintenance Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	
14	14	Closure strategy not effective for final land use, extending the closure period and resulting in a financial risk.	Closure	Closure Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	
15	15	Decommissioning poorly done causing safety risks in the mining area and resulting in a financial risk	Decommissioning	Decommissioning Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	
16	16	Monitoring and measurement not conducted, causing an inability to react to the degradation of the environment	Monitoring and Measurement	Monitoring and measurement Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	
17	17	Poor rehabilitation strategies extending the rehabilitation timeframes and causing financial risks	Rehabilitation	Rehabilitation Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	
18	18	Wind causing wind erosion from remaining dumps causes dust pollution to surrounding farmland	Air	Dust monitoring	**2**	Minor	**C**	Moderate	*Moderate*	
19	19	The spread of weeds and alien vegetation could have an influence on land-use capability and natural vegetation.	Flora	Environmental Management Plan (EMP)	**2**	Minor	**C**	Moderate	*Moderate*	
20	20	Erosion from areas around open pit requires to be managed and stop sedimentation to alter the river flow	Soil	Environmental Management Plan (EMP)	**2**	Minor	**C**	Moderate	*Moderate*	
21	21	Disturbed and denuded areas inhibiting vegetation growth need to be repaired	Soil	Monitoring	**2**	Minor	**C**	Moderate	*Moderate*	
22	22	Poor environmental rehabilitation prohibit fauna to return to the area	Fauna	Environmental Management Plan (EMP)	**2**	Minor	**D**	Unlikely	*Low*	

3.1.4 Project Risk Assessment Results

Risks were identified and analysed in terms of their likelihood of occurrence and their consequence or impact they could have on the mine. Figure 3.1 illustrates the level of impact the identified risks could have on the project before mitigation.

Risk Map Before Treatment				Consequence				
				Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	A	Almost Certain	95%			4	1	
	B	Likely	80%			5 6 7 8 9 10	2 3	
	C	Moderate	50%		18 19 20 21	11 12		
	D	Unlikely	20%		22	13 14 15 16 17		
	E	Rare	5%					
				Low 1	Moderate 9	High 8	Extreme 4	

Figure 3.1: Project Risk Map before treatment.

From Figure 3.1 several major risks are recorded for the Ndanganeni Mining Area in its current state. The most significant risks are identified in the high and extreme cells of the matrix. These risks include:

- Extreme Risks
  - People will lose employment which will have a negative impact on families and their communities
  - Safety aspects on the mine, relates to people and animals and the possibility of fatalities.
  - Safety risks around the pit lake areas that could cause casualties of animals and people and possible fatalities
  - Suppliers will lose business which will have a negative impact on local business and on a regional scale.
- High Risks
  - Surface water contamination degrading the water bodies downstream of mine resulting in further rehabilitation and a financial risk.
  - Groundwater contamination increasing as water rebound influencing downstream surface activities and groundwater supplies and resulting in a financial liability

- Heavy rainfall events causing the erosion of the trenches and berms allowing for polluted water to the enter the environment
- Extreme drought conditions prohibiting the growth of vegetation and resulting in poor rehabilitation
- Migration of mine workers after the mine has closed will negatively affect community structures
- Not able to return quality of soil back to its natural soil quality impacting on the final land-use of the area
- Wetland system downstream of the mine in danger to be impacted by mine closure reducing the quality of the wetland
- Redesign of the areas around the pits to represent the topography of pre-mining conditions could have a financial impact.

3.2 Predicted Mitigation to risks

3.2.1 Project Mitigation, Ability to Influence and Action Plan Type

The possible risks, the existing controls, and the risk treatment plan to mitigate the latent and residual risks that were identified are shown in Table 3.3.

Table 3.3 Mitigation Identification

Number	Rank	Risk Description (Event and Consequence OR Cause)	Risk Treatment Plan	Ability to Influence	Action Plan Type	Risk Severity After Treatment				
							Consequence		Likelihood	Risk Level After Treatment
1	1	People will lose employment which will have a negative impact on families and their communities	SLP annual review and continuous engagement Early engagement before mine closes Set up a community forum	Low / None	Reduce consequence	**3**	Moderate	**A**	Almost Certain	*Extreme*
2	2	Safety aspects on the mine, relates to people and animals and the possibility of fatalities.	Continuous implementation of Mine Health and Safety Plan and designing the top edges of the pit to relinquishing criteria.	Low / None	Reduce likelihood	**4**	Major	**C**	Moderate	*Extreme*
3	3	Safety risks around the pit lake areas that could cause casualties of animals and people and possible fatalities	Continuous implementation of Mine Health and Safety Plan and designing the top edges of the pit to relinquishing criteria.	High	Reduce likelihood	**3**	Moderate	**B**	Likely	*High*

4	4	Suppliers will lose business which will have a negative impact on local business and on a regional scale	SLP annual review and continuous engagement Early engagement before mine closes Set up a community forum	Low / None	Reduce likelihood and consequence	**3**	Moderate	**B**	Likely	*High*
5	5	Surface water contamination degrading the water bodies downstream of mine resulting in further rehabilitation and a financial risk.	Measurement and monitoring on a quarterly basis. Updating surface water studies every second year	Moderate	Reduce likelihood	**3**	Moderate	**C**	Moderate	*High*
6	6	Groundwater contamination increasing as water rebound influencing downstream surface activities and groundwater supplies and resulting in a financial liability	Measurement and monitoring on a quarterly basis. Updating surface water studies every second year	Moderate	Reduce likelihood	**3**	Moderate	**C**	Moderate	*High*
7	7	Heavy rainfall events causing the erosion of the trenches and berms allowing for polluted water to the enter the environment	Plan for high rainfall events	Low / None	Reduce consequence	**2**	Minor	**B**	Likely	*High*
8	8	Extreme drought conditions prohibiting the growth of vegetation and resulting in poor rehabilitation	Plan for extreme drought events	Low / None	Reduce consequence	**2**	Minor	**B**	Likely	*High*
9	9	Migration of mine workers after the mine has closed will negatively affect community structures	SLP annual review and continuous engagement Early engagement before mine closes Set up a community forum	Low / None	Reduce likelihood and consequence	**3**	Moderate	**C**	Moderate	*High*
10	10	Not able to return quality of soil back to its natural soil quality impacting on the final land-use of the area	Importing and treating topsoil to sustain the vegetation requirement of the final land-use	High	Reduce likelihood and consequence	**2**	Minor	**D**	Unlikely	*Low*
11	11	Wetland system downstream of the mine in danger to be impacted by mine closure reducing the quality of the wetland	Continuous monitoring and rehabilitation plan for wetlands	Moderate	Reduce consequence	**2**	Minor	**C**	Moderate	*Moderate*
12	12	Redesign of the areas around the pits to represent the topography of pre-mining conditions could have a financial impact.	Require a mine operation post closure design as part of the final rehabilitation plan	High	Reduce likelihood and consequence	**2**	Minor	**D**	Unlikely	*Low*

13	13	Care and maintained process not followed, deteriorating the mine area, and resulting in a financial risk	Annual review of the decommissioning, closure, and rehabilitation plan Conducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*
14	14	Closure strategy not effective for final land use, extending the closure period and resulting in a financial risk.	Annual review of the decommissioning, closure, and rehabilitation plan Conducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*
15	15	Decommissioning poorly done causing safety risks in the mining area and resulting in a financial risk	Annual review of the decommissioning, closure, and rehabilitation planConducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*
16	16	Monitoring and measurement not conducted, causing an inability to react to the degradation of the environment	Annual review of the monitoring and measurement plan Conducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*
17	17	Poor rehabilitation strategies extending the rehabilitation timeframes and causing financial risks	Annual review of the decommissioning, closure, and rehabilitation plan Conducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*
18	18	Wind causing wind erosion from remaining dumps causes dust pollution to surrounding farmland	Annual review of the monitoring and measurement plan for dust. Proper dump design and vegetation on dumps to reduce erosion	High	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*
19	19	The spread of weeds and alien vegetation could have an influence on land-use capability and natural vegetation.	Continuous monitoring of vegetation growth	High	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*
20	20	Erosion from areas around open pit requires to be managed and stop sedimentation to alter the river flow	Erosion Management Plan	Moderate	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*
21	21	Disturbed and denuded areas inhibiting vegetation growth need to be repaired	Improve vegetation growth to improve land capability	High	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*
22	22	Poor environmental rehabilitation prohibit fauna to return to the area	Continuous monitoring of vegetation growth	High	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*

3.2.2 Project Mitigation Assessment Results

Risks were identified and analysed in terms of their likelihood of occurrence and their consequence or impact they could have on the mine. Figure 3.1 illustrates the level of impact the identified risks could have on the project before mitigation.

Risk Map After Treatment				Consequence				
				Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	A	Almost Certain	95%			1		
	B	Likely	80%		7 8	3 4		
	C	Moderate	50%		11	5 6 9	2	
	D	Unlikely	20%		10 12 13 14 15 16 17 18 19 20 21 22			
	E	Rare	5%					

Low	Moderate	High	Extreme
12	1	7	2

Figure 3.2: Project Risk Map after treatment.

From Figure 3.1 several major risks are recorded for the Ndanganeni Colliery Mining Area in its current state. The most significant risks are identified in the high and extreme cells of the matrix. These risks include:

- Extreme Risks
  - People will lose employment which will have a negative impact on families and their communities
  - Safety aspects on the mine, relates to people and animals and the possibility of fatalities.
- High Risks
  - Safety risks around the pit lake areas that could cause casualties of animals and people and possible fatalities
  - Suppliers will lose business which will have a negative impact on local business and on a regional scale

- Surface water contamination degrading the water bodies downstream of mine resulting in further rehabilitation and a financial risk.
- Groundwater contamination increasing as water rebound influencing downstream surface activities and groundwater supplies and resulting in a financial liability
- Heavy rainfall events causing the erosion of the trenches and berms allowing for polluted water to the enter the environment
- Extreme drought conditions prohibiting the growth of vegetation and resulting in poor rehabilitation
- Migration of mine workers after the mine has closed will negatively affect community structures.

3.3 Identified opportunities

Within the risk assessment the process offers an opportunity to identify any opportunities with respect to the Decommissioning, Closure and Rehabilitation plans. Regarding the Ndanganeni Colliery Mine, the following opportunity was identified.

- Ndanganeni Colliery can negotiate with the adjacent farmer to work towards a final land use which will enhance the capabilities and capacity of the surrounding landscape. Possibilities include creating a lake after rehabilitation an ensure better drainage;
- Roads identified that could assist with the movement within the site; and
- Handing over infrastructure (offices) to the benefit of communities.

3.4 Latent and Residual Risks

According to the Mineral and Petroleum Resources Development Regulations, 2004 (Published under Government Notice R527 in Government Gazette 26275 of 23 April 2004) (GN R527) latent and residual impacts are defined as follows:

"Latent environmental impact means any environmental impact that may result from natural events or disasters after a closure certificate has been issued" (own emphasis);
and
"Residual environmental impact means the environmental impact remaining after a closure certificate has been issued" (own emphasis).

Latent and residual risks are specifically related to post mining impacts that occur at the site once rehabilitation has been completed.

The residual impacts identified for the Ndanganeni mine as required by NEMA General Notification (GN R1147) are described as follows:

- Loss of employment and loss of revenue for the employees, suppliers and surrounding communities has a social impact on the region;
- Leaving an open void because of the type of mining that took place could pose a safety risk to animals and humans; and
- Potential ongoing pollution of surface water resources could affect aquatics and quality downstream of the mine.

The possible latent impacts identified for the Ndanganeni mine as required by NEMA General Notification (GN R1147) are described as follows:

- Heavy rainfall (Climate Change) events causing the erosion of the trenches and berms allowing for polluted water to the enter the environment; and
- Extreme drought conditions (Climate Change) can impact the rehabilitation of the mine's surface areas making it difficult to obtain the final land use.

3.5 Changes from previous risk assessment reports

As this is the first iteration of the Environmental Risk Report that is in line with the GN R1147, there are no specific changes to the risk assessment that can be qualified.

4 CLOSURE COST ASSESSMENT

Ndanganeni Colliery mining is currently an operational mining site although mining in some areas has ceased. The methods and closure costs for each of the possible latent and residual risks identified, as stated in the previous sections, are detailed in the Decommissioning, Closure and Rehabilitation Plan for Ndanganeni Colliery Mining Area as part of the GNR 1147 document.

5 Monitoring

5.1 Groundwater and Surface Water Localities

Groundwater and surface water sampling localities conducted by Eco Elementum are identified in Figure 5.1.

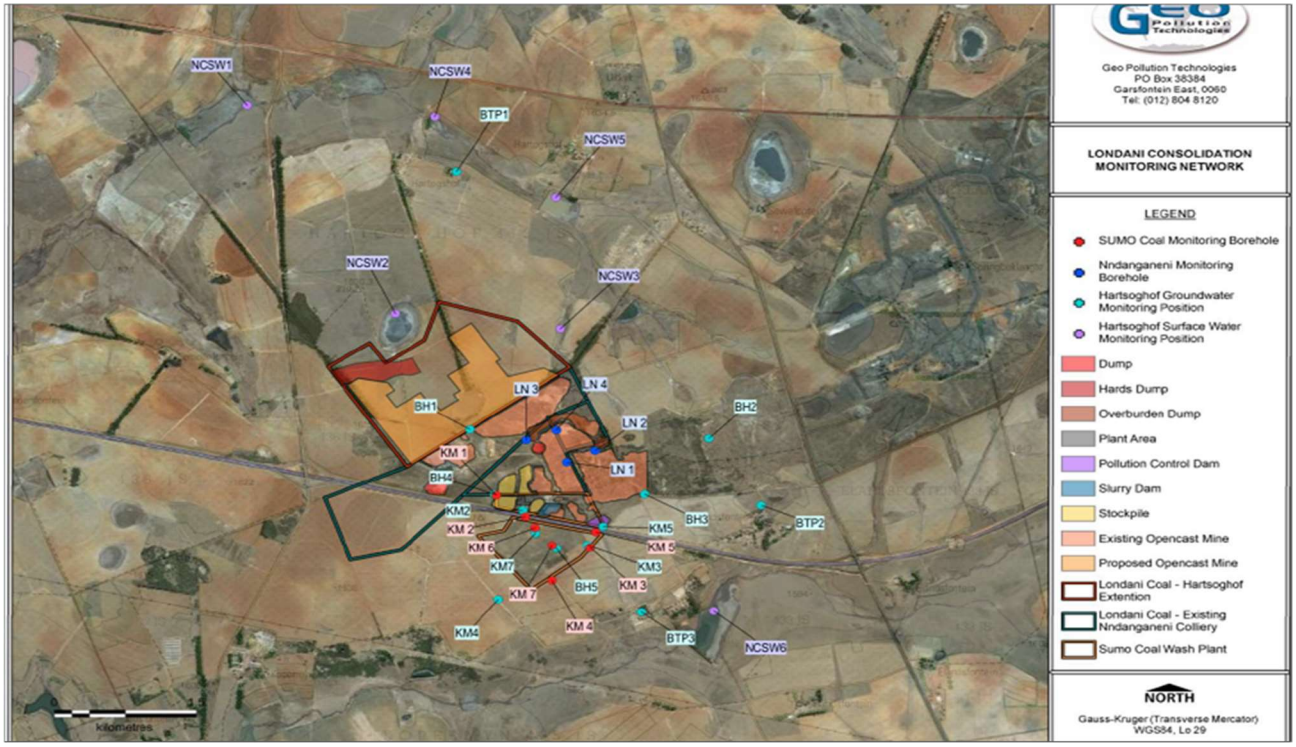


Figure 5.1 Groundwater and surface water sample localities (EcoElementum 2018)

6 Conclusion

It was found that the major risks identified with closure and rehabilitation are related to climate change, creating a void, and unemployment as an example of the societal impacts. While most of the impacts were ranked as having a high risk, some could be mitigated to a lower risk level with appropriate mitigation plans.

Latent and residual risks are specifically related to post mining impacts that occur at the site once rehabilitation has been completed. As a requirement by NEMA General Notification (GN R1147), these risks need to be highlighted and mitigated.

The residual impacts identified for the Ndanganeni mine as required by NEMA General Notification (GN R1147) are described as follows:

- Loss of employment and loss of revenue for the employees, suppliers and surrounding communities has a social impact on the region;
- Leaving an open void because of the type of mining that took place could pose a safety risk to animals and humans; and
- Potential ongoing pollution of surface water resources could affect aquatics and quality downstream of the mine.

The possible latent impacts identified for the Ndanganeni mine as required by NEMA General Notification (GN R1147) are described as follows:

- Heavy rainfall events causing the erosion of the trenches and berms allowing for polluted water to the enter the environment;
- Extreme drought conditions can impact the rehabilitation of the mine's surface areas making it difficult to obtain the final land use; and
- Potential ongoing pollution of groundwater resources could affect quality downstream of mine.

It is recommended that Ndanganeni Colliery implement and continue to conduct monitoring on possible future risks. These monitoring studies should focus on:

- Surface water monitoring;
- Ground water monitoring;
- Wetland health; and
- Flora downstream of site.

As this is the second iteration of the Environmental Risk Report that is in line with the GN R1147, there are no specific changes to the risk assessment that can be qualified.

Appendix A: Assessor CV

Jacques Muirhead Harris

Address: *51 Brunton Street, Founders View, Edenvale*

E-mail: *jacques.mharris@gmail.com*

Tel: *+(27) 71 684 3414*

Linkedin: *https://za.linkedin.com/in/jacques-harris-687100*

Summary

I am currently the Environmental Operations Manager (SACNASP 400363/13, IRMSA 53533736, SAIOSH 55514187) for CIGroup, with over 25 years' experience in business management processes. I obtained my experience working as a teacher at Linden High School, at a large international manufacturing facility, Saint-Gobain Abrasives (2360 people in RSA), an international consulting firm, WorleyParsons RSA (1500 in RSA), an African Consulting Firm, GCS Pty Ltd (100 Professionals) and currently at CIGroup South Africa.

Through my career I have managed large teams (30 people) and have been involved through all the processes of business. I have been intrinsically involved in setting up Key Performance Indicator (KPI's), and conducting Employment, Retrenchments, Disciplinarians, and the CCMA processes. I have been part of the EXCOM and MANCOM of companies and was part of the Salary Negotiation Team with the Unions (NUMSA and SAEAWU) at Saint-Gobain.

My experience includes procurement activities in terms of procurement contracts, supplier quality assurance audits, BBEEE compliance, raw material storage and product life cycles and financial risk. I have developed ISO 9001, and ISO 14001 systems and managed the OSHAS 18001 systems. I was responsible for Enterprise Risk Management for Saint-Gobain, Project Risk facilitation for WorleyParsons, financial risk modeling for Quatern and responsible for bid and contract risk management for projects. My RND experience include the development of new products for manufacturing through our laboratory services, developing new applications for products, and optimising applications. Operations management in GCS and WorleyParsons included allocating time for procurement for projects, bidding, and contract management, reporting and quality control, budgeting, time management, stakeholder engagement, Human resources, and Scope management.

In Business Development I have marketed products and service in the Mines and Minerals, Power, Oil and Gas, Manufacturing, Government and Financial sectors in South Africa. I have been a manager for Large Account Management Clients (LAMC) with sales and project budgets of up to R30 million, which include companies such as Exxaro, SolarReserve, Government, Columbus Stainless Steel, Investec etc. My sustainability experience includes Carbon, Water and Ecological footprints and offsets and financial implications working towards the climate change objectives of companies.

As a teacher of mathematics and science, education and training has always been important in my working career. In Saint-Gobain I initiated a 2-year course that became the Centre of Excellence of Management studies for Saint Gobain.

Qualification

1992: BSc. Hons Chemistry
1991: HED. Chemistry and Math's
1990: BSc. Chemistry, Biochemistry

Courses and Certificates

1998: Handling Discipline
1998: Assertive Communication Skills
1998: Hands on Managing of IR
1998: Total Workplace Environment
1998: Successful Selling
1998: Training the Trainer
2001: Business / Technical Writing
2002: OSHAS 18001 Auditing Training
2002: Sales Training
2002: Level 2 – RND
2007: Competition Law
2009: Internal Risk Management
2009: Financial Risk Management
2009: Business Development Planning
2011: ISO 9001:2008 ISO lead auditor
2012: Serious about Zero Harm
2013: Risk facilitator training
2013: Global Reporting initiative
2014: Sustainable Design and SEAL Coordinator
2017: Occupational Health and Safety

Skills

Statistical Control and Assurance
Research and Development
Sustainability
Project Management
Project Risk Management
Enterprise Risk Management
Financial Risk Assessment
Financial Modelling
ISO systems (9001, 14001, 45001, 17025, 31001)
Quality Management
Health and Safety
Environmental Management
Societal Management
Energy Balance
Carbon Footprint
Water Footprint
Closure and Rehabilitation

Jacques Muirhead Harris

Registrations

- SACNASP Registration, 400363/13, 2013;
- The Institute of Risk Management South Africa IRMSA 53533736
- SAIOSH Membership Number 55514187
- IOCSA, Chartered Consultant, A00107, 2017;
- Environmental Law Association, ELA, 2016/140/GP, 2015; and
- International Association for Impact Assessment South Africa, IAIA, 3985, 2015

Work Summary

2019 – Present: CIGROUP Pty Ltd **Environmental Operational Manager**

Units: Health and Safety, Environmental Sustainability, Environmental Systems, Environmental Closure and rehabilitation, Risk and Quality.

2018 – 2019: GCS Pty Ltd **Group SHERQ Manager Consulting**

Units: Health and Safety, Environmental Sustainability, Environmental Systems, Environmental Closure and rehabilitation, Risk and Quality.

2014 – 2018: GCS Pty Ltd **Group Environmental Manager**

Units: Pre-Authorizations, Environmental Authorization, Water Authorization, Post-Authorization, Environmental Control Management, Sustainability, Ecology, Health and Safety, Environmental Systems, Closure and Rehabilitations, Business Development

2011 – 2014: WorleyParsons RSA **Environmental Manager**

Units: Environmental and Water Authorizations, Closure and Rehabilitation, Risk Facilitation and Assessment, Financial Risk Modelling.

2009 – 2011: WorleyParsons **Senior Project Manager**

Environmental, Public and Private Partnership, Risk Management and Financial Risk Projects

2008 - 2009: Quatern Advisory **Executive Energy**

Unit Manager, Power, Risk Management and Financial Risk Projects

2003 - 2008: Saint-Gobain **SHERQ and Sustainability Manager**

SHERQ Unit Manager – ISO 9001; ISO 14001, OSHAS 18001, ISO 170125, Enterprise Risk Management; Sustainability GRI reporting for RSA

1999 - 2003: Saint-Gobain **RND Manager**

Research and Development on Products, Services and Client Development

1995 - 1999: Saint-Gobain **Laboratory Manager**

RND and Operations Laboratory and Quality Manager

1993 - 1995: Linden High School **Teacher**

Grade 8 – 12 Math's and Science Teacher

Legislation Experience

MPRDA; NEMA; NEM:AQA; NEM:WA; NRM:BA; NWA; Occupational Health and Safety Act; Mine Health and Safety Act; MFMA; and PFMA

Business Travels

USA (3); UK (2); France (2); Australia (1); Mozambique (1); Namibia (1); and Zambia (1)

System Management Experience

Laboratory Management: ISO 17025
Quality: ISO 9001
Environment: ISO 14001
Health and Safety: ISO 45001
Enterprise Risk Management: ISO 31001
Sustainability: GRI
Project Management: PMBOK
Public and Private Partnerships: PPP
Performance Management.

Computer Literacy

VBA – Good; MS Word – Advanced; MS Excel – Advanced; MS Access – Advanced; MS Project – Advanced; MS Power point – Advanced; Outlook – Good; Eviews – Good; @Risk – advanced; Sketchup – Good; Edraw – Good; and Proman - Advanced

Conference Presentations

2015 – Wits; Environmental Management Systems ISO14001
2015 – Masterclass: Closure liability of mines in South Africa
2016 – IAIA: Closure liability of mines in South Africa
2017 - 8th Annual Construction Risk Conf: Environmental Risk
2018 – GSSA: Climate Change

ACHIEVEMENTS

In 1999 I developed a statistical quality control system that were used until the company closed doors in South Africa. In 2002 I started a Center of Excellence for Management training teaching a total of 125 entrants in becoming supervisors and managers. In 2004 I certified Saint-Gobain in ISO 9001 (SANS accredited) which were held until I left in 2008. In 2006 I obtained a Diamond award for one of 24 best SHERQ facilities from 420 facilities worldwide. I was asked to present the facility and achievements (1million hours without a lost time accident) in Manchester UK. I was the lead in the Risk Assessment Process for St Helena Airport and designed a Disaster Management Plan for an Oil refinery in Vladivostok Russia. Currently I am requested to do a number of presentations on various subjects for the industry.

Jacques Muirhead Harris

I believe that I have the qualification and experience in assisting your company in their future endeavors. I am a hard and dedicated worker loyal to the company I work for (can be seen in the years spent at previous companies). I am focused and precise on the financial and scheduled components of my activities, and work towards satisfying the needs of my clients. Clients are key to the success of any business.

Social

- Project Manager and team member: Study to determine the **socioeconomic benefits of Roads on the economy of South Africa** (RSA Department of Transport (R2mil project))
- Team Member: Chitima **Social Impact Assessment and Resettlement Management Plan** (ERG)
- Team Member: Belfast **Social Impact Assessment, Social and Labor Plan** and Management for Resettlement Implementation.
- Team member: **Social and Labor Plan** for Goeboe Goeboe salt mine.
- Team member: **Social and Labor Plan** for Chrominet Greenfields project

Environmental Impact Assessment

- Estima Coal Mine (Mozambique) - Power Plant EIA
- Director: Individual Environment, Waste, Water, Electrical and GIS assessments for **Concentrated Solar Plants** in Humansrus, Rooipunt, Arriesfontein.
- Director: Individual Environment, Water, Electrical and GIS assessments for **Photovoltaic Plants** in Southdrift, Humansrus, Rooipunt, Arriesfontein and Farm 198
- Director: Individual Environment, Waste, Water and GIS assessments for **Anaerobic Plants** in Starke, Bonnievale, Keibees and Butt Farming
- Director: Individual Environmental and Water Assessments for **Biomass Gasification Plants** in Ringkink, Lourensford and J&J Sawmills
- Director: Health and Safety, Environment, Water, Waste and GIS **assessments for an Oil Tank farm** in Saldanha Bay (Equator Principles)
- Director: **Environmental and Waste Assessments** for George Mukari Hospital Extension
- **Environmental Management Plan** for uMdloti Wastewater Treatment works
- **Environmental Feasibility** for the construction of a bypass road at Hazyview
- Director: **EIA** for Subenza substation.
- Project Manage: **EIA** for Witsand Desalination Plant.
- Project Manage: **EIA** for Elliotdale Rural Development.

ISO systems and Accreditations

- **Environmental, Health and Safety and Environmental certification and accreditation,** Saint-Gobain Abrasives South Africa
- **Quality control, assurance management and statistical control for products leaving the facility** for Saint-Gobain Abrasives.
- **Environmental, Health and Safety and Environmental implementation**, Quatern, KV3, WorleyParsons and GCS in RSA
- **Disaster Management, Environmental, Health and Safety Management Plan**, Oil Refinery, Vladivostok, Russia
- **Health and Safety, Carbon foot printing as lead auditor on all Cape Town Wastewater Treatment sites** for NIRAS on behalf of the German development Band (KfW) as lender.
- **ISO 9001** development/implementation for Consulting Engineers for CIGroup

Mine Closure and Rehabilitation

- Paladin Energy – Kayelekera Uranium Mine in Malawi
- Exxaro – NBC GNR 1147 Closure and Rehabilitation for 3 mines
- Kangra – GNR1147 Closure and Rehabilitation process on all 18 mines
- Tharissa – Mine closure, Decommissioning, Closure and Closure Liability
- Bokoni Anglo American - Mine closure, Decommissioning, Closure and Closure Liability
- Dwarsrivier (Assore) - Mine closure, Decommissioning, Closure and Closure Liability
- Gem Diamond (Botswana) - Mine closure, Decommissioning, Closure and Closure Liability
- Ladomode – Mine Closure Assessment
- Sibanye Gold – Driefontein and Burnstone Rehabilitation Strategy and Implementation Action Plan
- Pilansburg Platinanum Mine – Mine Closure Design, Rehabilitation and Financial Provision
- Director: Assmang Manganese Cato Ridge Works Conceptual Closure Plan.
- Director: Cronimet Conceptual Closure Plan and closure Liability Assessment.
- African Rainbow Minerals Limited (ARM) Dormant mines closure liability assessments. Drafted a legal opinion on old order mining rights and liabilities ito environmental legislation.

Sustainability

- Project Director to determine the **feasibility of changing gas into electricity** using the Combined Heat and Power Technology for Heritage Hill Development (Project size R256 Million)
- Project Manager Mbombela **Integrated Waste Management Plan**, Municipal Service Plan, and Waste Recycling and Minimization Plan.
- Gem Diamond (Botswana, Lesotho) – **Energy Balance, Carbon, and Water footprint**
- **Water management for rehabilitation for 18 Kangra mines.**

Corporate

- **Business improvement and Marketing Strategy for Forza Racing** for Quatern Advisory Services.
- **Business risk management Assessment for meridian Wine Merchants for** Quatern Advisory Services.
- **Project Manager to determine the appropriate Tariff for Kouga Municipality** for Quatern Advisory Services.
- **Business risk management plan for Goeboe Goeboe salt mine in the Northern Cape** for Quatern Advisory Services.
- **Risk Facilitator and Risk Manager** for the Siemens Photovoltaic Plant for WorleyParsons.
- **Risk Facilitator and Risk Manager** for the St Helena Airport for WorleyParsons.
- Assisted the client in conducting a full **Environmental Due Diligence and Risk Assessment** of purchasing an Anglo Mine
- Assisting Duetche Bank KfW with a due diligence on funding for Water treatment works in Cape-Town CIgroup

Public and Private Partnership

- **Broadband Financial Risk Modelling** for the Municipality of Cape Town (8 billion Rand Project)
- Project Manager: Eden District Municipality **Landfill PPP** and Risk Management Processes
- Director: **Environmental and Waste Assessments** for George Mukari Hospital Extension
- Team Member: City of Johannesburg **Waste to Electricity Feasibility Study** – Contributed to the Risk and BEE implications of the study
- Team Member: **PPP Strategy and Policy** for the City of Windhoek. Created **access software** for the purpose of running the system.
- Team Member: **Mbombela Integrated Waste Management Plan** with landfill site transport routes, pickers, and additional facilities

Health and Safety

- Director for **Sanral N17 Upgrade Health and Safety Compliance Officer**
- Director for **SANRAL N2 Umtate upgrade**
- Director for **Compliance Officer for Grahamstown Slope Stability study**
- Director for **the City of Johannesburg Orlando Station Upgrade (H&SCO)**
- Director for **Health and Safety Compliance for KwaZakhele Storm Water and Roads construction**
- Director of **Compliance Officer for Nelson Mandela Bay Stadium Health and Safety Audit**
- Director for **N2 Bridge Construction Health and Safety**
- Director for **Health and Safety Compliance Officer for Kwa Nomzamo sewage plant augmentation**
- Director for **Health and Safety Compliance Officer for Derdepoort 189&190 Township Establishment**
- Director for **Compliance Officer on Goedemoed Correctional Services Health and Safety**
- Assisted companies to develop **Mine Health and Safety Files for mines including Anglo American, African Rainbow Minerals, Exxaro, Kangra, Arcelor Mittal, and Samancor.**
- Developed the **Health and Safety Management system for Goeboe salt mine.**

Engineering

- **Design, development, and operations of a water treatment facility** for Saint-Gobain Abrasives.
- **Development and operations of a Field instrumentation unit to measure power consumption on Abrasives machines** for Saint-Gobain Abrasives.
- **Maintenance and operations of a ovens and furnaces at Isando operation** for Saint-Gobain Abrasives.
- **Bottling plant feasibility for Ensunc at** Quatern advisory services**.**
- Thubelisha appointed Quatern to provide a **Professional Engineering Audit of Services to verify and quantify installed services, at Delft Symphony, N2 Gateway project, Cape Town.**
- **Pre-feasibility study in generating electricity and heat using gas as a primary source of energy through Micro CHP's** for Quatern Advisory Services
- **Feasibility Assessment for the Visitor Centre for SKA at Carnavon in the Northern Cape SKA** for Quatern advisory services.
- **Assmang Manganese Cato Ridge Work Slag Investigation**. Investigated the use of slag for stabiliser for pipeline
- **Assessment of the contamination of ballast and surrounding areas** for Transnet on South African railway network

Appendix B: Closure legislation

1. Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)

The Constitution of South Africa is the supreme act to which all other acts must speak to. The Constitution sets out the rights for every citizen of South Africa and aims to address past social injustices. With respect to the environment, Section 24 of the constitution states that:

"Everyone has the right:

a) To an environment that is not harmful to their health or well-being;

b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

i. Prevent pollution and ecological degradation;

ii. Promote conservation; and

iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

The constitution also establishes the idea of the polluter pays principal - simply that the party responsible for pollution of the environment remains responsible for financial reparations of the impacts from their activities.

2. National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) provides the framework environmental legislation and establishes an integrated environmental management system for South Africa. It aims to prevent pollution and degradation of South Africa's natural environments while at the same time promoting sustainable economic and social development.

Central to NEMA is the idea of Integrated Environmental Management (IEM). IEM seeks to:

- Promote the integration of the principles of environmental management into the making of all decisions;
- Identify, predict, and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising

negative impacts, maximising benefits, and promoting compliance with section 2 principles; and

- Ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them.

NEMA also enforces the idea of the polluter pays principle as established in the Constitution. Section 28(1) of the NEMA states:

"Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment".

This is central to the idea of mine closure whereby the holder of a mining permit remains responsible for ensuring the mined area is rehabilitated to a state acceptable to all parties and that is not harmful to people or the surrounding environment.

Section 24P of the NEMA also sets out the requirements for financial provision for remediation of environmental damage while Section 24R of the NEMA speaks specifically to environmental authorization on mine closure. Section 24P (5) states the following:

"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 Mineral and Petroleum Resources Development Act, 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. responsible for mineral resources in terms of the Mineral and Petroleum Resources Development Act, 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" (own emphasis).

Furthermore, Section 24R (1) of the NEMA states:

"Every holder, holder of an old order right and owner of works remain responsible for any environmental liability, pollution or ecological degradation, the pumping and treatment of polluted or extraneous water, the management and sustainable closure thereof notwithstanding the issuing of a closure certificate by the Minister responsible for mineral resources in terms of the Mineral and Petroleum Resources Development Act, 2002, to the holder or owner concerned" (own emphasis).

Important to note here is that the NEMA specifically states that the liabilities associated with mining do not end with the issuing of a closure certificate. This is at odds with the MPRDA as illustrated before. Furthermore, the NEMA carries heavier penalties than the MPRDA for transgressions.

1.1. NEMA 2017 Environmental Impact Assessment (EIA) Regulations GN R326

The Department of Environmental Affairs (DEA) has developed a list of activities which are likely to have an impact on the environment. The list of activities was published in 2014 and were separated into three listing notices (GN R983, GN R984 and GN R985) and were amended by the Department in 2017. The amended list of activities was separated into three listing notices (GN R.324, GN R.325 and GN R327).

Any activity which is listed under these notices requires an environmental assessment to be conducted and approved before the activity can proceed. Activities falling under Listing Notice 1 (GN R327) or Listing Notice 3 (GN R324) require a Basic Assessment (BA) to be conducted while any activity falling under Listing Notice 2 (GN R325) requires a full Scoping and Environmental Impact Assessment (S&EIA) process to be conducted.

With the introduction of the 2014 NEMA EIA Regulations (GN R982), as amended by the 2017 NEMA EIA Regulations (GN R326) on 07 April 2017, mine closure is now a listed activity under GN R983 which requires a BA. The listing detailed in **Error! Reference source not found.**.

Table 1.1: Listing Notice GN R327 which triggers a BA.

Activity Number	Activity Description
Activity 22 under GN R324.	The decommissioning of any activity requiring - (i) a closure certificate in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002); or

	(ii) a prospecting right, mining right, mining permit, production right or exploration right, where the throughput of the activity has reduced by 90% or more over a period of 5 years excluding where the competent authority has in writing agreed that such reduction in throughput does not constitute closure. but excluding the decommissioning of an activity relating to the secondary processing of a – a) mineral resource, including the smelting, beneficiation, reduction, refining, calcining, or gasification of the mineral resource; or b) petroleum resource, including the refining of gas, beneficiation, oil, or petroleum products; – in which case activity 31 in this Notice applies.

Therefore, any mine that wishes to apply for a closure certificate is now required to conduct a BA and submit this alongside the application for a closure certificate.

1.2. NEMA 2015 Regulations Pertaining to Financial Provision

The NEMA regulations pertaining to financial provision were previously regulated under the MPRDA, however they have since been retracted from the MPRDA and have now been gazetted under the NEMA.

The regulations pertaining to financial provision (GN R1147) under the NEMA set out the requirements for an applicant or holder of a right or permit to determine and make financial provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of prospecting, exploration, mining, or production operations.

GN R1147 now requires an applicant or holder of a right or permit to compile and annually review the following three documents:

1. A final rehabilitation plan;
2. An annual rehabilitation plan; and
3. An environmental risk assessment report.

The NEMA regulations require that the financial provision is, at any given time, equal to the sum of the actual costs of implementing the plans and report for a period of at least

10 years forthwith. The calculation of these costs needs to be based on real costs and are no longer calculated according to given rates.

The transitional arrangement under regulation 17(4) states that:
"A financial provision approved in terms of the Mineral and Petroleum Resources Development Regulations, 2004 must be regarded to be the financial provision approved in terms of these Regulations, on condition that a holder that operates in terms of a financial provision approved in terms of the Mineral and Petroleum Resources Development Act, 2002 at the time of the coming into operation of these Regulations, must review and align such approved financial provision with the provisions of these Regulations, after the coming into operation of these Regulations, as set out in sub-regulations (5) to (10), and annually thereafter as set out in regulations 9 and 11, read with the necessary changes" (own emphasis).

Therefore, the previous financial provisions for the Ndanganeni Mine which were approved as per the Mineral and Petroleum Resources Development Regulations (published under Government Notice R527 in Government Gazette 26275 of 23 April 2004) (GN R527), can be approved of in terms of GN R1147 so long as Ndanganeni Mining reviews and aligns the previous financial provisions with GN R1147 and continues to do so on an annual basis.

In terms of the time within which the first review and alignment must take place the transitional arrangement under regulation 17(5) further states that:
"A holder must –

(a) within three months of its financial year end following the coming into effect of these Regulations and annually thereafter; or

(b) within 15 months after the coming into effect of these Regulations and annually thereafter;

ensure that a review, assessment and adjustment of the financial provision is conducted in accordance with regulation 11 of these Regulations, read with the necessary changes, and submit an updated financial provision, including the plans and report contemplated in regulation 11(1), a copy of the independent auditor's reports and proof of payment or arrangements to provide the financial provision for approval by the Minister responsible for mineral resources, which updated financial provision must be included in—

i) any audit required in terms of an environmental authorisation issued in terms of the Act; and

ii) any amendment of an environmental management programme to be submitted in terms of the Environmental Impact Assessment Regulations, 2014" (own emphasis).

This document comprises the final rehabilitation plan for the Ndanganeni mine and contains all the required information as per Appendix 4 of the NEMA regulations. This plan should be read in conjunction with the Annual Rehabilitation Plan and the Environmental Risk Assessment Report.

3. Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)

The Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) was enacted to make provision for equitable access to and sustainable development of South Africa's mineral and petroleum resources; and to provide for matters connected therewith. The MPRDA recognises that mineral and petroleum resources are non-renewable resources yet are important resources for ensuring the continued economic growth and social upliftment of the people of South Africa. The MPRDA therefore sets out the State's obligation to protect the environment for the benefit of present and future generations, to ensure ecologically sustainable development of mineral and petroleum resources and to promote economic and social development.

As part of the commitments to protect the environment for the benefit of present and future generations and to ensure ecologically sustainable development of mineral and petroleum resources the MPRDA provides that all mining activities need to minimise their impacts on the surrounding environment as much as possible. This includes rehabilitation and mitigation of latent environment impacts of the site post closure of the mine.

Section 43 of the Act enforces the need for every mine to apply for a closure certificate upon completion of the activity. Section 43(1) states that:
"The holder of a prospecting right, mining right, retention permit, mining permit, or previous holder of an old order right or previous owner of works that has ceased to exist, remains responsible for any environmental liability, pollution, ecological degradation, the pumping and treatment of extraneous water, compliance to the conditions of the environmental authorisation and the management and sustainable closure thereof, <u>until</u> the Minister has issued a closure certificate in terms of this Act to the holder or owner concerned" (<u>own emphasis</u>).

Important to note here is that the MPRDA specifically speaks to the holder of a right or permit. Even if the right or permit has ceased to exist the holder remains responsible for any environmental liability associated with their activities until a closure certificate is granted. As mentioned earlier, this is at odds with the NEMA which states that the liabilities associated with mining activities remain with the holders of the rights or permits notwithstanding the issuing of a closure certificate.

1.3. MPRDA Regulations (GN R537)

The MPRDA Regulations (GN R537 of 23 April 2004) regulate the procedures and criteria for mining related activities as set out in the MPRDA.

The MPRDA Regulations set out the principles for mine closure in Section 56 as follows:

"In accordance with applicable legislative requirements for mine closure, the holder of a prospecting right, mining right, retention permit or mining permit must ensure that -

a) **The closure of a prospecting or mining operation incorporates a process which must start at the commencement of the operation and continue throughout the life of the operation;**
b) **Risks pertaining to environmental impacts must be quantified and managed pro-actively, which includes the gathering of relevant information throughout the life of a prospecting or mining operation;**
c) **The safety and health requirements in terms of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) are complied with;**
d) **Residual and possible latent environmental impacts are identified and quantified;**
e) **The land is rehabilitated, as far as is practicable, to its natural state, or to a predetermined and agreed standard or land use which conforms with the concept of sustainable development; and**
f) **Prospecting or mining operations are closed efficiently and cost effectively".**

The Regulations also set out the procedure for applying for a closure certificate in Section 57 when a mine reaches its Life of Mine (LoM).

4. Mine Health and Safety Act, 1996 (Act No. 29 of 1996) (MHSA)

The Mine Health and Safety Act, 1996 (Act No. 29 of 1996) (MHSA) was enacted to provide for the protection of the health and safety of employees and other persons at mines. The Act seeks to promote a culture of safe and healthy work environments in the South African mining sector. The Act further seeks to regulate employers' and employees' duties to identify hazards; to eliminate, control and minimise the risk to health and safety; to entrench the right to refuse to work in dangerous conditions; and to give effect to the public international law obligations of the Republic relating to mining health and safety.

According to Section 2(2) of the act the MHSA applies to the mine until a closure certificate is awarded as per Section 43 of the MPRDA:

"The employer of a mine that is not being worked, but in respect of which a closure certificate in terms of the Minerals and Petroleum Resources and Development Act has not been issued, must take reasonable steps to continuously prevent injuries, ill-health, loss of life or damage of any kind from occurring at or because of the mine".

This section of the act highlights that the employer of a mine remains liable for any injuries, ill-health, loss of life or damage of any kind occurring at or because of the mine until a mine closure certificate has been awarded. Not only are they liable but they must take reasonable steps to continuously prevent any of these incidents from occurring.

5. National Water Act, 1998 (Act No. 36 of 1998) (NWA)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) aims to ensure the protection and sustainable use of South Africa's water resources. The three main pillars of the NWA are sustainability, equity, and efficiency. The NWA requires that any activity which might impact on water resources apply for a Section 21 Water Use License (WUL).

The NWA also enforces the idea of the polluter pay principle. Section 19(1) of the NWA states that:

"An owner of land, a person in control of land or a person who occupies or uses the 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 such pollution from occurring, continuing, or recurring."

Appendix C: Risk Assessment Process

1. Risk Methodology

Risk is a measure of future uncertainties in achieving program performance goals and objectives within defined cost, schedule, and performance constraints. Risk can be associated with all aspects of a program (e.g., threat, technology, supplier capability, design maturation, performance against plan, etc.). Risk addresses the potential variation in the planned approach and its expected outcome.

A risk assessment process comprises identification of the following three components:

- A future root cause (yet to happen), which, if eliminated or corrected, would prevent a potential consequence from occurring;
- A probability (or likelihood) assessed at the present time of that future root cause occurring; and
- The consequence (or effect) of that future occurrence.

A future root cause is the most basic reason for the presence of a risk. Accordingly, risks should be tied to future root causes and their effects or consequences.

1.1. Risk Management Objective

The objective of a well-managed risk management program is to provide a reputable process for balancing cost, schedule, and performance goals within program funding.

Successful risk management depends on the knowledge assessments of all aspects of the program coupled with appropriate mitigations applied to the specific root causes and consequences.

1.2. The Risk Management Process

Risk management is a continual process, performed throughout the life cycle of a system or project. It is an organised methodology for continuously identifying and measuring the unknowns; developing mitigation options; selecting, planning, and implementing appropriate risk mitigations; and tracking the implementation to ensure successful risk reduction. Effective risk management depends on risk management planning; early identification and analysis of risks; early implementation of corrective actions; continuous monitoring and reassessment; and communication, documentation, and coordination.

Planning a good risk management program is integral to the overall program management process that ensures risks are handled at the appropriate management level.

1.3. The Risk Management Process Model

The risk management process model (**Error! Reference source not found.**) includes the following key activities, performed on a continuous basis:

- Risk Identification;
- Risk Analysis;
- Risk Mitigation Planning;
- Risk Mitigation Plan Implementation; and
- Risk Tracking.

Effective risk management approaches generally have consistent characteristics and follow common guidelines regardless of program size.

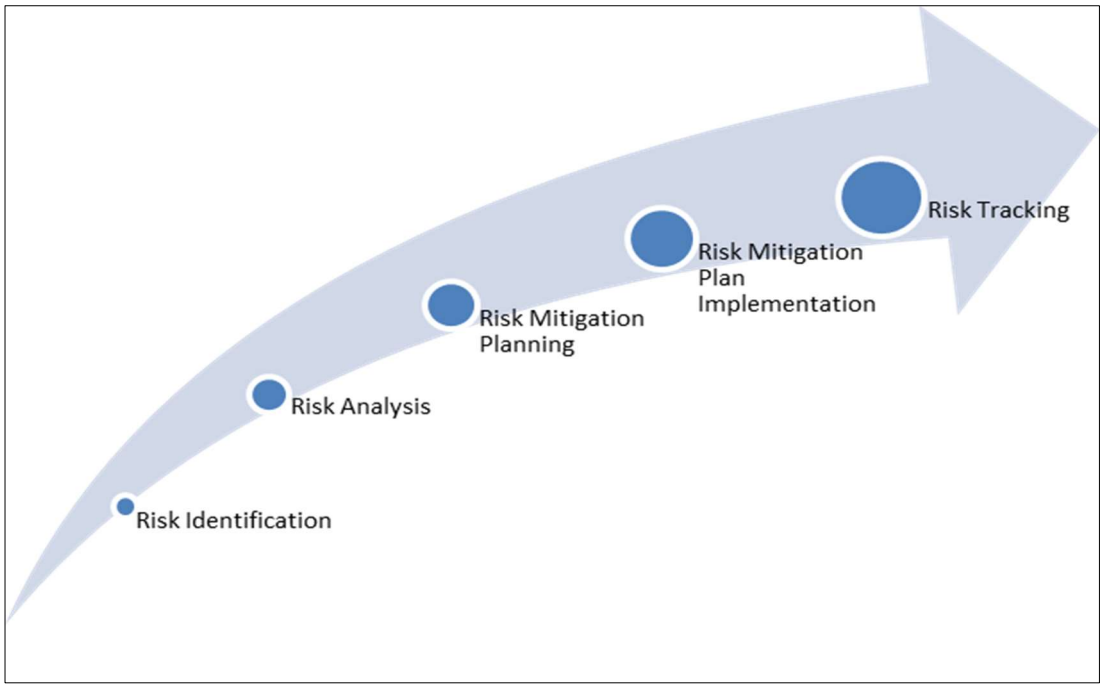


Figure 1.3: Risk Management Process

2. Risk Identification

The first key activity in the risk management process is Risk Identification. The intent of risk identification is to answer the question "What can go wrong?" by:

- Looking at current and proposed staffing, process, design, supplier, operational employment, resources, dependencies etc.;

- Monitoring test results especially test failures (readiness results and readiness problems for the sustainment phase);
- Reviewing potential shortfalls against expectations; and
- Analysing negative trends.

Risk identification is the activity that examines each element of the program to identify associated root causes, begin their documentation, and set the stage for their successful management. Risk identification begins as early as possible in successful programs and continues throughout the program with regular reviews and analysis.

Identification of Root Causes

The risk manager should examine the programs and identify root causes by reducing program elements to a level of detail that permits an evaluator to understand the significance of any risk and identify its causes. This is a practical way of addressing the large and diverse number of risks associated with a project or program. Root causes are identified by examining each product and process element in terms of the sources or areas of risk. Root causes are those potential events that evaluators determine would adversely affect the program at any time in its life cycle.

An approach for identifying and compiling a list of root causes is to:

- List product or process elements;
- Examine each in terms of risk sources or areas;
- Determine what could go wrong; and
- Ask "why" multiple times until the source(s) is discovered.

2.1. Risk Analysis

The intent of risk analysis is to answer the question "How big is the risk?" by:

- Considering the likelihood of the root cause occurrence;
- Identifying the possible consequences in terms of performance, schedule, and cost; and
- Identifying the risk level using the Risk Reporting Matrix shown in the figure below.

Risk analysis is the activity of examining each identified risk to refine the description of the risk, isolate the cause, determine the effects, and aid in setting risk mitigation priorities and strategies. It refines each risk in terms of its likelihood, its consequence, and its relationship to other risk areas or processes. Analysis begins with a detailed study of the risks that have been identified. The objective is to gather enough information about future

risks to judge the root causes, the likelihood, and the consequence/s of the risk should it occur. The frequently used term "risk assessment" includes the distinct activities of risk identification and risk analysis.

Risk analysis sequence of tasks includes:

- Develop likelihood and consequence scales;
- Assign a probability of occurrence to each risk appropriate criteria;
- Determine consequence; and
- Document the results in the program risk database.

Risk Reporting Matrix

The Risk Reporting Matrix (**Error! Reference source not found.**), should be aligned with Ndanganeni Mine risk rating matrix' and is typically used to determine the level of risks identified and associated with a project or within a program. The level of risk for each root cause is reported as low (green), low moderate (yellow), high moderate (purple) or high (red). The purpose of a risk assessment process is to move risks from the top right to the bottom left as reflected in the risk map.

Risk Map Before Treatment			Consequence				
			Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	A	Almost Certain			17 32		
	B	Likely			11 14 27 29 34 35 36 37	9 13 19 28 30	
	C	Moderate		33	1 2 7 20 23 24 38	6 21	3
	D	Unlikely			5 16 18 22 26	4 25 31	8
	E	Rare				39	

Low	Moderate	High	Extreme
0	6	19	11

Figure 2.1: Illustrative Risk Map

The level of likelihood of each root cause is established utilising specified criteria (**Error! Reference source not found.**). For example, if the root cause has an estimated five per cent probability of occurring, the corresponding likelihood is Rare (Level E).

Table 2.1: Likelihood Category

Likelihood Category				
E	**D**	**C**	**B**	**A**
Rare	**Unlikely**	**Moderate**	**Likely**	**Almost Certain**
Highly unlikely to occur on this project	Given current practices and procedures, this incident is unlikely to occur on this project	Incident has occurred on a similar project	Incident is likely to occur on this project	Incident is very likely to occur on this project, possibly several times

The level and types of consequences of each risk are established utilising criteria such as those described in **Error! Reference source not found.**. For each type of consequence there is a description that relates to a specific consequence value.

Table 2.2: Levels and Types of Consequences

	Consequences				
	1 - Insignificant	2 - Minor	**3 - Moderate**	**4 - Major**	**5 - Catastrophic**
Safety and Health	First Aid Case	Minor Injury, Medical Treatment Case with/or Restricted Work Case.	Serious Injury or Lost Work Case	Major or Multiple Injuries - permanent injury or disability	Single or Multiple Fatalities
Environment	No impact on baseline environment. Localized	Localized within site boundaries. Recovery	Moderate harm with possible wider	Significant harm with local effect. Recovery	Significant harm with widespread effect.

	Consequences				
	1 - Insignificant	2 - Minor	**3 - Moderate**	**4 - Major**	**5 - Catastrophic**
	to point source. No recovery required	measurable within 1 month of impact	effect. Recovery in 1 year	longer than 1 year.	Recovery longer than 1 year. Limited prospect of full recovery
Reputation	Localised temporary impact	Localised, short-term impact	Localised, long-term impact but manageable	Localised, long-term impact with unmanageable outcomes	Long term regional impact
Business Impact	Impact can be absorbed through normal activity	An adverse event which can be absorbed with some management effort	A serious event which requires additional management effort	A critical event which requires extraordinary management effort	Disaster with potential to lead to collapse of the project

The results for each risk are then plotted in the corresponding single square on the Risk Reporting Matrix. In this example, since the level of likelihood and consequence of risk 36 were both "3 and C", the corresponding schedule risk is reported as "purple" as shown in **Error! Reference source not found.**.

Risk Map Before Treatment			Consequence				
			Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	A	Almost Certain			17 32		
	B	Likely			11 14 27 29 34 35 36 37	9 13 19 28 30	
	C	Moderate		33	1 2 7 20 23 24 38	6 21	3
	D	Unlikely			5 16 18 22 26	4 25 31	8
	E	Rare				39	

Low	Moderate	High	Extreme
0	6	19	11

Figure 2.2: Illustrative Risk Map before treatment

2.2. Mitigation Identification

The intent of risk mitigation identification is to answer the question "What is the project or program approach for addressing this potential unfavourable consequence?"

Risk mitigation identification is the activity that identifies, evaluates, and selects options to set risk at acceptable levels given program constraints and objectives. Risk mitigation planning is intended to enable program success. It includes the specifics of what should be done, when it should be accomplished, who is responsible, and the funding required to implement the risk mitigation plan. The most appropriate program approach is selected from the mitigation options listed below and documented in a risk mitigation plan. One or more of these mitigation options may apply:

- Avoiding risk by eliminating the root cause and/ or the consequence;
- Controlling the cause or consequence;
- Transferring the risk; and/ or
- Assuming the level of risk and continuing the current program plan.

For each root cause or risk, the type of mitigation must be determined, and the details of the mitigation described.

2.3. Mitigation Analysis

The intent of mitigating analysis is to answer the question "How does the mitigation identification affect the risk?" by:

- Considering the likelihood of the root cause after mitigation;
- Identifying the possible consequences after mitigation; and
- Identifying the change in risk level using the Risk Reporting Matrix.

Once alternatives have been analysed, the selected mitigation option should be incorporated into the risk analysis, either into existing program plans or documented separately as a risk mitigation plan (not to be confused with the risk management plan). The tasks are like the Risk Analysis described in section 4 of the Report. By mitigating a risk, the report will illustrate a shift to a lower left level as indicated in **Error! Reference source not found.**.

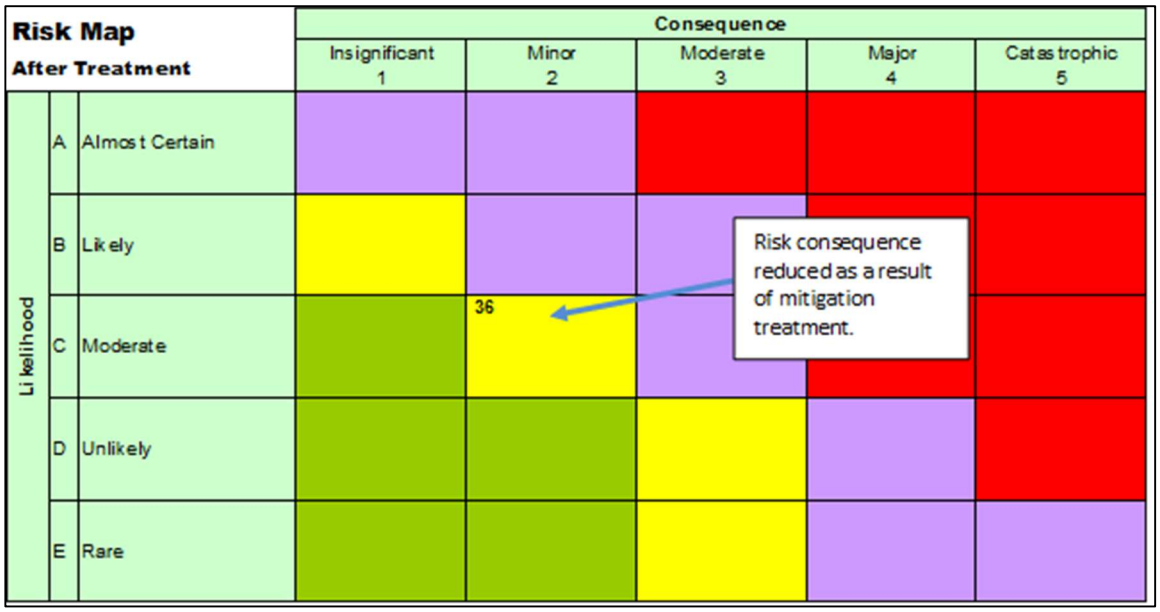


Figure 2.3: Illustrative Risk Mitigation Map after treatment

3. Mitigation Planning

The intent of risk mitigation (plan) execution is to ensure successful risk mitigation occurs. It answers the question "How can the planned risk mitigation be implemented?" it:

- Determines what planning, budget, requirements, and contractual changes are needed;
- Provides a coordination vehicle with management and other stakeholders;
- Directs the teams to execute the defined and approved risk mitigation plans;
- Outlines the risk reporting requirements for on-going monitoring; and
- Documents the change history.

Once alternatives have been analysed, the selected mitigation option should be incorporated into program planning, either into existing program plans or documented separately as a risk mitigation plan (not to be confused with the risk management plan). The risk mitigation plan needs to be realistic, achievable, measurable, and documented and address the following topics:

- A descriptive title for the identified risk;
- The date of the plan;
- The point of contact responsible for controlling the identified root cause;
- A short description of the risk (including a summary of the performance, schedule, and resource impacts, likelihood of occurrence, consequence, whether the risk is within the control of the project or program);
- Why the risk exists (root causes leading to the risk);
- The options for mitigation (possible alternatives to alleviate the risk);
- Definition of events and activities intended to reduce the risk, success criteria for each plan event, and subsequent "risk level if successful" values;
- Risk status (discuss briefly);
- The fall-back approach (describe the approach and expected decision date for considering implementation);
- A management recommendation (whether budget or time is to be allocated, and whether the risk mitigation is incorporated in the estimate at completion or in other program plans);
- Appropriate approval levels; and
- Identified resource needs.

Appendix D: Risk Assessment

Number	Rank	Risk Description (Event and Consequence OR Cause)	Category	Existing Controls	Risk Severity Before Treatment					Risk Treatment Plan	Ability to Influence	Action Plan Type	Risk Severity After Treatment				
						Consequence		Likelihood	Risk Level Before Treatment					Consequence		Likelihood	Risk Level After Treatment
1	1	People will lose employment which will have a negative impact on families and their communities	Societal	Social and Labour Plan (SLP)	**4**	Major	**A**	Almost Certain	*Extreme*	SLP annual review and continuous engagement Early engagement before mine closes Set up a community forum	Low / None	Reduce consequence	**3**	Moderate	**A**	Almost Certain	*Extreme*
2	2	Safety aspects on the mine, relates to people and animals and the possibility of fatalities.	Safety	Mine Health and Safety Plan Landform redesign	**4**	Major	**B**	Likely	*Extreme*	Continuous implementation of Mine Health and Safety Plan and designing the top edges of the pit to relinquishing criteria.	Low / None	Reduce likelihood	**4**	Major	**C**	Moderate	*Extreme*
3	3	Safety risks around the pit lake areas that could cause casualties of animals and people and possible fatalities	Safety	Mine Health and Safety Plan Landform redesign	**4**	Major	**B**	Likely	*Extreme*	Continuous monitoring of vegetation growth	High	Reduce likelihood	**3**	Moderate	**B**	Likely	*High*
4	4	Suppliers will lose business which will have a negative impact on local business and on a regional scale	Societal	Social and Labour Plan (SLP) Supplier Management	**3**	Moderate	**A**	Almost Certain	*Extreme*	SLP annual review and continuous engagement Early engagement before mine closes Set up a community forum	Low / None	Reduce likelihood and consequence	**3**	Moderate	**B**	Likely	*High*
5	5	Insufficient material to fill void and return the environment to pre mining conditions	Surface Water	Stormwater Management Plan (SMP) Environmental Management Plan (EMP)	**3**	Moderate	**A**	Almost Certain	*Extreme*	Annually improving the SMP and following the prescribed EMP	Moderate	Reduce consequence	**2**	Minor	**A**	Almost Certain	*High*
6	6	Heavy rainfall events causing the erosion of the trenches and berms allowing for polluted water to the enter the environment	Climate Change	None	**3**	Moderate	**B**	Likely	*High*	Plan for high rainfall events	Low / None	Reduce consequence	**2**	Minor	**B**	Likely	*High*
7	7	Extreme drought conditions prohibiting the growth of vegetation and resulting in poor rehabilitation	Climate Change	None	**3**	Moderate	**B**	Likely	*High*	Plan for extreme drought events	Low / None	Reduce consequence	**2**	Minor	**B**	Likely	*High*
8	8	Migration of mine workers after the mine has closed will negatively affect community structures	Societal	Social and Labour Plan (SLP) Supplier Management	**3**	Moderate	**B**	Likely	*High*	SLP annual review and continuous engagement Early engagement before mine closes Set up a community forum	Low / None	Reduce likelihood and consequence	**3**	Moderate	**C**	Moderate	*High*
9	9	Not able to return quality of soil back to its natural soil quality impacting on the final land-use of the area	Soil	Surveyor quantities	**3**	Moderate	**B**	Likely	*High*	Importing and treating topsoil to sustain the vegetation requirement of the final land-use	High	Reduce likelihood and consequence	**2**	Minor	**D**	Unlikely	*Low*
10	10	Wetland system downstream of the mine in danger to be impacted by mine closure reducing the quality of the wetland	Sensitive Landscapes	Wetland Monitoring	**3**	Moderate	**C**	Moderate	*High*	Continuous monitoring and rehabilitation plan for wetlands	Moderate	Reduce consequence	**2**	Minor	**C**	Moderate	*Moderate*
11	11	Redesign of the areas around the pits to represent the topography of pre-mining conditions could have a financial impact.	Topography	Surveyor quantities	**3**	Moderate	**C**	Moderate	*High*	Require a mine operation post closure design as part of the final rehabilitation plan	High	Reduce likelihood and consequence	**2**	Minor	**D**	Unlikely	*Low*
12	12	Care a maintained process not followed, deteriorating the mine area, and resulting in a financial risk	Care and Maintenance	Care and Maintenance Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	Annual review of the decommissioning, closure, and rehabilitation plan Conducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*
13	13	Closure strategy not effective for final land use, extending the closure period and resulting in a financial risk.	Closure	Closure Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	Annual review of the decommissioning, closure, and rehabilitation plan Conducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*
14	14	Decommissioning poorly done causing safety risks in the mining area and resulting in a financial risk	Decommissioning	Decommissioning Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	Annual review of the decommissioning, closure, and rehabilitation plan Conducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*
15	15	Monitoring and measurement not conducted, causing an inability to react to the degradation of the environment	Monitoring and Measurement	Monitoring and measurement Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	Annual review of the monitoring and measurement plan Conducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*

16	16	Poor rehabilitation strategies extending the rehabilitation timeframes and causing financial risks	Rehabilitation	Rehabilitation Plan	**3**	Moderate	**D**	Unlikely	*Moderate*	Annual review of the decommissioning, closure, and rehabilitation plan Conducting annual rehabilitation	High	Reduce consequence	**2**	Minor	**D**	Unlikely	*Low*
17	17	Wind causing wind erosion from remaining dumps causes dust pollution to surrounding farmland	Air	Dust monitoring	**2**	Minor	**C**	Moderate	*Moderate*	Annual review of the monitoring and measurement plan for dust. Proper dump design and vegetation on dumps to reduce erosion	High	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*
18	18	The spread of weeds and alien vegetation could have an influence on land-use capability and natural vegetation.	Flora	Environmental Management Plan (EMP)	**2**	Minor	**C**	Moderate	*Moderate*	Continuous monitoring of vegetation growth	High	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*
19	19	Erosion from areas around open pit requires to be managed and stop sedimentation to alter the river flow	Soil	Environmental Management Plan (EMP)	**2**	Minor	**C**	Moderate	*Moderate*	Erosion Management Plan	Moderate	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*
20	20	Disturbed and denuded areas inhibiting vegetation growth need to be repaired	Soil	Monitoring	**2**	Minor	**C**	Moderate	*Moderate*	Improve vegetation growth to improve land capability	High	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*
21	21	Poor environmental rehabilitation prohibit fauna to return to the area	Fauna	Environmental Management Plan (EMP)	**2**	Minor	**D**	Unlikely	*Low*	Continuous monitoring of vegetation growth	High	Reduce likelihood	**2**	Minor	**D**	Unlikely	*Low*

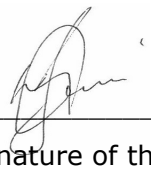
Appendix E: Declaration of Independence

I, Jacques Harris, declare that –

- I act as the independent external assessor in this assessment;
- I have expertise in conducting Mine Closure Assessments, including knowledge of the Acts, Regulations and any guidelines that have relevance to the permit/license in question;
- I will comply with the Acts, Regulations, and all other applicable legislation;
- I will perform the work relating to the Mine Closure Assessment in an objective manner, even if this results in views and findings that are not favourable to the permit/license holder or site operator;
- I undertake to disclose to the permit/license holder or site operator and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the permit/license by the Competent Authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the Competent Authority, unless access to that information is protected by law, in which case it will be indicated that such information exists and will be provided to the Competent Authority;
- I will perform all obligations as expected from an external assessor in terms of the Regulations; and
- I am aware of what constitutes an offence in terms of the Acts and that a person convicted of an offence in terms of the Acts is liable to the penalties as contemplated in the Acts.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal, or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.



Signature of the External Assessor

CIGroup Environmental (Pty) Ltd

Name of Company

31 October 2022

Date