GOEDGEVONDEN COMPLEX

A
GLENCORE
MANAGED OPERATION

Revised Environmental Management Programme

Draft for Comment – August 2022

DMR Ref No: MP 30/5/1/2/2/169 MR

APPLICANT

Name of Project	GGV Complex EMP Amendment
Reference Number	MP 30/5/1/2/2/169 MR
Name of Applicant	Glencore Operations South Africa (Pty) Ltd: Goedgevonden Complex
Company Registration Number	1997/017998/07
Responsible person	Oos van der Merwe
Designation	General Manager
Physical address	Farm Goedgevonden 10 IS, Witbank district.
Postal Address	P/Bag X17, Leraatsfontein, 1038
Telephone	013 643 4380
Facsimile	086 643 3881
E-mail	Oos.vanderMerwe@glencore.co.za
Environmental Consultant	Jacana Environmentals cc
Responsible person	Marietjie Eksteen
Physical address	7 Landdros Maré Street, Polokwane
Postal Address	PO Box 31675, Superbia, 0759
Telephone	(015) 291 4015
Facsimile	(015) 291 5035
E-mail	marietjie@jacanacc.co.za

In terms of the NEMA 2014 EIA Regulations contained in GN R982 of 04 December 2014 (as amended in 2017) the Environmental Management Programme (EMPr) must comply with Appendix 4 of the NEMA 2014 EIA Regulations (GN R982 of 04 December 2014).

Legal Requirement		**Relevant section in EMPr**
(1)	An EMPr must comply with section 24N of the Act and include–	
(a)	details of- (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Appendix 1
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 1.2
(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	N/A (existing operation)
(d)	a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including– (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operational activities;	Section 2.1 Section 2.2
(e)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 3.1 Table 2 Section 4
(f)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (e);	Section 5.1 Table 6
(g)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (e);	Section 5.1 Table 6
(h)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 3.2 Table 3
(i)	the time periods within which the impact management actions contemplated in paragraph (e) must be implemented;	Section 5.1 Table 6
(j)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (e);	Section 5.3 Table 8
(k)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 5.3 Table 8
(l)	an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 7
(m)	any specific information that may be required by the competent authority.	Section 6

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1 INTRODUCTION

1.1 BACKGROUND

African Rainbow Minerals Coal Proprietary Limited (ARM Coal) and Glencore Operations South Africa Proprietary Limited (GOSA) own and operate the Goedgevonden (GGV) Complex through unincorporated joint venture in which ARM Coal and GOSA hold 51% and 49% participating rights respectively.

GGV is located approximately 50 km south-west of eMalahleni, and 38 km east of Delmas. The town of Ogies is situated directly north of GGV. It falls in the eMalahleni Local Municipality of the Nkangala District Municipality, Mpumalanga Province.

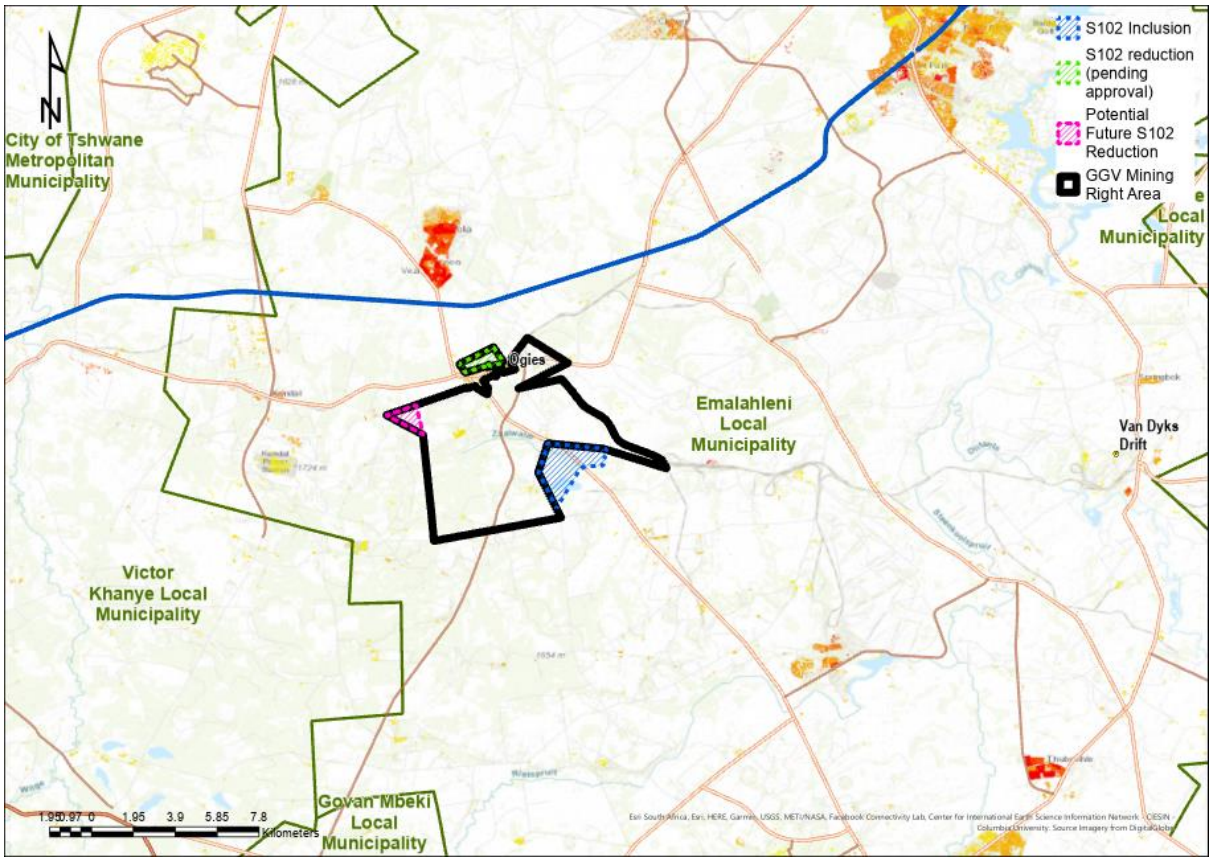

Figure 1: Locality Map

GGV operates under Mining Right No. MP 30/5/1/1/2/169 MR and has an approved Environmental Management Programme (EMPr), the latest amendment having been approved by the then Department of Mineral Resources (DMR) on 10 February 2016.

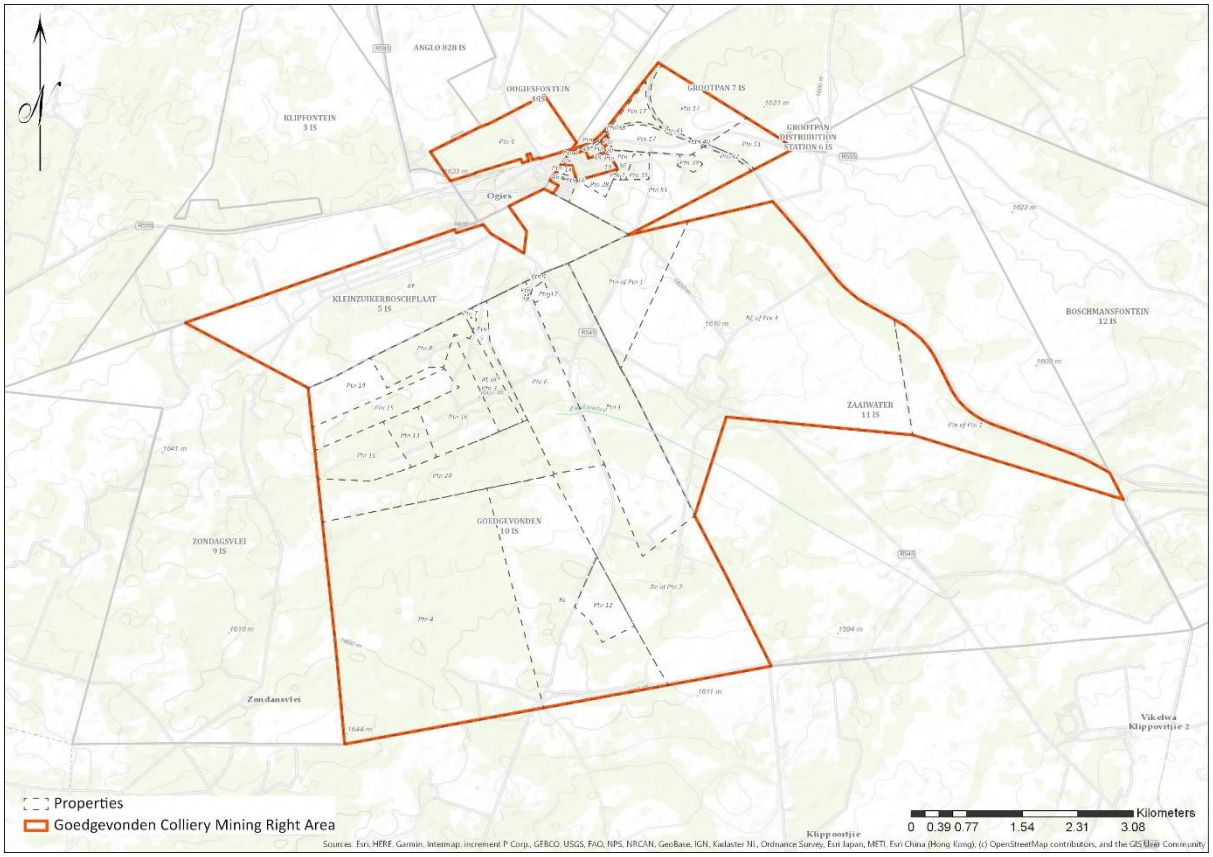

Figure 2: GGV Complex existing Mining Right boundary

The history of the GGV Mining Right applications and amendments thereto are summarised in Table 1 below.

Table 1: GGV Application Summary

Application	Applicant	Date of approval
Original EMP for Goedgevonden Colliery	Duiker Mining	27 February 2002 Ref: OT6/2/2/448
Amendment to Goedgevonden Colliery EMP	Xstrata Coal SA August 2005	-
Amendment to Goedgevonden Colliery EMP Inclusive of Zaaiwater West Reserves	Xstrata Coal SA June 2006	10 August 2006 Ref: OT6/2/2/448
New Order Mining Right for Goedgevonden Colliery	Xstrata Coal SA	February 2008 Ref: MP 30/5/1/2/2/169 MR
Mining Right for Zaaiwater West	Xstrata Coal SA	February 2008 Ref: MP 30/5/1/2/2/168 MR
Mining Right for Oogiesfontein	Xstrata Coal SA January 2009	20 April 2010 Ref: MP 30/5/1/2/2/343 MR
Oogiesfontein EMPr	Xstrata Cola SA August 2009	Ref: MP 30/5/1/2/2/(343) EM
Amendment to Goedgevonden Colliery EMP Consolidation of GGV & OFT EMPs	GOSA April 2015	10 February 2016 MP 30/5/1/2/3/2/1/(169) EM

Application	Applicant	Date of approval
S102 – Consolidation of 343 MR & 168 MR into 169 MR Converted right for GGV Complex	GOSA	6 September 2018 Ref: MP 30/5/1/2/2/169 MR
S102 – Abandonment of RE of Portion 4 of Oogiesfontein 4 IS	GOSA 24 March 2020	Pending approval Ref: MP 00127/102

GGV is essentially an opencast mine, mining seam 2, seam 4 and seam 5 coal on portions of the farms Goedgevonden 10 IS, Zaaiwater 11 IS and Kleinzuikerboschplaats 5 IS. Coal mined at GGV is beneficiated on site and the mine supplies coal both to Eskom for power generation and to the export market. Underground mining was approved on portions of the farm Grootpan 7 IS which is still to be developed. Recent optimisation of the mineral resource within the Mining Right area (MRA) resulted in a change to the mining schedule with the introduction of additional mining areas previously excluded from the mine plan.

The 2016 approved EMPr includes the re-alignment of provincial Road P53-1 which links Road R555 and Road 545 on the south-eastern side of Ogies. Environmental Authorisation for the re-alignment of Road P53-1 was granted by the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (MDARDLEA) on 8 September 2015 (Ref No 17/2/3N-273). The re-alignment of Road P53-1 has recently been optimised to improve traffic safety in respect of the curvature back into the existing road, as well as to effect minimum impact on coal reserves.

To facilitate the proposed mining and infrastructure changes at GGV, it is necessary to amend the approved Environmental Authorisation (EA) and EMPr in terms of the 2014 Environment Impact Assessment (EIA) Regulations promulgated in Government Notice No. R. 982-986 of 4 December 2014 in terms of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998), as amended, to:

- Introduce limited additional mining areas (underground) that have now become economically viable.
- Change the mining methodology in certain areas, from opencast to underground.
- Include some limited additional infrastructure requirements for the underground mining.
- Slightly revise the re-alignment of P53-1.

In addition to the proposed mining and infrastructural changes at GGV, GOSA is currently in negotiation with third parties in respect of the reduction and/or extension of the GGV MRA in terms of section 102 of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002), as follow:

- An application was submitted on 24 March 2020 to abandon the remaining extent of portion 4 of Oogiesfontein 4 IS from our GGV MR in favour of South32 SA Coal Holdings (Pty) Ltd (now Seriti Resources). South32 simultaneously lodged an application in terms of section 102 on 25 March 2020 to incorporate the said land into its adjacent right 125 MR. Both these applications remain pending.

- GOSA is in the process of negotiating a sale agreement with Mshengu Mining to buy 11790 PR from them. Once the agreement is concluded, a section 11 application to cede the PR to GOSA, together with a simultaneous application in terms of section 102 to incorporate the area into GOSA's GGV MRA will be submitted.
- A Portion of Kleinzuikerboschplaats 5 IS forms part of GOSA's GGV MR. It is contemplated that this area will be abandoned in favour of Thungela Resources and/or Seriti Resources. Negotiations are currently taking place and the necessary section 102 applications will be submitted in due course.

The reduction/extension areas are indicated in Figure 3.

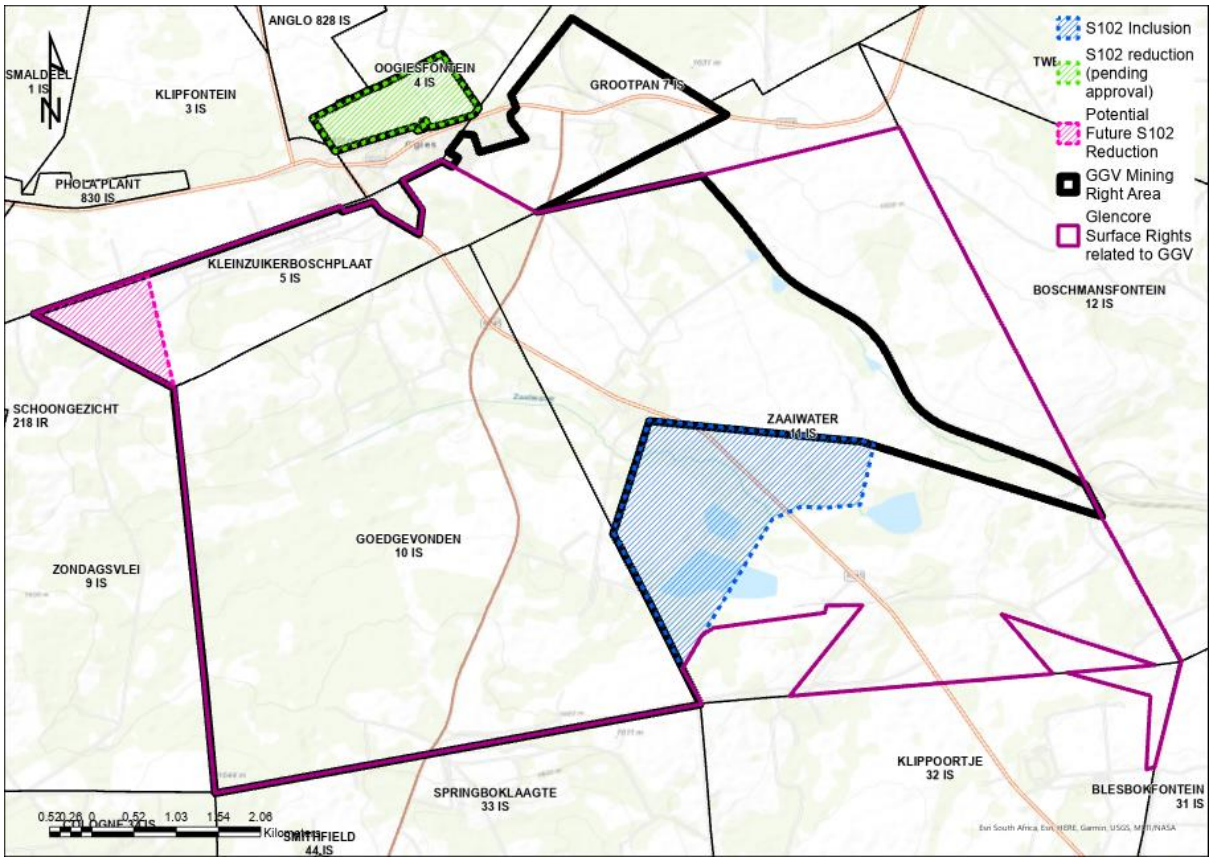

Figure 3: GGV operational area

This revised EMPr is in support of the above noted proposed changes in respect of the MRA, mining schedule and methodology, and infrastructure. The following changes were made to the 2016 approved EMPr:

- Removal of (limited) objectives and strategies related to Portion 4 (RE) of Oogiesfontein 4 IS.
- Inclusion of objectives and strategies related to the additional underground mining areas.
- Inclusion of objectives and strategies related to the underground infrastructure and re-alignment of P53-1.

1.2 LIST OF MAIN MINING ACTIONS, ACTIVITIES OR PROCESSES

Below a summary of the main activities/processes (current and future) at the GGV Complex and their associated activities:

Opencast mining	• Mining Pits: North Pit; South Pit; Zaaiwater Pit. • Primary river diversions, comprising the Zaaiwaterspruit and Southern Tributary diversions. • Secondary stormwater management canals and pipeline systems. • In-pit water management: sumps and pumping systems. • Surface overburden and waste rock dumps. • Topsoil dumps/berms. • Supporting infrastructure. • Haul roads. • Dragline walkway.
Underground mining	• Portal area. • Incline shaft. • Supporting infrastructure: offices, change houses workshops, parking lots, wash bays, diesel tanks, weighbridge, stores yard and substations. • Access roads. • Conveyor systems for the No 2 and 4 seams. • ROM stockpile. • Stone dust silos. • Pumping systems. • U/G sumps/dam. • Sewage treatment plant. • Water tanks / concrete water reservoirs. • Underground fans. • Stormwater management: stormwater trench and holding dam (PCD).
Coal Handling and Processing Plant (CHPP) area	• Access road with controlled entrance to site from provincial road R545. • Main Coal Handling and Processing Plant (CHPP). • 5 seam CHPP/blending facility. • ROM Tip and crushing facilities. • Pillared ROM Tip. • Surge facility. • ROM stockpiles. • Product stockpiles. • Clean water storage tanks. • Mine Residue Facility (MRF). • Dirty water management facilities: Western Stormwater Dam; Eastern Pollution Control Dam (PCD); Farm Dam; Raw Water Dam; MRF Return Water Dam. • Settling dam facilities (silt traps) associated with the PCDs and MRF. • Silt traps / dirty water canals. • Sewage treatment plant.

	• Potable water treatment plant. • Supporting infrastructure: offices, stores, and workshop areas with associated parking areas. • Communication towers. • Wash-bay. • Waste tyre storage area. • Emulsion silos. • Hard Park area. • Underground equipment storage facility. • Bulk hydrocarbons facilities.
ROM Tip (Zaaiwater Section)	• ROM stockpile with PCD. • Crushing facilities. • Overland conveyor to CHPP. • Bridges (road/dragline walkway) and conveyor over the R545.
On-site conveyance of ROM & product	• On-site haul roads / service roads. • River crossings / culverts. • Overland conveyor from Zaaiwater Section.
Stockpiles, mine residue & waste management	• MRF and return water dam. • Surface overburden and waste rock dumps. • Topsoil stockpiles / berms. • Waste management (general / hazardous). • In-pit disposal of overburden, discard and slurry.
Off-site product transport	• Rail load-out terminal (RLT) and rail loop. • Product loading area (trucks). • Off-site truck transport. • River crossings / culverts.
Bulk services	• Water pipelines from Waterpan and South Witbank areas. • Dewatering of Ogies underground workings. • Powerlines that pass from east to west through the mining area.

1.2.1 Mining Schedule

The remaining opencast mining is scheduled for the next 22 years until 2043 as indicated in Figure 4. Underground mining is scheduled over a period of 8 years, of which the commencement date is still to be determined. The 2 Lower and 4 Lower coal seams will be targeted through underground mining. The underground mining schedule is indicated in Figure 5 and Figure 6 for the 2L and 4L seams respectively.

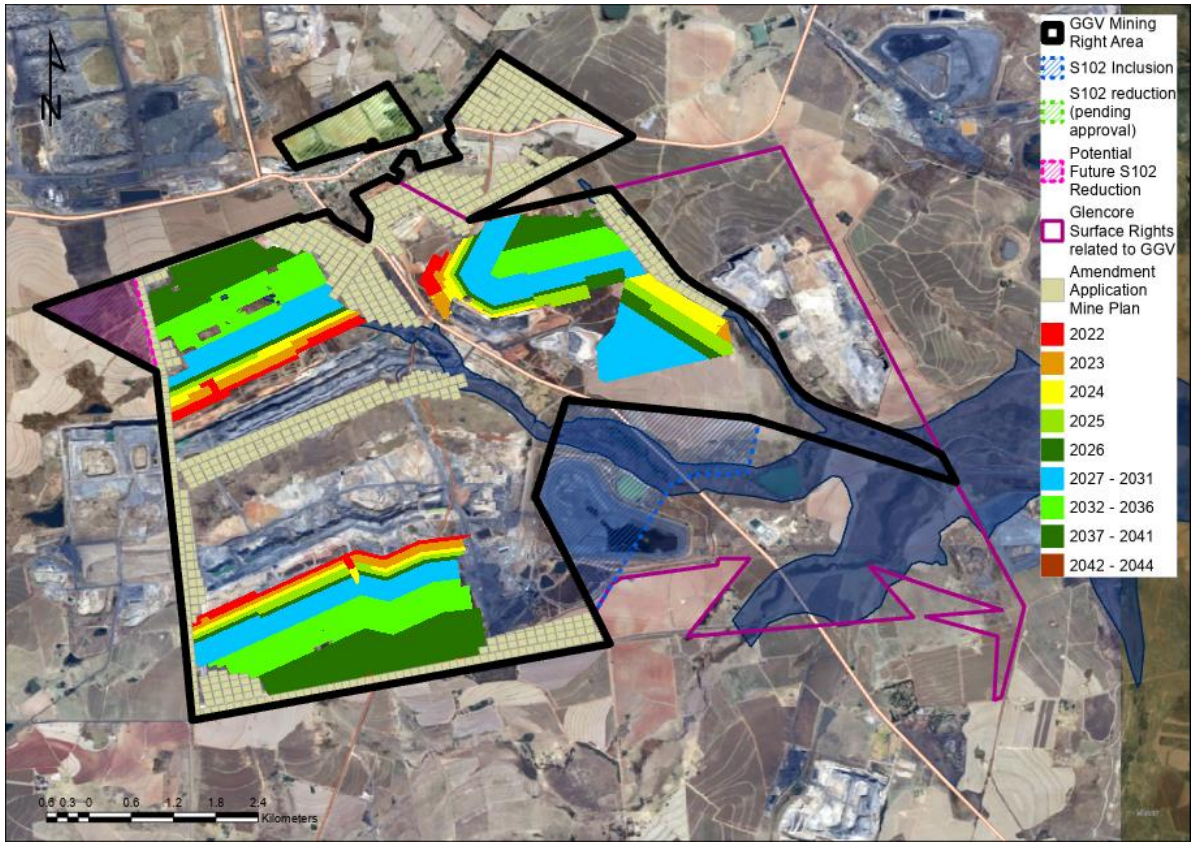

Figure 4: Opencast mining schedule

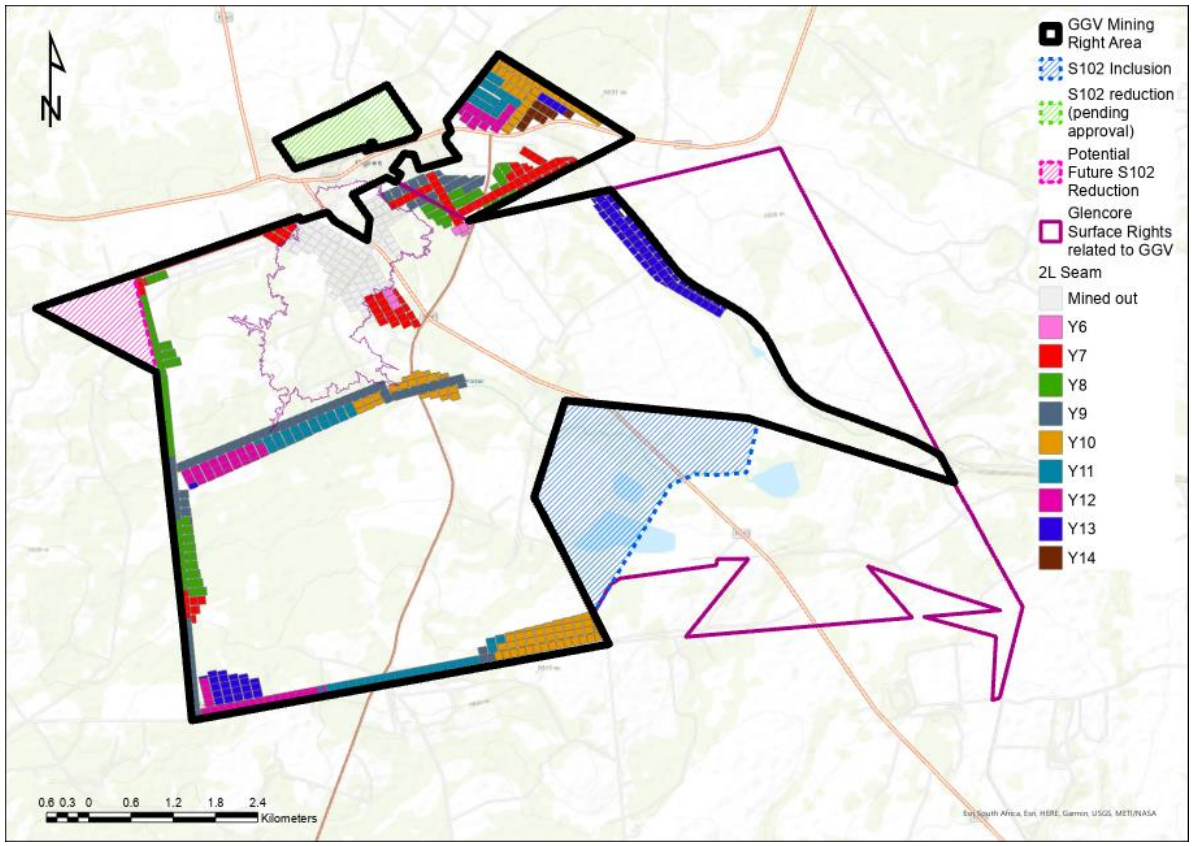

Figure 5: Underground mining schedule for the 2L seam

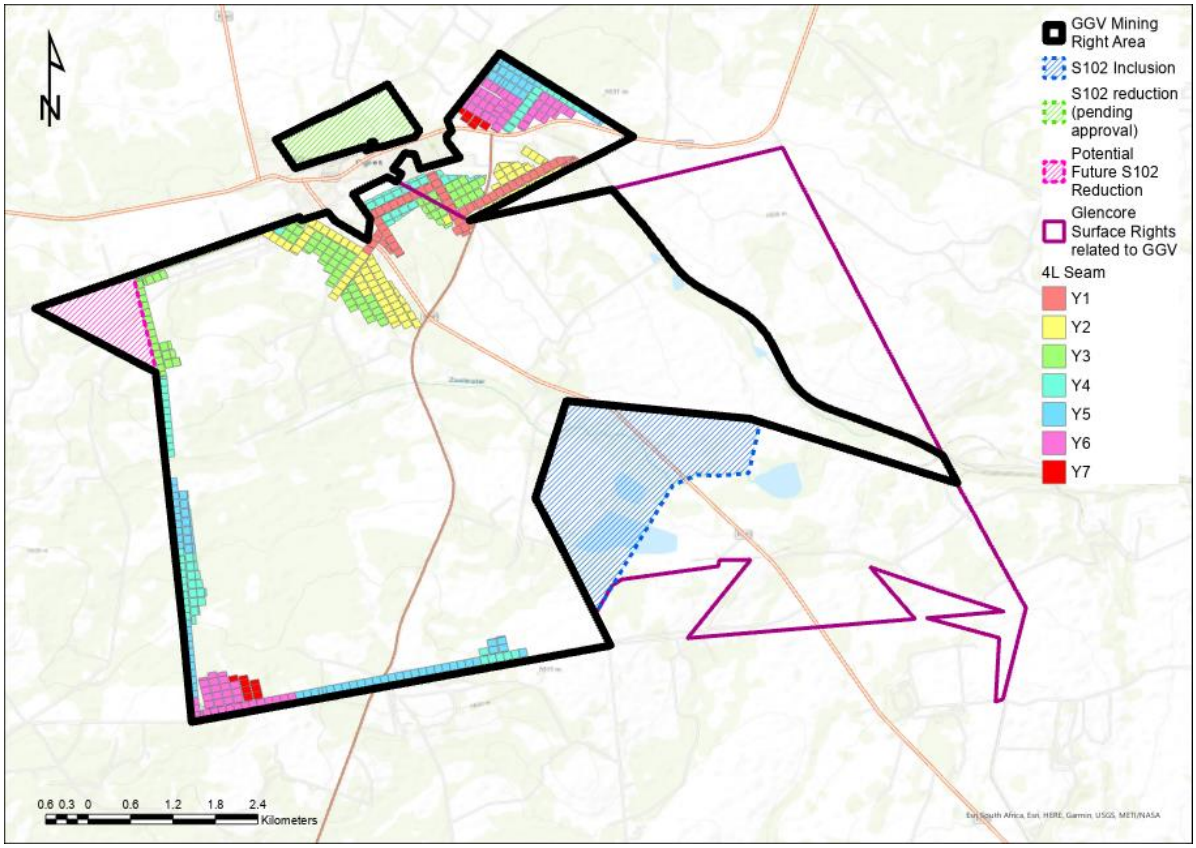

Figure 6: Underground mining schedule for the 4L seam

1.2.2 Mine Infrastructure

The mine infrastructure layout (existing and future) is shown in Figure 7. Figure 8 indicates the processing plant infrastructure area with associated infrastructure components.

As indicated earlier in this report, the 2016 approved EMPr also includes the re-alignment of provincial Road P53-1 which links Road R555 and Road 545 on the south-eastern side of Ogies. The revised re-alignment of Road P53-1 has been optimised to improve traffic safety in respect of the curvature back into the existing road, as well as to effect minimum impact on coal reserves and privately owned surface areas. The revised re-alignment of Road P53-1 is shown as the red line in Figure 9.

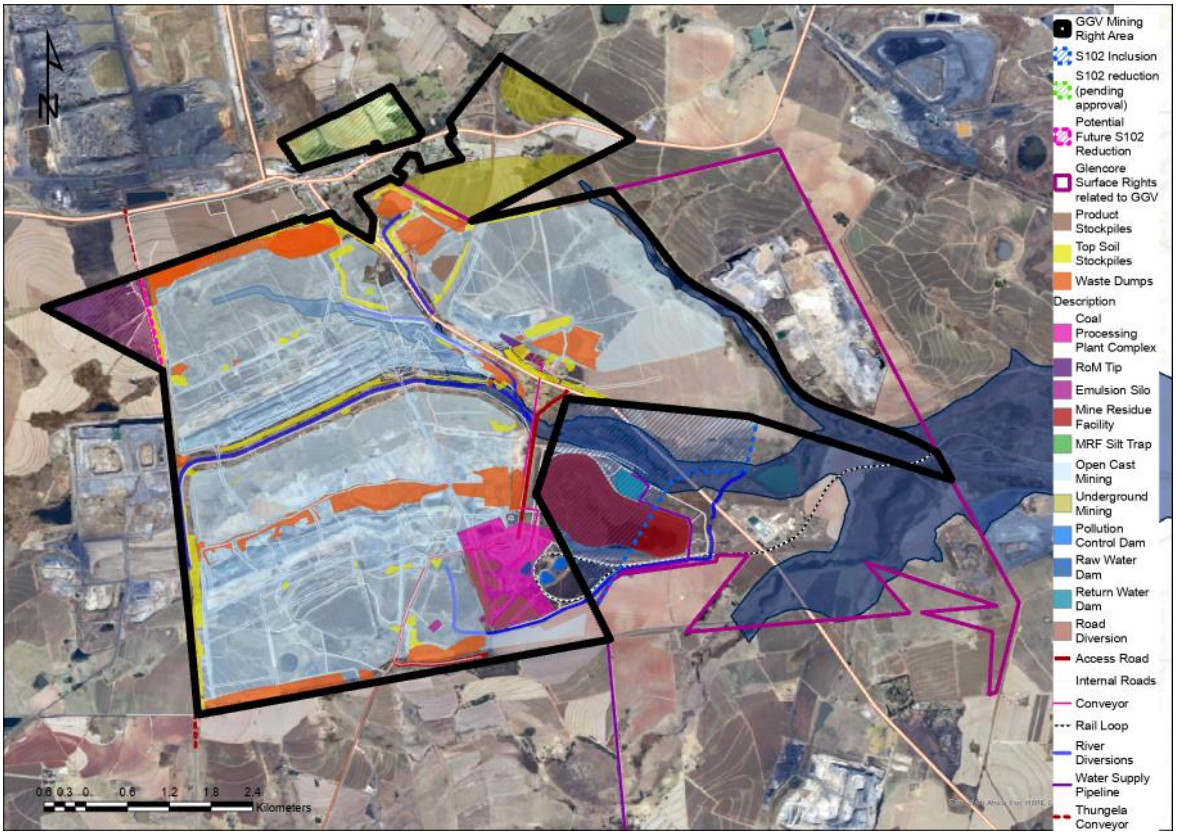

Figure 7: Mine infrastructure layout

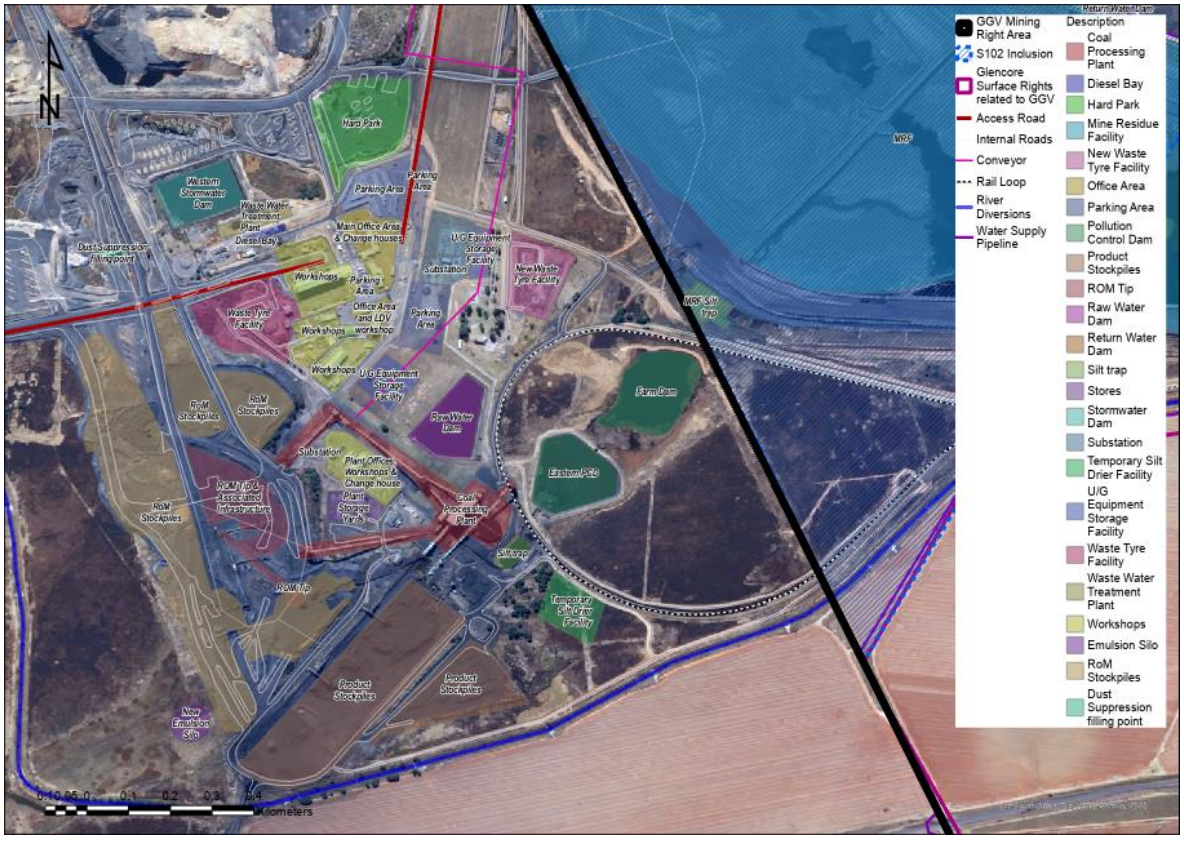

Figure 8: Processing plant infrastructure area

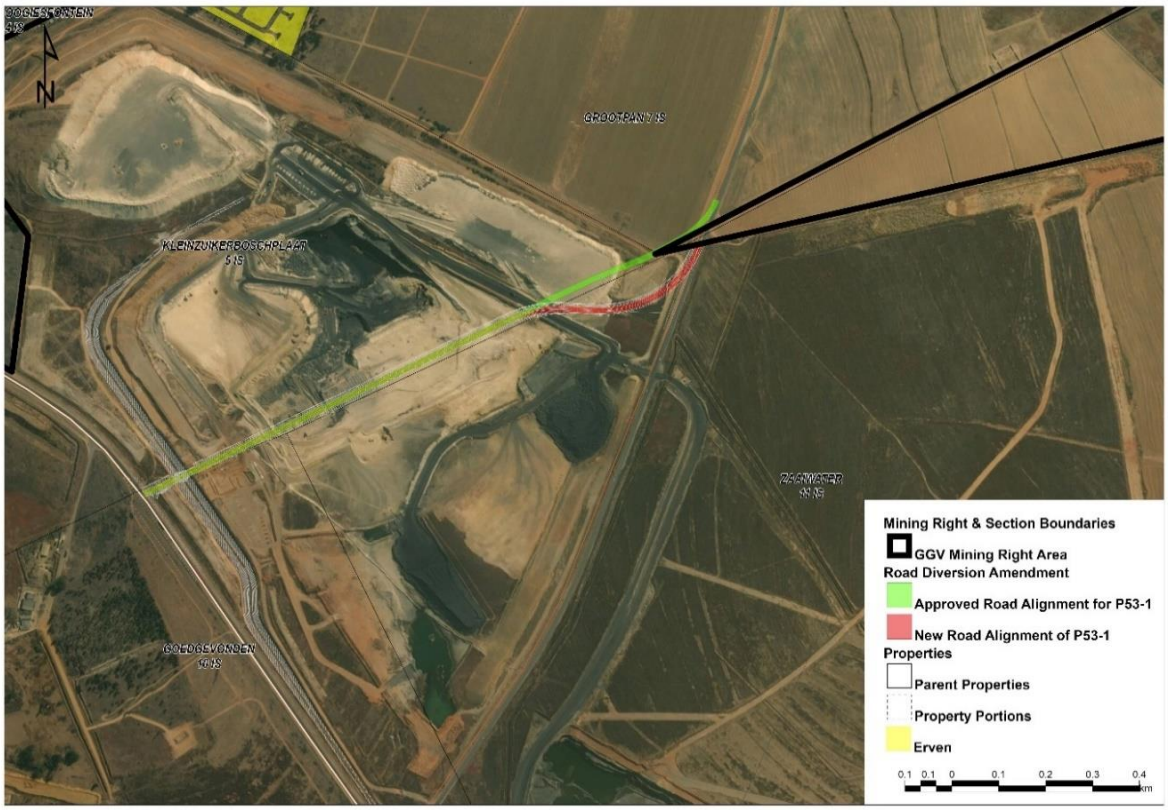

Figure 9: Existing and proposed options for re-alignment of P53-1

2 ENVIRONMENTAL OBJECTIVES AND GOALS

2.1 MINE CLOSURE OBJECTIVES

2.1.1 Objectives for Mine Rehabilitation

Objective 1: To rehabilitate the disturbed infrastructure areas to a final landform that is sustainable, free-draining, and non-erosive.

Objective 2: To establish a post-mining land use that will sustain post-mining land use as per the Rehabilitation, Decommissioning and Closure Plan.

Objective 3: To ensure a sustainable, functional ecosystem post-mining.

Objective 4: To identify and implement a sustainable post-closure decant management system to prevent the contamination of sensitive water resources.

2.1.2 Objectives for Livelihood Retention

Objective 5: To empower local communities through Local Economic Development (LED) Initiatives, i.e. identify and establish livelihood retention projects that can create off-mine livelihoods during and post-mining.

Objective 6: To equip employees with portable skills that can be utilised in other sectors post-mining.

2.1.3 Rehabilitation Goals

The following goals have been set for the successful rehabilitation of the disturbed areas associated with the GGV Complex:

- **Reclamation**: To reclaim all mining related infrastructure from underground and seal the underground operations when production ceases. Possible reclamation of MRF.
- **Demolition**: To demolish the surface structures and rehabilitate the areas where required.
- **Rehabilitation**: To rehabilitate the opencast pits and disturbed areas to a post-mining grazing capability class.

To achieve the rehabilitation objectives and goals, the following actions will be implemented when mining cease:

2.1.3.1 Reclamation

- Reclaim all usable infrastructure from underground for recycling with the surface infrastructure.

- Shafts and adits will be filled with non-combustible inert building rubble and terrace material.
- Shafts will be capped and permanently sealed in accordance with the specifications stipulated by the Department of Mineral Resources and Energy (DMRE).
- Possible reclamation of the MRF if financially viable.

2.1.3.2 Demolition

- All buildings and steel structures will be demolished in a safe and environmentally responsible manner.
- Material will be recycled as far as possible, and GOSA will make use of contractors specialising in this field to dismantle the surface infrastructure and recycle the building material as far as possible.
- Inert building rubble that cannot be recycled will be used to seal the incline and ventilation shafts.
- Other non-recyclable building material will be disposed of at a registered landfill site as per the Waste Management Procedure.
- All contaminated and carbonaceous material within the CHPP Infrastructure Area will be removed to the MRF prior to final capping and topsoiling of the facility.

2.1.3.3 Rehabilitation

- All disturbed areas will be ripped to a minimum depth of 1 m.
- Levelling, sloping and landscaping of the disturbed areas according to the mine rehabilitation plan.
- Topsoiling and re-vegetation of levelled areas.

2.1.4 Operational Goals to facilitate Closure

Apart from the short-term objectives and strategies to manage the environmental impacts over the Life-of-Mine (LOM), the following goals have been set to address post-closure issues early on during the operational phase:

2.1.4.1 Refine long-term water- and salt-balance

- Dedicated monitoring programme to facilitate the quantification of inter-mine flows.
- Dedicated monitoring programme and modelling to refine the post-closure water balance and decant water quality. The model will be revised at least every 2 years.

2.1.4.2 Verify and manage post-closure decant

- Ongoing sampling and monitoring of parameters important to the final water quality and water volumes.

- Quantification and verification of the groundwater model and the water balance model.
- Ongoing evaluation and reassessment of alternative options for the final water use and required associated water quality, together with the technologies required to achieve the required quality.
- The final land use will also be used to evaluate the post-closure water management.
- Active involvement in the regional integrated water management plan developed in conjunction with the Department of Water and Sanitation (DWS).

2.1.4.3 Develop final land use plan

- Define, in consultation with all Interested and Affected Parties (IAPs), the final (post-closure) land use for the mining area, including mining areas, surface and water management infrastructure, MRF and surface dumps, etc.
- Develop a final land use plan and implementation programme as part of the Rehabilitation, Decommissioning and Closure Plan, considering important issues such as ongoing operational and maintenance requirements and long-term responsibilities and ownership.
- Set final closure objectives and standards to ensure conformance to the final land use plan and the requirements of the IAPs and relevant environmental legislation.
- Develop a detailed Closure Plan for the GGV Complex five years prior to closure and obtain approval from the relevant authorities.

2.2 OPERATIONAL MANAGEMENT OF ENVIRONMENTAL IMPACTS

2.2.1 Glencore Sustainability Policy

The Sustainability Policy of Glencore addresses occupational health, safety, and environmental management, as well as community and stakeholder engagement.

GLENCORE

Sustainability Policy

We are committed to creating value for all of our stakeholders in a manner that is responsible, transparent and respects the rights of all. Our approach is risk and materiality based and is applicable to all of our managed assets.

Human rights

We support and respect human rights in a manner consistent with the Universal Declaration of Human Rights. We uphold the dignity, fundamental freedoms and human rights of our employees, contractors and the communities in which we live and work, and others affected by our activities.

In our relationship with local communities we respect and promote human rights within our area of influence. This includes respect for the cultural heritage, customs and rights of those communities, including those of indigenous peoples.

Our people

Our people are fundamental to our success. We believe that a diverse workforce is essential for a successful business. We treat our people fairly and with respect, and ensure they have the opportunity to develop their careers to match their potential. We are committed to upholding the International Labour Organisation Declaration on Fundamental Principles and Rights at Work.

Health and safety

The safety of our people is our number one priority. We believe that all fatalities, occupational diseases and injuries are preventable and that we must all take responsibility for maintaining a safe and healthy workplace. Our ambition is to become a leader in the field of health and safety and to create a workplace free from fatalities, injuries and occupational diseases. Our aim is to maintain a health and safety culture where everyone proactively supports the Glencore health and safety objectives and commitments.

Community

We believe that our operations have a predominantly positive impact on the communities in which we operate. We aim to build lasting relationships with our neighbours by identifying and addressing their concerns, and by contributing to activities and programmes designed to improve their quality of life. Throughout the lifecycle of our activities, we conduct ongoing consultations with local communities and other stakeholders to ensure that we operate in a manner that is appropriate.

Environment

In everything we do, we seek to minimise any negative impact on the environment and to comply with applicable laws, regulations and other environmental management requirements. We conserve and protect environmental resources through a broad range of proactive initiatives, including our planning, management systems and day-to-day activities. We demonstrate active stewardship of the land, freshwater and biodiversity systems with which we interact.

This policy is aligned with our Code of Conduct, values and HSEC policies. Our approach is supported by explicit verifiable outcomes to which we hold all of our managed operations accountable.

Our values

- *Safety*
- *Responsibility*
- *Entrepreneurialism*
- *Openness*
- *Simplicity*

Ivan Glasenberg
Chief Executive Officer

Murray Houston
Chief Executive Officer of Glencore Coal SA

June 2017

2.2.2 Water and Waste Management Objectives and Outcomes

2.2.2.1 Surface water

2.2.2.1.1 Process water

Process water is required at all coal handling facilities. Management of process water should aim to:

- Minimise the water demand.
- Re-use process water where possible.

The objective of GGV Complex is to use the polluted water generated on the complex in the plants for the processing of coal, in the mining operation and for dust suppression.

2.2.2.1.2 *Potable water*

Potable water will be required for both current and future use. A water treatment plant has been provided at GGV to treat mine affected water and supply the potable water requirements of the operation.

Management of potable water should aim to:

- Minimise the wastage of water.
- Treat to a potable standard where potable water is required for mining.

2.2.2.1.3 *Water quality*

The objective regarding water quality is to have the surface water qualities remain largely unaffected by the activities on site. By achieving the objectives detailed in Section 1.2.2.1.4, clean and dirty water separation should be achieved to maintain the water quality of the clean water resources. Clean water quality should meet, as a minimum, drinking water standards or the catchment management unit objectives of the Upper Olifants Water Management Area Unit 5.

Water quality objectives will be measured and achieved by monthly water quality monitoring of surface water, with associated interventions as and when required. Interventions include managing dirty water make from the various point sources and ensuring that the pit water levels remain below the decant levels through the extraction and treatment of water as and where required.

2.2.2.1.4 *Storm water*

Develop and implement an Integrated Water and Wastewater Management Plan (IWWMP) for the GGV Complex. Management of storm water on the mine should aim to achieve the following:

- Prevent storm water from coming into contact with material that could pollute the water, thereby maximising clean water runoff.
- Route clean water runoff to the natural environment.
- Keep water of differing quality (i.e. clean and contaminated water) separate and manage these separately.
- Collect and contain contaminated runoff in appropriate facilities.
- Address potential water pollution at the source.
- Avoid the discharge of polluted water to the natural environment and therefore aim to ensure that surface water qualities remain largely unaffected by the activities on site.
- Re-use contaminated water where possible.
- Treat contaminated water before discharge or release into the receiving environment to acceptable standards.
- Prevent erosion of land and watercourses.

- Implement and maintain water management measures that are effective during different hydrological cycles and that will be viable in the long-term.

2.2.2.1.5 Catchment yield and hydrology

During the mine's life there will be a negative impact on the catchment yield and hydrology. The objective is to minimise the impact, by managing the impact in the following ways:

- Minimise the loss of yield during the operational phase by:
  - Minimising the footprint of dirty areas as far as is practical.
  - Ensuring clean water from areas upslope of dirty areas is diverted around the dirty areas.
  - Continuous rehabilitation of opencast areas, according to a defined schedule to avoid rehabilitation backlogs.
- Design of rehabilitated areas to ensure that they are free draining as far as is practicable both during operations and post-closure.
- Sufficient compaction of the spoils and overburden should be ensured to limit surface water ingress, followed by a sufficient topsoil layer.
- Due to the potential for unstable roof conditions and the formation of sinkholes, no underground mining should occur within areas associated with the main river diversion and remaining wetlands at depths of less than 20m.
- Ensure that there is minimal impact on catchment yield and hydrology post-closure.

Practically the effect on catchment yield is sometimes difficult to quantify, and the objective will be evaluated on the extent of the rehabilitation backlog and adequacy of measures returning clean water off rehabilitated areas back to the natural environment.

2.2.2.2 Groundwater

Although it is inevitable that groundwater will be affected by mining, particularly around the waste management facilities and post-closure around the mining areas, management of the activities that could potentially impact on the groundwater resource should aim to:

- Minimise the impact on groundwater quality.
- Minimise groundwater influx into the mine workings and excavations.
- Minimise penetration into the groundwater table.
- Maintain the mine at water levels that will prevent decant from the pits.
- Minimise the source and driving force for water infiltration into and through potential sources of groundwater pollution.

This objective will be measured and achieved by groundwater monitoring, with associated interventions as and when required.

2.2.2.3 Waste

GGV Complex aims to manage the generation of waste according to the following waste management hierarchy:

- Prevent the generation of waste, as far as is practical.
- Minimise the amount of waste generated.
- Re-use and recycle waste as much as possible.
- If waste cannot be re-used or recycled, dispose on facilities which provide appropriate protection to the environment.
- Characterise waste to determine the potential risk posed, the protection required, as well as the re-use potential.

2.2.2.4 Protection and reinstatement of a healthy ecosystem

The objective in terms of the ecosystem is to return the local ecosystem to as close to pre-mining levels as is practically possible. This will be measured through two primary mechanisms, namely:

- Water quality monitoring to assess the suitability of the water to support aquatic life.
- Biomonitoring (aquatic and terrestrial assessment).
- Wetland offsetting programme to compensate for the wetlands that will be lost because of mining activities.

2.2.2.5 Refine the operational water balance

The operational surface water balance and groundwater balance must be revised on an annual basis. To facilitate this, the necessary monitoring needs to be undertaken, as described under Section 5.

2.2.2.6 Post-closure decant management

The post-closure water balance must be revised on a regular basis, at least every 2 years. To facilitate this, the necessary monitoring needs to be undertaken, as described under Section 5.

GOSA has since 2006 developed a Strategic Water Management Plan (SWMP). This plan outlines the water management strategy of the complexes and how to deal with water over the LOM and post-closure. Due to the nature of mining, the mine plan is always evolving, and changes therefore need to be made to the water strategy on a regular basis. Water management plays a significant role in the ability to mine areas. Surface water and groundwater studies have since the development of the SWMP predicted that excess water will become an issue in years to come. In 2011 GOSA initiated a Water Treatment Strategy (Golder, 2011) to deal with excess mine water for the next 30 years. This plan will be updated regularly as more data becomes available.

2.2.3 Land Use Management Objectives and Outcomes

2.2.3.1 Minimise the loss of agricultural land

- Sufficient topsoil is available to rehabilitate the whole mining to arable standards and this will be implemented as far as practicably possible. As a minimum the area will be rehabilitated to grazing standards.
- A monitoring programme is in place to ensure conformance to this objective.

2.2.3.2 Rehabilitation concurrent to mining operations

- Rehabilitation will be undertaken concurrent to mining operations. The mining plan/schedule will be optimised to facilitate continuous rehabilitation.
- Landscaping of the rehabilitated areas will be done, avoiding steep slopes and concentrated runoff to prevent erosion and increased sediment transport into water resources.
- Revegetation will be done as soon as possible to limit dust and erosion.
- The mining plan/schedule will ensure optimal placement of excavated material to facilitate concurrent rehabilitation as per the Rehabilitation, Decommissioning and Closure Plan for GGV Complex.
- The mining plan/schedule will be updated on a continuous basis to ensure best practice.
- Ongoing water quality and rehabilitation monitoring will be implemented during the operational and decommissioning phases to establish the success of the final rehabilitation, and to determine any shortcomings.

2.2.3.3 Effective management of topsoil

- The topsoil will be stripped prior to mining and placed directly (as far as practicably possible) on levelled spoils.
- The compaction of topsoil during stripping and/or placement operations by heavy machinery will be limited and by maintaining vehicle speed to reduce the duration of applied pressure.
- All soil material will be stockpiled only as a last resort when it is impractical to place such material directly onto levelled spoils. Stockpile duration of soils will be limited to 2 years (as far as practicably possible) to maintain the reproductive seed bank life of the topsoil.
- Disturbed areas will be rehabilitated to arable standards as far as practicably possible, and as a minimum to grazing standards (300 mm depth).

2.2.3.4 Effective, long-term sustainable revegetation practices

- Grassing will be undertaken on a seasonal basis, to ensure germination of the grass species.

- All available topsoil areas will be seeded prior to the start of the rainy season to ensure maximum drainage from these areas of clean water back into the catchment system without excessive erosion and suspended solids.
- Soil analysis will be performed prior to seeding and the soil fertility rectified (if necessary) to facilitate vigorous growth.
- The existing seed mix will be re-evaluated, considering inclusion of herbaceous and bulbous species to restore to a diverse as possible state.

2.2.3.5 Maintenance of rehabilitated areas

- Annual biodiversity (vegetation) assessments will be undertaken to determine the soil fertility, vegetation coverage and self-sufficiency of the revegetated areas. The necessary actions will be implemented to correct any non-conformances of deficiencies identified during the audit. Once the desired nutritional status and vegetation coverage has been achieved, the audits will be conducted in intervals of 3-4 years.
- Preventing and managing erosion of rehabilitated surfaces, taking account of possible exposure to fire and drought.
- The revegetated areas will be monitored for declared weeds and invasive plants. This will be controlled and managed as per the Alien and Invasive Plant Control and Management Plan (AIPCP).
- Grazing of revegetated areas will be avoided for the first 3-5 years, after which controlled (rotational) grazing would be considered.
- Veld fires will be controlled in the revegetated areas and a rotational burning programme will be developed for the area in consultation with experts in this field.

2.2.3.6 Clearance of exotic vegetation

- Develop and implement an AIPCP for known alien and invasive plants in the GGV area.
- Regular update of the AIPCP, based on an annual review of the AIPCP, which must guide future management and should be implemented to ensure the success of the AIPCP.
- Evidence must be recorded and filed to form part of the annual audit of the progress of the AIPCP.

2.2.3.7 Maintain remaining natural environment

- In areas included in the proposed mining plan, the natural vegetation will be retained for as long as possible before topsoiling commences to limit dust and erosion.
- Develop and implement a Rescue and Rehabilitation Plan for floral Species of Conservation Concern (SCC) prior to construction and operational activities commencing and obtain relevant permits from the Mpumalanga Tourism and Parks Agency (MTPA).
- In areas not impacted by the mining activities, the natural vegetation/wetland systems will be maintained by implementing the following:

- burning programmes;
- rotational grazing programmes;
- implementation of the AIPCP; and
- restricting vehicle movement to existing roads.

- Illegal access will be limited to prevent illegal hunting and snaring of fauna in the area.
- An environmental awareness campaign will be implemented, both internally and externally (local communities).

2.2.3.8 Limit impact on wetland systems

- Implementation of watercourse alterations that is stable in the long-term, in that they mimic the naturally stable characteristics of flow within the current catchment.
- Ensuring that where activities have affected streams, these areas are not prone to erosion or deterioration in the future. In particular, the stability of the river diversions is a key issue.
- Engineering of the various wetland crossings to ensure that they comply with the DWS requirements in terms of limiting channelling of flow and increasing velocity. Any proposed design mitigation and methods must be evaluated by an appropriate wetland as well as a storm water specialist.
- Construction of gabions at storm water discharge points to contain erosion.
- Sensitive areas, including wetlands, outside of the approved mining area must be demarcated as no-go zones.
- Due to the potential for unstable roof conditions and the formation of sinkholes, no underground mining should occur within areas associated with the main river diversion and remaining wetlands at depths of less than 20m.
- Maintain the Present Ecological State (PES) of the remaining wetlands.
- Implementation of a wetland offsetting programme to compensate for the wetlands that will be lost because of mining activities.

2.2.4 Socio-Economic Objectives and Outcomes

2.2.4.1 Limit the impact to surrounding communities

- Design and maintain stakeholder engagement strategies that will enable local stakeholders to engage GOSA on a regular basis.
- Establishing and maintaining a Complaints and Grievance Procedure and raise awareness among local stakeholders of the availability of the procedures and avenues of raising issues and concerns.

- Ground vibration and air blast monitoring will be conducted for all blasts in close proximity to sensitive receptors to ensure that the limits are being achieved and to provide an indication of when modification are needed to the blasting method to correct for increased ground vibration and air blast levels.
- The impact and risks associated with light spillage will be limited by installing light fixtures that provide precisely directed illumination.
- Berms will be placed along sensitive viewing areas to screen off unpleasant views on to the open pit mining activities. The screening berms will be rehabilitated with indigenous grasses to increase its aesthetic appeal and screening effect.
- In the case of depletion of water resources due to mining activities, alternative supplies of water to replace existing usage will be negotiated with affected groundwater users based on a structured compensation protocol.
- Dust suppression is implemented at all operations that could cause increased dust levels, including access and haul roads, stockpiles, residue facilities, process plant areas, opencast mining activities and rehabilitation and revegetation activities.
- General good housekeeping will be maintained in all areas prone for dust release. Regular inspection and maintenance routines will be implemented in these areas to address spillages on ground level and along conveyors, thereby preventing the re-suspension of settled dust.
- Ongoing air quality monitoring system and maintain dust fall-out (external points) within the guideline range of < 1200 mg/m^2/d. When these limits are exceeded, a detailed action plan will be compiled.
- Maintain natural vegetation cover for as long as possible to limit dust pollution. Rehabilitate opencast areas as soon as possible after mining and re-establish grass cover on topsoiled areas to limit dust pollution and erosion.
- Traffic management where product transport coincides with local movement on roads, such as the roads to the south of GGV. Provision of additional “park lanes” for product transport trucks, and no allowance of trucks to park or wait on the existing road.
- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport product are fitted with covers.
- All vehicles used for off-site hauling must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.
- A procedure will be developed to ensure timeous reporting and cleaning of any spillages on the road surface by the contractors. This will be monitored on a regular basis to ensure compliance.
- Implementation of the GOSA Blasting Procedure and blasting monitoring programme.

- When blasting is conducted closer than 500m from any public road, road closure will be initiated during blasting times to prevent the risk of dust, fumes and fly rock injuries to motorists.
- All buildings and structures containing people that are closer than 500m to any blasting should be evacuated during blasting times.
- When blasting is conducted close to the Mosque and Madrassah, blasting activities must be curtailed at times of worship or as agreed to with the leaders.

2.2.4.2 Community upliftment programmes

- Provide information on benefits and opportunities through the stakeholder engagement strategies.
- Optimise local employment where new opportunities become available.
- Implementation of Human Resource Development (HRD) Programmes to increase skills amongst the existing workforce.
- Implement participation strategies with staff through future forums and current union structures.
- Ensure implementation of Social and Labour Plan (SLP) programmes.
- Local beneficiation programmes to be implemented as part of the SLP.
- Optimise local involvement in on-mine business opportunities to maximise local economic growth.
- Maintain database of black- and women-owned and empowered as well as local companies able to provide capital goods, consumables and services to the mine.
- Identify contracts or part of contracts that may be suitable to smaller local companies.
- Facilitate and encourage the involvement of SMME's in larger contracts as sub-contractors.
- Establish development programmes to support SMME businesses.

2.2.4.3 Downscaling and retrenchment

- Implement portable skills development programmes to enable retrenched employees to find alternative employment.
- Design and implement economic development programmes that will assist people being retrenched in sustaining their livelihoods.
- Establish a future forum with representation from the workforce to discuss potential difficulties and solutions.
- Implementation of programmes to minimise and mitigate the impact of downscaling and retrenchment.

- Implementation of capacity building programmes to minimise and mitigate the impact of mine downscaling and closure.
- Design and implement economic development programmes that will assist Ogies and Phola in sustaining their livelihoods.
- Engage Emalahleni Local Municipality in the closure planning to provide support and inputs into the broader regional planning.

2.2.4.4 Operational worker health impacts

- Continued dust suppression.
- Ensuring employees are equipped with appropriate personal protection equipment (PPE).
- Ensuring continuous ventilation of underground workings contributes to a healthier working environment as large quantities of clean air enter the mine areas underground and dilute the dust concentration.
- Ensure that equipment is well maintained and fitted with appropriate noise abatement measures.
- The applicant includes a component covering occupational noise in the Health and Safety Induction to sensitise all employees and contractors about the potential impact of noise.
- Compliance with noise limits in underground, surface and plant operations.

2.2.4.5 Carbon footprint

Glencore PLC has set targets for the reduction of its total carbon emission (Scope 1, 2 and 3) worldwide, namely:

- Short-term (2026): Target of 15% reduction in total CO_2e emissions.
- Medium-term (2035): Target of 50% reduction in total CO_2e emissions.
- Long-term (2050): Target of achieving net zero total CO_2e emissions.

GGV Complex specific targets would be the South African legislative requirements which are:

- the reporting of its Greenhouse Gas (GHG) emissions on SAGERS in terms of the GHG Reporting Regulations 2017 published under GN No. 275 in Government Gazette 40762 of 03 April 2017 promulgated under the National Environmental Management: Air Quality Act No.39 of 2004;
- Pollution Prevention Plans (PPP) and approved carbon budget, and the annual progress reporting in terms of the PPP Regulations 2017 published under GN No. 712 in Government Gazette 40996 of 21 July 2017, as amended; and
- the identification of feasible carbon abatement projects to help achieve the global targets.

Carbon abatement strategies are being developed for GOSA to contribute to the said targets.

2.2.5 Historical and Cultural Management Objectives and Outcomes

- All graveyards that could be impacted (directly and indirectly) by the mining operations must be relocated before being impacted, in accordance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999).
- Avoid and demarcate the remaining gravesites and the Mosque to prevent any damage.
- Develop and implement a Cultural Heritage Management Plan (CHMP).
- Ongoing monitoring during construction and mining activities to be conducted by a qualified heritage specialist for early detection of unidentified (sub-surface) sites or graves.
- All activities shall cease immediately upon any discovery of cultural and heritage resources and a qualified archaeologist informed to do further assessment and reporting.
- The site where cultural and heritage have been discovered shall be cordoned until such time that an instruction to resume work is provided to the contractor in writing, following consultation with the regulating authorities.
- A heritage educational and awareness programme will be implemented for all employees working on site, and where feasible, this initiative should be extended to the affected communities in the area.
- Pre-blast structural surveys will be conducted of the Mosque and Madrassah before blasting commences within a radius of 1 km.

2.2.6 Legal Compliance

To ensure compliance with the commitments reflected in this EMPr, GGV will perform auditing as prescribed by law and/or licencing conditions to ensure conformance to environmental objectives and strategies and the implementation thereof. Annual external EMPr performance assessments (EMPPA) will be conducted to determine conformance with this EMPr, including effectiveness and appropriateness of the EMPr. In addition, an annual revision of the closure cost assessment for immediate (pre-mature) closure will be undertaken as part of the revision of the Rehabilitation, Decommissioning and Closure Plan.

To ensure ongoing compliance to the environmental legislation of the country, the enviro-legal register for the GGV Complex will be updated on an ongoing basis, as required, considering all relevant environmental legislation, including relevant regulations promulgated in terms of:

- Act No. 28 of 2002: Mineral and Petroleum Resources Development Act (MPRDA)
- Act No. 107 of 1998: National Environmental Management Act (NEMA)
- Act 59 of 2008: National Environmental Management: Waste Act (NEMWA)
- Act No. 36 of 1998: National Water Act (NWA)

- Act No. 108 of 1996: The Constitution of South Africa
- Act No. 25 of 1999: National Heritage Resources Act (NHRA)
- Act No. 10 of 2004: National Environmental Management: Biodiversity Act (NEMBA)
- Act No. 43 of 1983: Conservation of Agricultural Resources Act (CARA)
- Act No. 84 of 1998: National Forests Act (NFA)
- Act No. 39 of 2004: National Environmental Management: Air Quality Act (AQA)
- Act No. 15 of 2019: Carbon Tax Act
- Act No. 29 of 1996: Mine Health and Safety Act
- Act No. 10 of 1998: Mpumalanga Nature Conservation Act

3 IMPLEMENTATION PROGRAMME

3.1 IMPACT MANAGEMENT ACTIONS

Table 2 lists the impact management actions (mitigatory measures) identified for the GGV Complex to reverse, reduce, and mitigate the identified impacts for existing and future planned activities. Mechanisms and responsibilities for the implementation of the impact management actions is provided in Table 3.

Table 2: List of significant impact identified for the mining and associated activities, together with proposed mitigation measures

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
PRE-CONSTRUCTION PHASE (PLANNING PHASE)				
1	Re-alignment of Road P53-1 over mined out area	• Subsidence of road. • Impact on long-term stability of road.	Safety and Risk Exposure	• All proposed road upgrades and improvements are to be designed by a professional engineer and submitted for official approval by the Mpumalanga Provincial Roads Department, prior to implementation. • The necessary engineering design criteria must be considered during the design to ensure long-term stability of the road. • Surfacing of road re-alignment with suitable black top specification as agreed to with the Mpumalanga Provincial Roads Department. • A road maintenance system will be implemented in conjunction with the provincial roads agency.
2	Unsafe intersection of the re-alignment with Provincial Road R545	• Safety of road users may be compromised. • Increase in road accidents.	Safety and Risk Exposure	• All proposed road upgrades and improvements are to be designed by a professional engineer and submitted for official approval by the Mpumalanga Provincial Roads Department, prior to implementation. • The provision of traffic warning signs and decrease in speed limit for all vehicles over the affected sections. • Include speedbumps to control speed. • Develop a Traffic Management Plan for implementation during construction of the re-alignment and associated intersections.
3	Construction and operational activities, including future opencast mining and infrastructure development	• Potential degradation and modification of the remaining extent of the receiving freshwater environment, further loss of wetland ecological structure and related	Wetland/aquatic habitat Floral habitat, diversity, SCC	• Minimise loss of indigenous vegetation and remaining natural habitat where possible through adequate planning and ensuring that the inclines and associated surface infrastructure remain within the disturbed (opencast) areas. No additional vegetation clearance should be allowed. • It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is placed outside of remaining extent of wetland/sensitive habitat units as well as the 1:100 year floodline where applicable.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
		ecological service provisioning. • Degradation of remaining floral habitat, terrestrial diversity. • Impact on Species of Conservation Concern (SCC).		• Access roads should be kept to existing roads to reduce fragmentation of wetland/sensitive habitat outside of the authorised footprint. Sensitive areas outside of the planned mining activities must be demarcated as no-go zones, including the interflow soil areas. • It is recommended that prior to the commencement of construction activities that the construction servitude be demarcated off. • Prior to the commencement of new construction and mining activities, a Rescue and Rehabilitation Plan for floral SCC should be in place for implementation. • The necessary permits should be obtained from the MTPA prior to the relocation of the SCC.
4	Undermining of main river diversion and remaining wetlands	• Potential subsidence of surrounding environment if pillars are insufficient or inadequate to support the ground or if the depth of mining is too shallow. • Alteration of hydropedological flow drivers of the wetlands.	Wetland/aquatic habitat Catchment yield	• Mining plan should adhere to proposed design as investigated by the Geotechnical specialist, i.e. pillar size of 11.5m skin to skin, bord width of 6.5m with a maximum mining height of 3.5m. Should the mine design be changed, further geotechnical investigations should be conducted to determine the possibility for subsidence. • Due to the potential for unstable roof conditions and the formation of sinkholes, no underground mining should occur within areas associated with the main river diversion and remaining wetlands at depths of less than 20m. • A management plan for mining under the main river diversion and wetland areas must be developed prior to mining. • The vadose zone of shafts should be sealed as soon as possible after construction to limit the hydropedological losses to ensure that the PES category remains unchanged.
5	Construction and operational activities, including future opencast mining and infrastructure development	• Spread of AIPs, leading to potential loss of floral habitat and species diversity from surrounding natural habitat outside of the footprint areas. • Indirect impact on watercourses due to AIP removal.	Terrestrial biodiversity Wetland/aquatic habitat	• Develop and implement an AIPCP for known alien and invasive plants in the GGV area (Appendix 2). • The AIPCP should be implemented by a qualified professional (i.e., the person must have a good record of experience in AIP management and control). • No chemical control of AIPs to occur within 32 m of a watercourse. • No vegetation cuttings from AIP removal may be left to accumulate in watercourses. • As far as possible, it must be ensured that no AIP propagules are spread with construction rubble, or soils contaminated with AIP seeds/propagules. • Discard cleared vegetation at a registered waste facility (or in a secluded area designated by the mine). Particular attention to be paid to potential spread of AIPs. • AIP control measures should ideally be done by hand and not involve heavy machinery which may lead to compaction of soils and the trampling / compacting of vegetation, notably in sensitive habitats.
CONSTRUCTION PHASE – ADDITIONAL INFRASTRUCTURE, INCLINE SHAFTS & ROAD-RE-ALIGNMENT				
6	Vegetation clearing for the purpose of	• Soil erosion and dust generation during	Erosion Air quality Biodiversity	• Laydown areas, storage areas and ablution facilities must be located within the existing disturbed mining area, no additional disturbance or vegetation clearance should be allowed.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
	establishing a construction camp	vegetation clearance activities. • Habitat destruction.		• The road leading to the construction site must be demarcated to prevent more than one road from being formed. • All disturbed and compacted footprint areas must be rehabilitated and landscaped after construction is complete and left for natural vegetation. • Exposed soils to be protected by means of a suitable geotextile covering such as hessian sheeting until adequate vegetation has established. • Special attention should be paid to alien and invasive plant control within these areas.
7	Construction of road re-alignment	• Exposure of soils, leading to increased runoff, erosion and increased potential for sedimentation. • Proliferation of alien vegetation because of disturbances.	Soils Biodiversity	• All development footprint areas to remain as small as possible. • Temporary erosion control measures must be implemented to protect the disturbed soils during the construction phase until adequate vegetation has established. • Exposed soils to be protected by means of a suitable geotextile covering such as hessian sheeting until adequate vegetation cover is achieved. • Monitor and fix any erosion. • Implement an AIPCP. • Once construction activities have been completed, it must be ensured that all temporary and construction-related infrastructure are removed, and that efficient rehabilitation takes place within these areas.
8	Construction of road re-alignment	• Construction activities will generate noise.	Ambient noise Socio economic: Health and well-being	• Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. • Ensure a good working relationship between mine management and all potentially noise-sensitive receptors in the surrounding area. • Establish and implement a Complaints and Grievance Procedure.
9	Construction of road re-alignment	• Construction activities resulting in open, unprotected soils which are prone to wind erosion leading to an increase in dust and a reduction in ambient air quality in the MRA area and along the re-alignment.	Air quality Socio economic: Health and well-being	• Set the speed limit for construction vehicles to as low a speed possible and enforce the speed limits specified. It is recommended the speed limit be set to 40 km/h on unpaved roads. • Include a program of wet suppression of unpaved roads with major vehicle activity. The wet suppression can typically be grey water from the mine, or the water can contain a chemical that will increase the dust trapping capability once sprayed over a surface. • Limit the load size of the vehicles to ensure the wind in transit does not pick up more dust that need be. • Exposed soils to be protected by means of a suitable geotextile covering such as hessian sheeting until revegetated. • Bare soils must be regularly dampened with water to suppress dust during the construction phase, especially when strong wind conditions are predicted according to the local weather forecast. • Early paving of permanent roads. • Complaints and Grievance Procedure available to local people.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
10	Increased vehicle movements within the construction areas	• Indiscriminate driving through the open veld leading to increased vehicle related mortalities of faunal species.	Terrestrial Biodiversity	• Make use of existing roads as far as possible. • Vehicles should be restricted to travelling only on designated roadways. • Speed restrictions to be placed on all vehicles and monitored to ensure compliance. • Drivers to be educated through the Environmental Awareness Programme about the presence and importance of faunal species and instructed to actively avoid collisions with faunal species, regardless of size.
11	Waste/Hydrocarbon handling	• Accidental spills and/or leakages of hazardous chemicals and hydrocarbons resulting in soil contamination. • Contamination of water resources due to spillage of construction material and waste and/or poor management of sewerage waste at construction sites. • Poor handling of waste and the transport of building material can cause various types of spills (especially hydrocarbons) that may potentially infiltrate and contaminate the underlying groundwater system.	Soils Water resources	• No fuel must be stored at the construction sites and no refuelling or servicing of construction plant must take place at the construction sites. • All vehicle re-fuelling is to take place within the contractor laydown area only, within a bunded area. • All vehicles are to be serviced in a correctly bunded area or off-site. • Leaking vehicles should have drip trays placed under them where the leak is occurring. • Drip trays must be placed under any vehicles/machinery requiring active lubrication or oiling. • Spill clean-up kits must be available on site for immediate remediation of any spills and removal of contaminated soils. • A Spill Management and Emergency Contingency Plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress to groundwater. • Regular monitoring of soil contamination levels at construction sites. • All construction related waste and material is to be disposed of at a registered waste facility, no waste or construction rubble is to be dumped in the surrounding natural habitats. • Solid waste must either be stored on-site in an approved waste disposal area or removed by credible contractors. • All waste material to be removed to a licensed waste disposal facility if it cannot be re-used or recycled. • Chemical toilets to be provided at various sections along the route, as required. • The appointed contractor must ensure that these facilities are emptied on a regular basis and maintained as required. No chemical toilets to be placed in close proximity of watercourses. • A Construction Method Statement must be compiled and approved prior to the commencement of construction activities. The Environmental Control Officer (ECO) must ensure that the contractor adheres to the above-mentioned documents. • The relevant authorities should be notified in the event of a significant spill.
12	Increased personnel on site	• Increased risk of veld fires leading to loss of faunal and floral species as well as alteration of plant	Biodiversity	• No indiscriminate driving through the veld is allowed. As far as possible vehicles are to utilise the existing roads. • No illicit fires must be allowed during any phases of the proposed mining development.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
		diversity in the surrounding areas. • Hunting/collection of common faunal species.		• A Fire Management Plan should be set in place to ensure that any fires that do originate can be managed and / or stopped before significant damage to the environment occurs. • No hunting or trapping of faunal species is to be allowed. Access control to the property must be implemented and perimeter fences are to be regularly inspected for signs of damage by poachers. • Roadsides and if applicable burrows under fences used by fauna are to be inspected for snares, which if found are to be removed and destroyed.
13	Construction activities Removal of topsoil	• Impact on cultural and heritage significance within close proximity of construction activities. • Recovery of sub-surface sites during construction and/or excavation.	Cultural heritage	• Activities must cease immediately upon any discovery of cultural or heritage resources and a qualified archaeologist informed to do further assessment and reporting. • Any discovery of artifacts, graves or other remains of archaeological interest should be reported to SAHRA. • Identified sites of cultural and heritage significance within close proximity to the construction activities must be clearly demarcated and declared as no-go areas to prevent any damage thereto during construction.
14	Need of human resources and recruitment	• Creation of temporary construction employment.	Human capital	• Prioritise employment from local communities with the development of recruitment procedures. • Implementation of practical skills programmes.
15	Construction of intersections with R545 and existing P53-1	• Disruption in daily living and movement patterns. • Traffic congestion. • Safety of road users may be compromised. • Increase in road accidents.	Safety and Risk Exposure Socio economic: Health and well-being	• Develop a Traffic Management Plan for implementation during construction of the re-alignment and associated intersections. • Limit disruption to the flow of traffic. • Limit construction to day-light hours. • The provision of traffic warning signs and management measures. • Decrease in speed limit for all vehicles over the affected sections. • Clear notification and early warning of road closures. • Complaints and Grievance Procedure available to local people.
OPERATIONAL PHASE				
16	Surface disturbance caused by ongoing mining and infrastructure development	• Loss of topsoil due to incorrect stripping and stockpiling.	Soils / Land Use & Capability	• “Live” placing of topsoil material. • Minimise the size of the topsoil stockpiles. • Reclaim or apply protective covering on disturbed soils as quickly as possible. • Apply erosion controls relative to possible soil erosion from vehicular traffic and during mining activities. • Avoid creating excessive slopes during excavation operations.
17	Surface disturbance caused by ongoing mining and	• Spread of AIPs, leading to potential loss of habitat and species diversity from	Terrestrial Biodiversity	• No additional habitat outside of the approved footprint areas may be disturbed during the operational phase of the project. The approved mining footprint is to be clearly demarcated and all mining activities are to remain within this boundary.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
	infrastructure development	surrounding natural habitat. • Loss of favourable floral/ faunal habitat outside of the direct mining footprint due to poorly managed edge effects, including a decrease in diversity and loss/decline of potentially occurring SCC.		• Edge effects of all activities which may affect floral/faunal habitat within surrounding areas must be strictly managed, e.g. implement an AIPCP, mitigate soil erosion by reducing soil compaction caused by movement of construction personnel and vehicles, suppress dust in order to mitigate the impact of dust on flora within a close proximity of activities. • Ongoing removal of the AIPs, with specific emphasis on Category 1b alien species, encountered within the footprint areas and immediate surrounds (approximately 30 m buffer around activities) must take place (following the NEMBA: Alien and Invasive Species Regulations of 2020). • No indiscriminate driving through surrounding natural veld is allowed. As far as possible vehicles are to utilise the existing roads. Where this is not feasible, new roads are to be located in areas of existing high disturbance, and not encroach upon sensitive habitats. • Harvesting of protected floral species by mining and operational personnel should be strictly prohibited. • No collection or hunting/snaring of faunal may be allowed by mine personnel in the areas surrounding the mine. • No informal fires by mine personnel are to be allowed on site, notably in close proximity of the adjacent natural areas. • Ongoing implementation of a Rescue and Rehabilitation Plan for floral SCC. Ensure that the necessary permits is obtained from the MTPA prior to the relocation of the SCC.
18	Surface disturbance caused by ongoing mining and infrastructure development	• Potential degradation and modification of the remaining extent of the receiving freshwater environment. • Further loss of wetland ecological structure and related ecological service provisioning. • Alteration of hydropedological flow drivers of the wetlands. • Increased flood peaks into the wetlands because concentration of surface runoff. • Potential for erosion of terrestrial areas because	Wetland/aquatic habitat	• No additional habitat outside of the approved footprint areas may be disturbed during the operational phase of the project. The approved mining footprint is to be clearly demarcated and all mining activities are to remain within this boundary. • Retain as much indigenous wetland vegetation as possible within the remaining extents of wetlands. • Placement of shallow berms between the opencast footprint and downslope wetlands to prevent sediment-rich runoff from entering the wetlands. • Maintenance of the clean water run-off systems to avoid siltation. • Canals, berms and watercourse crossings must be inspected annually, preferably before the start of the rainy season, by a Registered Professional Engineer to note any flood damage as well as to determine if the system is able to function as per the design. • Implementation of strict erosion control measures to limit loss of soil and sedimentation of the wetlands adjacent to the operational activities. • Landscaping of the rehabilitated areas will be done, avoiding steep slopes and concentrated runoff to prevent erosion and increased sediment transport into water resources. • All exposed soil must be protected to prevent erosion and sedimentation of the downgradient wetlands.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
		of the formation of preferential flow paths, leading to sedimentation of the wetlands. • Increased sedimentation into the Zaaiwaterspruit due to uncontrolled surface run-off.		• Construction of gabions at storm water discharge points to contain erosion. • Ensure that the inclines and associated surface infrastructure for the underground mining remain within the disturbed (opencast) areas, outside of the remaining sensitive and wetland systems. • Excavation activities and removal of soil within the wetlands and hydropedologically important soils should remain as small as possible and strict control of edge effects must take place. • The vadose zone of the incline shafts should be sealed as soon as possible after construction to limit the hydropedological losses to ensure that the PES category remains unchanged. • Annual biomonitoring (aquatic and terrestrial assessment) to be undertaken. • Implementation of wetland offset mitigation to compensate for the loss of wetland systems.
19	Operational activities, opencast mining and surface dumps	• Loss of catchment yield due to stormwater containment and decreased surface runoff. • Potential stream flow impact because of the stream diversions. • Reduction in volume of water entering the wetlands, leading to loss of recharge (and thus potential desiccation) of the wetland system. • Further altered vegetation communities due to moisture stress.	Wetland/aquatic habitat	• Flood diversion systems must be accompanied by an Operations, Maintenance and Emergency Preparedness Manual. • Development and implementation of a Stormwater Management Plan as part of the IWWMP (Appendix 3). • Clean and dirty water systems must be kept separate in line with GN704 as it relates to the NWA, as per the IWWMP. • Ensuring clean water from areas upslope of dirty areas is diverted around the dirty areas. • Minimising the footprint of dirty areas as far as is practical. • Construction of the outstanding diversion canals prior to mining the specific areas. • Route clean water runoff to a watercourse. • Canals, berms and watercourse crossings must be inspected annually, preferably before the start of the rainy season, by a Registered Professional Engineer to note any flood damage as well as to determine if the system is able to function as per the design. • Continuous rehabilitation of opencast areas, according to a defined schedule, to increase the clean water runoff. • Design of rehabilitated areas to ensure that they are free draining as far as is practicable, both during operations and post closure. • Sufficient compaction of the spoils and overburden should be ensured to limit surface water ingress, followed by a sufficient topsoil layer. • Annual biomonitoring (aquatic and terrestrial assessment) to be undertaken.
20	Operational activities, opencast mining and surface dumps	• Water quality impact on water resources due to uncontrolled dirty water runoff. • Water quality impacts due to infiltration of water	Wetland/aquatic habitat Groundwater	• Development and implementation of a Stormwater Management Plan as part of the IWWMP (Appendix 3). • Ensure all potential polluting activities within the operational areas are demarcated as dirty water areas and managed accordingly. • Collect and contain contaminated runoff in appropriately lined facilities. • Re-use contaminated water where possible.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
		from the dirty water facilities, CHPP and mine residue facilities.		• The MRF is equipped with a clay lining system, with sub-soil drainage to collect seepage from the facility. A seepage cut-off drain downstream of the MRF collects sub surface flows at the facility. The water collected by this drain must be pumped to a dirty water facility for reuse in the process. • Dirty water facilities must be accompanied by an Operations, Maintenance and Emergency Preparedness Manual. • Dirty water facilities must be inspected annually, preferably before the start of the rainy season, by a Professional Registered Engineer to note any flood damage as well as to determine if the system is able to function as per the design. • Silt traps must be constructed upstream of the dirty water facilities to allow silt to settle out of the runoff water. Silt traps and dirty water canals must be cleaned regularly, and the silt dried within the dirty water footprint before placement on the MRF and/or within opencast voids. • Dirty water canals and silt traps associated with the dirty water facilities must be inspected annually, preferably before the start of the rainy season, by site personnel to note any flood damage as well as to determine if the system is able to function as per the design. • Water quality monitoring programme to be implemented to ensure early detection of any water contamination.
21	Undermining of main river diversion and remaining wetlands	• Potential subsidence of surrounding environment if pillars are insufficient or inadequate to support the ground or if the depth of mining is too shallow. Potential creation of a cone of depression, which may drain water from surrounding wetland habitats, resulting in desiccation of the wetlands.	Wetland/aquatic habitat	• Due to the potential for unstable roof conditions and the formation of sinkholes, no underground mining should occur within areas associated with the main river diversion and remaining wetlands at depths of less than 20m. • Ensure that the incline shafts are properly sealed to avoid seepage and possible cone of depression impacts. • Any seepages and especially seepages from vertical to near vertical discontinuities in the roof must be mapped and monitored, and the inflow estimated. Periods of inflow and dry periods must be noted. • Underground sections where large groundwater inflows are observed should be grouted to reduce inflows. • Flow in the streams/wetlands upstream and downstream of the workings must be monitored and recorded. The water level and the discharge from the wetland just downstream wetland area must be monitored and recorded to define a base level flow. Any reduction in the ratio between rainfall and flow will indicate stream capture and underground ingress.
22	Dewatering of underground workings	• Water entering the underground mining area because of ingress into underground mine workings may necessitate dewatering of the	Wetland/aquatic habitat Groundwater Safety and Risk Exposure	• Underground sections where large groundwater inflows are observed should be grouted to reduce inflows. • Water pumped from the underground workings must be stored in appropriately lined dirty water facilities for reuse in the process.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
		underground mining area, which may result in the discharge of dirty water into the surrounding wetland environment.		
23	Mining activities On-site conveyance of ROM & product	• Spillages along haul roads could impact on water quality	Wetland/aquatic habitat	• Prevent overloading of vehicles. • Polluted water must be captured in the dirty water system. • Immediate cleaning of spillages that may occur. • All conveyors to be fully enclosed for zero spillage over all crossings.
24	Uncontrolled runoff from road re-alignment surface	• Increased flood peaks because of concentration of surface runoff leading to erosion and the formation of preferential flow paths. • Risk of contaminated stormwater runoff (e.g. hydrocarbons, sediment, originating from impermeable road surface).	Safety and Risk Exposure Water resources	• Construction should be immediately followed by rehabilitation. • Exposed soils to be protected by means of a suitable geotextile covering such as hessian sheeting until adequate vegetation cover is achieved. • Appropriate storm water management and erosion control measures should be included in the re-alignment engineering design. • Monitor and fix any erosion. • If spillages occur, these should immediately be cleaned up according to the Spill Management and Emergency Contingency Plan.
25	Opencast and underground mining	• Dewatering of aquifer because of mining	Groundwater Socio economic: Health and well-being	• Quarterly monitoring of borehole levels to monitor the extent of the dewatering. • Compensation mechanisms need to be developed and agreed with landowners to compensate those who are impacted upon.
26	Operational activities, opencast mining and surface dumps	• Decrease in regional water quality	Groundwater Socio economic: Health and well-being	• Quarterly monitoring of water qualities in boreholes. • Drains and cut-off trenches (stormwater management system) around the opencast pits must be implemented before commencing with pit development to prevent clean run-off water from entering the pit. • Contain dirty water runoff and water pumped from the pit in appropriately lined facilities for reuse in the process. • Ensure that barrier pillars with neighbouring mines are as wide as possible. • Effectively reduce the infiltration potential of opencast pits through good rehabilitation, shaping, vegetation and run-off designs. • Where possible, coal discard from the plant, and carbonaceous rocks should be placed in the deepest part of the pit (at least 20m deep) and covered as soon as possible. • Treatment of water prior to discharge – GOSA Treatment Strategy

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
27	Mining activities On-site conveyance of ROM & product	• Air quality impacts associated with mining and blasting activities and movement of vehicles, hauling of ROM coal.	Air quality Socio economic: Health and well-being	• Surfacing and/or chemical stabilisation of haul roads. • Limit speed of vehicles. • Implement appropriate maintenance management programme for vehicles. • Implement the GOSA Blasting Procedure.
28	Materials handling, processing	• Air Quality (dust) impact caused by materials handling, crushing and screening operations.	Air quality Socio economic: Health and well-being	• Increase the moisture content of the material being transported to limit the amount of material that can be liberated to atmosphere due to strong winds. • Reduction of drop height to reduce the dispersion of materials being transferred. • Wet suppression during tipping. • Ensure conveyors are covered especially where material is being transferred between conveyors. • Installation of dust suppression or capture system to the crusher to contain and capture fugitive dust.
29	Mine residue facilities, product stockpiles	• Increased dust emissions from the surface dumps and stockpiles, MRF.	Air quality Socio economic: Health and well-being	• Dust suppression of material being dumped. • Decrease tipping height. • Make use of wet suppression or vegetation where required to reduce the amount of available dust which can be liberated during strong gusts of wind
30	Opencast and underground mining	• Methane emissions leading to air quality impacts.	Air quality Socio economic: Health and well-being Carbon footprint	• Ongoing methane monitoring.
31	Underground mining	• Air quality impacts associated with ventilation shafts.	Air quality Socio economic: Health and well-being	• Dust collection systems in ventilation shafts.
32	Mining activities, mine residue facilities and surface dumps	• Spontaneous combustion during pillar mining leading to air quality impacts. • Spontaneous combustion of surface dumps.	Air quality Socio economic: Health and well-being Carbon footprint	• Smaller diameter blast holes (160mm compared with 311mm) to be used, together with a loser spacing of holes to obtain better fragmentation of the overburden. • Temperature monitoring of the interburden is practised continually using available drill holes. • Buffer blasting methods to be reintroduced. • After blasting coal must be mined immediately. • The open voids to be clad by sub-soil (softs) to reduce the amount of oxygen getting through the mined-out areas. • Surface dumps must be compacted and cladded where appropriate to reduce the amount of oxygen from entering the waste rock dumps. • A spontaneous combustion team has been formed to plan and measure the awareness of spontaneous combustion throughout the mine. • Increased vigilance must be practiced in summer months as the risk of spontaneous

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
				combustion rises in wet conditions.
33	Operational activities, opencast mining and surface dumps	• Health impacts due to air pollution	Health impacts due to air pollution Socio economic: Health and well-being	• Air Quality Monitoring programme. • Dust suppression on haul roads and stockpiles. • Dust suppression in CHPP and ROM Tip. • Required PPE is to be worn by employees working close to the site to reduce inhalation risk.
34	Operational and mining activities and surface dumps	• Elevated noise levels caused by mining operation, hauling of ROM and coal, processing coal) and blasting activities. • Noise impact (especially during the night) because of the ventilation systems/ extractor fan.	Ambient noise Socio economic: Health and well-being	• The design process must consider the insulation of particularly noisy plant and equipment. • The topsoil and overburden stockpiles from the opencast pit excavations should, where possible, be used as interim or long-term noise attenuation barriers. These berms should be as high as possible to break the line of sight from receptors to active mining activities. This is critical for all sensitive receptors located within 600 m from future mining activities. • All plant, equipment and vehicles are to be kept in good repair. • Where possible, very noisy activities should not take place at night (between the hours of 20h00 to 06h00). Specifically, blasting should take place to a regular programme and should be restricted to the period between 08h00 and 16h00. • Cladding of ventilation system/extractor fans – encapsulation in buildings, acoustic covers. • The applicant investigates any reasonable and valid noise complaints. A complaints register must be kept on site.
35	Operational activities, opencast mining and surface dumps	• Increased Visual Intrusion and Visibility of the mining operations and associated infrastructure.	Sense of Place Aesthetics Socio economic: Health and well-being	• Natural colours should be used in all instances and the use of highly reflective material should be avoided. Any metal surfaces should be painted to fit in with the natural environment in a colour that blends in effectively with the background. White structures are to be avoided as these will contrast significantly with the natural surroundings. • The identification of appropriate colours and textures for facility materials should consider both summer and winter appearance.
36	Night-time lighting	• Increased Visual Intrusion and Visibility of the proposed infrastructure due to night-time lighting.	Sense of Place Aesthetics Socio economic: Health and well-being	• Obtain guidance and advise from the Health Department on illumination in line with DMRE guidelines and regulations, as appropriate. • Minimum wattage light fixtures should be used, with the minimum intensity necessary to accomplish the light's purpose. The use of low-pressure sodium lamps, yellow LED lighting, or an equivalent reduces skyglow and wildlife impacts. • Outside lighting should be designed to minimise impacts on fauna, especially invertebrates. All outside lighting should be directed away from sensitive areas.
37	Blasting operation within the open pit area	• Potential damage to road infrastructure. • Potential for fly-rock, impacting on the safety of the road users.	Safety and Risk Exposure	• Mine not to blast in adverse meteorological conditions (overcast, strong wind blowing in direction of the road, early in the mornings, late in the afternoon). • Mine to erect blasting notice boards in the area with blasting dates and times highlighted. • Road closures within 500m of the blast. • Any evidence of fly rock must be noted, and the blast design analysed for possible improvements.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
				• Mine to implement a vibration and air blast measurement programme. This data must be analysed, and the blast impact assessment be reviewed and updated as required.

38	Blasting operation within the open pit area	• Impact on the communities because of blasting activities	Safety and Risk Exposure
			Socio economic: Health and well-being
				• Implement the GOSA Blasting Procedure.
				• Implementation of an Evacuation Procedure:
				  ○ All receptors or livestock within 500 m from a blast should be moved before, and during a blast.
				  ○ The roads must be closed when blasting is to take place within 500 m from the roads.
				  ○ Trains on the railway line be stopped before and during a blast taking place within 500 m from such infrastructure.
				• Vibration and air blast monitoring will be needed for all blasts in close proximity to sensitive receptors to ensure that the limits are being achieved and to provide an indication of when modification are needed to the blasting method to correct for increased vibration and air blast levels.
				• The mine must keep full records of each blast (blast design, timing, explosive mass per blast hole, stemming, subdrill, spacing, burden, meteorological conditions during the blast, etc.).
				• If any evidence of fly rock is noted, the blast be analysed for possible improvements.
				• The mine should discuss the blasting schedule when blasting is to take place within 1,000 m from the Mosque with the Muslim Iman of the Mosque. The mine should agree on the most appropriate time to blast.
				• The mine should erect clear signs indicating blast dates and times along the R545 road as well as agreed locations within Ogies. A blast schedule should be available to sensitive receptors.
				• Mine should initiate a forum to inform the close residents about the likely vibration and air blast levels, the proposed blasting schedule and warning methodology the mine will employ before a blast as well as a warning to residents that, when they are indoors during a blast, vibration of windows and ceilings may appear excessive. The local community members must be notified of times when blasts will be undertaken and the community must know that the potential impact of vibration was assessed.
				• Mine to prevent blasting in adverse meteorological conditions (overcast conditions, strong wind blowing in direction of local community, early in the mornings or late in the afternoon).
				• Communication and Grievance Mechanism.

39	Blasting operation within the open pit area Operational activities, opencast mining and surface dumps	• Destruction of heritage resources because of mining activities. • Impact on the Mosque and Muslim Graves.	Cultural heritage Burial sites	• Development and implementation of a Cultural Heritage Management Plan (CHMP) – Appendix 4. • Ongoing monitoring during construction and/or mining will be done by a qualified heritage specialist for early detection of unidentified (sub-surface) sites or graves. • All activities shall cease immediately upon any discovery of cultural and heritage resources and a qualified archaeologist informed to do further assessment and reporting. The site where

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
				cultural and heritage have been discovered shall be cordoned until such time that an instruction to resume work is provided to the contractor in writing, following consultation with the regulating authorities. • Include national heritage and cultural issues in the environmental awareness programme. • Avoid and demarcate the Mosque area and Muslim Grave sites. • Regular monitoring of the site to identify impacts at an early stage. • Pre-blast structural surveys will be conducted of the Mosque and Madrassah before blasting commences within a radius of 1 km.
40	Blasting operation within the open pit area Emulsion silos	• Water quality impacts (lowering of pH and increased nitrate levels) because of explosives dissolving in water • Safety and health risk associated with handling and preparation of bulk explosives	Water resources Safety and Risk Exposure Socio economic: Health and well-being	• Emulsion silos to be placed within dirty water footprint. All surface water runoff from the emulsion silo area to be collected in dirty water management facilities. • Accidental spillages during off-loading and blast preparation should be cleaned immediately. • Appropriate PPE to be worn when handling emulsion and bulk explosives. • Health and safety procedures to be included in the Blasting Procedure. • Monitoring of surface and groundwater to detect unacceptable levels of ammonium nitrate concentrations (>2 mg/l). • Disposal of unused emulsion should be done in accordance with the relevant local, provincial or national legislation. Recover, reclaim or recycle if practicable.
41	Transport of product (Rail Loop) Truck transport	• Increase of ambient noise levels along the rail route and product transport route.	Ambient noise Socio economic: Health and well-being	• Noise suppression devices on heavy vehicles / conveying equipment. • Adhering to maximum speed limit of 80 km/h for coal trucks. • Maintenance of vehicles. • Communication and Grievance Mechanism.
42	Transport of product (Rail Loop) Truck transport	• Dust impacts caused by materials handling. • Material and product loss from load bins. • Increase in vehicle entrained dust.	Air quality Socio economic: Health and well-being	• Reduce tipping height. • The transport route must be surfaced to limit dust emissions. • Reduction of vehicle speeds on all unpaved roads. • If there is a spill this is to be cleaned up to avoid additional entrained dust from other vehicles. • Use wheel mudguards to reduce dispersion of dust from wheels when travelling on unpaved roads. • Ensuring coal is covered with a tarpaulin when travelling on off-site roads to reduce dust emissions. • Ensure vehicle bins are covered both when loaded and empty. • Communication and Grievance Mechanism.
43	Transport of product (Rail Loop) Truck transport	• Killing of animals crossing the railway, avifauna.	Terrestrial biodiversity	• The rail route will be fenced off to prevent animals from going onto the track. • Animal corridors underneath the railway to be included in the design.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
44	Transport of product (Rail Loop) Truck transport	• Increased traffic leading to safety risk to other road users.	Safety and Risk Exposure Socio economic: Health and well-being	• Adhering to all road regulations, e.g. speed limits. Maximum speed limit of 80 km/h for coal trucks. • Ensuring headlights are on all the time to increase visibility. • Ensuring coal is covered with a tarpaulin when travelling on off-site roads. • Ensuring the coal trucks use only the designated routes. • Trucks fitted with tracking system for real-time reporting of speeding / deviation from route. • Trucks loaded and verified overweight bridge to prevent over-loading. • Traffic management where product transport coincides with local movement on roads, such as the roads to the south of GGV. Provision of additional “park lanes” for product transport trucks, and no allowance of trucks to park or wait on the existing road.
45	Transport of product (Rail Loop) Truck transport	• Spillages leading to environmental impact and safety risks.	Terrestrial biodiversity Water resources Safety and Risk Exposure	• Trailers of "side-tipper" design to ensure no spillage of coal or water on the road. • Ensuring coal is covered with a tarpaulin when travelling on off-site roads. • Cleaning up of any spillages that may have occurred. • Upgrading of transport routes as required. • Ensuring a system of road maintenance is in place.
46	Waste management	• Poor waste management could lead to environmental impacts.	Terrestrial biodiversity Water resources	• Implementation and regular review of Waste Management Procedure. • Different waste streams will be segregated and disposed of in appropriate designated receptacles. • Hazardous substances will be stored on impervious surfaces that allows for the containment of spills/leaks. • In the case of accidental spillages, this will be cleaned-up immediately in line with the hydrocarbon management procedure. • Appoint an approved, registered waste contractor to manage the waste generation and safe disposal thereof. • No waste will be disposed of or buried on site, or in any other location that is not a licensed waste disposal site. • Waste tyres must be stored in dedicated, demarcated storage areas until reuse on site or recycling can be effected. Management of the waste tyre storage areas should conform to the Waste Tyre Regulations (GN No. 1064 of 29 September 2017).
47	Hydrocarbon management	• Soil and water quality impacts because of poor hydrocarbon management and spillages.	Soils / Land Use & Capability Water resources	• Implement hydrocarbon management procedure. • Bulk facilities to be concrete lined and bunded to capacity of 110%. • Reclamation of soil in the event of accidental spillages.
48	Bulk electricity	• Further impact on over-allocated electricity reticulation system.	Carbon footprint	• Mine Engineer must identify and implement energy efficiency initiatives to reduce bulk electricity needs. • Develop and implement Pollution Prevention Plans (PPP).

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
				• Develop and implement carbon abatement strategies.
49	Bulk water	• Spills due to pipe leaks and spills	Biodiversity / Soil, Land Use & Capability Water resources	• Regular inspection of the pipeline route. • Maintenance and operational manual for all valves and joints. • Implement emergency procedure to address major leaks and spills.
50	Socio-economic	• Influx of temporary workers	Human capital	• Ensure, as far as possible, that contactors recruit local labour. • Establishing skills development programmes in areas where most employment opportunities will be available such as operators and artisans, e.g. learnerships and graduate training programmes.
DECOMMISSIONING AND CLOSURE				
51	Rehabilitation and decommissioning activities	• Ineffective removal of infrastructure and closure of opencast pit, resulting in a void in the landscape Ineffective rehabilitation leading to poor vegetation cover or and permanent scarring of the landscape.	Biodiversity / Soil, Land Use & Capability End land use	• Development of a Rehabilitation, Decommissioning and Closure Plan (GN1147), including but not limited to: o Concurrent rehabilitation and levelling of opencast pits. o Dismantling of infrastructure and rehabilitation of infrastructure areas post-mining. All surface infrastructure is to be removed and waste material disposed of at a registered dump site. Waste and remnant mine related material are not to be dumped or left within the footprint areas. o Final rehabilitation of disturbed areas. Where soils have been compacted, they are to be ripped and where necessary reprofiled. o Rehabilitation and capping of the MRF post-mining. o Ongoing revegetation of levelled areas. Indigenous floral species are to be used for revegetation of disturbed areas. Where possible, reinstatement of floral communities similar to the reference vegetation type for the area must form the goal of rehabilitation activities. o Ongoing monitoring and assessment to ensure that rehabilitation and vegetation cover is sustainable. • Annual review of Rehabilitation, Decommissioning and Closure Plan (GN1147). • Decommissioning and demolition of footprints and adjacent disturbed areas should be kept as small as possible and no further vegetation should be cleared or soils exposed for this purpose. • As an overarching closure and rehab objective, the rehabilitation should aim to reinstate natural hydropedological processes. This can be achieved by replacing the soil material in the same sequence as in the pre-mining scenario. This will likely restore (to a degree) some functionality of the remaining wetlands as far as possible. • Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity re-instatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
				re-establishment of the natural wilderness conditions which are analogous to the post-closure rehabilitation goal for the mine.
52	Rehabilitation and decommissioning activities	• Potential hard setting of soils post-reclamation. • Subsidence of rehabilitated areas. • Erosion	Biodiversity / Soil, Land Use & Capability End land use	• Limit vehicular movement after topsoil placement. • Reclaim or apply protective covering on disturbed soils as quickly as possible. • Rehabilitation of disturbed areas to free-draining scenario, preventing ponding. • Regular monitoring to identify and rectify subsidence. • Apply erosion controls relative to possible soil erosion from vehicular traffic and during mining activities (e.g. jute netting, silt fences, and check dams). • Stabilise all areas of disturbed soil using weed-free native shrubs, grasses, and forbs. • Soil erosion will be mitigated by planting pioneer grass species to stabilise soil. • Ongoing soil fertility monitoring.
53	Rehabilitation and decommissioning activities	• Impacts on the hillslope processes supporting the watercourse downstream. • Alteration of hydropedological flow drivers of the wetlands.	Aquatic/wetland systems	• Reinstatement of hydropedologically important soils should be undertaken for the remaining wetland portions in the landscape. • Although subsidence and cracking are not expected to occur, monitoring is deemed essential to ensure that the wetlands as well as the wetland recharge mechanisms remain unimpacted during all phases of development.
54	Rehabilitation and decommissioning activities	• Demolition and removal of infrastructure leading to dust generation, erosion and changes in the visual character of the area.	Biodiversity / Soil, Land Use & Capability Aesthetics	• Revegetation of exposed areas for long-term dust and water erosion control. • Indigenous and locally occurring plant species for use in re-vegetation should be selected taken quick growth rates into consideration to cover bare areas and prevent soil erosion.
55	Post-closure residual impacts	• Migration of pollution plume after full recovery of groundwater levels (prior to decant).	Water resources Aquatic/wetland systems	• Treatment of water prior to discharge – GOSA Treatment Strategy. • Groundwater and geochemical models must be updated on a regular basis (at least every 2 years) to verify potential decant.
56	Post-closure residual impacts	• Impact of long-term decant on water quality.	Water resources Aquatic/wetland systems	• Managing dirty water make from the various point sources. • Ensure that the pit water levels remain below the decant levels through the extraction and treatment of water as and where required. • Ensure that barrier pillars with neighbouring mines are as wide as possible. • Effectively reduce the infiltration potential of opencast pits through good rehabilitation, shaping, vegetation and run-off designs. • Where possible, coal discard from the Plant, and carbonaceous rocks should be placed in the deepest part of the pit (at least 20m deep) and covered as soon as possible. • Treatment of water prior to discharge – GOSA Treatment Strategy.

ID	Risk (impact) trigger	Potential Impact	Aspects affected	Impact Management Actions (Mitigation Measures)
57	Post-closure residual impacts	• Ongoing proliferation of alien vegetation.	Biodiversity / Soil, Land Use & Capability Aquatic/wetland systems End land use Aesthetics	• Ensure sound implementation of the AIPCP for up to 2 years after closure but preferably until all AIP species are under control and no risk of spread to adjacent, natural habitat remains. • Follow up with alien and invasive plant control measures for a period of 5 years post-closure.
58	Post-closure residual impacts	• Downscaling and retrenchment	Human capital	• Implement portable skills development programmes to enable retrenched employees to find alternative employment. • Design and implement economic development programmes that will assist people being retrenched in sustaining their livelihoods. • Establish a future forum with representation from the workforce to discuss potential difficulties and solutions. • Implementation of programmes to minimise and mitigate the impact of downscaling and retrenchment. • Implementation of capacity building programmes to minimise and mitigate the impact of mine downscaling and closure. • Design and implement economic development programmes that will assist Ogies and Phola in sustaining their livelihoods. • Engage Emalahleni Local Municipality in the closure planning to provide support and inputs into the broader regional planning.

3.2 MECHANISMS AND RESPONSIBILITIES FOR IMPLEMENTATION

The action plan to achieve the stated environmental management objectives and outcomes is tabled below, together with key performance areas and indicators, as well as roles and responsibilities.

Table 3: Key performance areas and indicators

Objective	Performance Area	Indicators	Roles and Responsibility
Surface water			
Water balance	Ensures good water management on site	• Dedicated monitoring programme • Annually updated water balance	Specialist to be appointed
Storm water management	Separation of clean and dirty water	• Adequate storm water controls including maintenance of these systems	Engineering Department
Erosion	Prevention of erosion, particularly where clean water diversions discharge back to the environment	• Adequate erosion protection	Engineering Department
River diversions	Prevention of erosion and degradation of water quality/quantity at river diversions	• Adequate maintenance and erosion protection	Engineering Department
Pollution	Prevention of pollution	• Well maintained pollution control dams; re-use of stored water on site, where possible; separation of clean and dirty water	Engineering Department
Surface water quality	Possible changes in water quality measured on the streams upstream and downstream	• Dedicated monitoring programme • Measurement of inorganic constituents of water qualities to quantify impacts	Environmental Officer
Catchment yield	Loss in yield related to rehabilitation or dewatering of groundwater	• Based on rehabilitation backlog, drainage of rehabilitated areas	Specialist to be appointed
Hydrology	Possible increase in flood peaks due to increased runoff through removing of grasses, damage to wetlands etc.	• Assess impacts on the natural systems that could affect the flood peaks or volumes	Specialist to be appointed
Groundwater			
Groundwater quality	Possible changes in water quality measured in users or monitoring boreholes	• Dedicated monitoring programme • Measurement of inorganic constituents of water qualities to quantify impacts	Environmental Officer

Objective	Performance Area	Indicators	Roles and Responsibility
Hydro-census	Possible changes to groundwater usage, quality and levels	• Hydro-census undertaken as required	Specialist to be appointed
Waste			
Waste management	Prevention of pollution due to local contamination at infrastructure areas, recycling	• Bund or contain all dirty and waste containment areas, reuse or recycle where possible • Implementation and auditing of waste management procedure	Environmental Officer
Long-term sustainability			
Biomonitoring and Ecosystem	Deterioration in the ecosystem through impacts on habitats, water quality	• Dedicated biodiversity monitoring programme • Remedial measures implemented • Wetland offset programme	Specialist to be appointed
Terrestrial biodiversity	Proliferation of IAPs Impact on SCC	• Dedicated IAPCP • Rescue and Relocation Plan	Specialist(s) to be appointed
Rehabilitation	Rehabilitation to free-draining landform	• Ongoing improvement and refinement of rehabilitation plan to facilitate free-draining landform • Develop final land use plan in conjunction with IAPs	Specialist to be appointed
Sustainability	Erosion of post mining or operational landforms, damage to natural systems Energy and material consumption Carbon footprint	• Monitor erosion and deposition on and off site • Monitor and take measures to efficiently manage water and energy consumption • Development, implementation and monitoring of carbon abatement strategies	Engineering Department
Social impact management			
Community	Manage IAP issues	• Consultation processes, effectiveness in addressing concerns, management of any complaints • Implementation and monitoring of Social Involvement Plans (SIP)	HSEC Committee and the Community Liaison
Heritage	Impact on heritage resources as a result of mining	• Develop and implement CHMP • Ongoing monitoring during construction and/or mining by a qualified heritage specialist	Environmental Officer
Health impact	Impact on surrounding communities	• Dedicated air quality monitoring • Remedial measures implemented	HSEC Manager

Objective	Performance Area	Indicators	Roles and Responsibility
Blasting impact	Impact on surrounding communities	• Dedicated blasting (vibration and air blast) monitoring • Remedial measures implemented	Engineering Department and HSEC Manager
Traffic impact	Safety risk to other road users	• Traffic Management Plan for construction of re-alignment and product transport (haulage)	Engineering Department

4 ENVIRONMENTALLY RELATED EMERGENCIES AND REMEDIATION

4.1 LIST OF POTENTIAL EMERGENCIES AND REMEDIATION

Corporate functions in terms of emergency preparedness and response relate primarily to reporting and communication. Emergencies at the sites will be managed through site emergency procedures as required (as a minimum) by the Health and Safety Emergency Code of Practice. The emergency procedure must address the following events:

- Oil or fuel leaks and spills
- Coal spillage on the floodplain of any streams
- Rupture of dirty water pipes, particularly at stream crossings
- Dirty water dams overtopping or failing during extreme rainfall events or because of overflow blockages, resulting in pollution
- Flooding (surface and underground)
- Fires (surface and underground)
- Accumulation of flammable/noxious gases
- Major ground movement (surface and underground including rock burst)
- Chemical spills
- Flammable and combustible liquids
- MRF collapse/overtopping
- Labour/civil disturbances (surface/underground)
- Multiple casualty accidents
- Power failure (surface and underground).
- Explosion of gas/coal dust
- Premature ignition of explosives
- Shaft accidents
- Any other eventuality determined by critical task analysis, baseline-, or issue-based risk assessment
- Community incidents
- Natural events such as extreme rain events, wind conditions, veld fires, lightning strikes

The HSEC manager will be available to provide advice to business units on incident management and emergency response, where necessary. All business units shall develop and implement an emergency code of practice for critical incidents and emergency situations and for preventing and mitigating environmental and social impacts associated with such incidents. This should include the completion of a risk assessment to identify potential emergency situations, the development of response plans to manage such emergencies, the identification of responsibilities and contacts in case of emergency, and internal and external communication procedures.

Emergency response plans should also detail training and testing plans relating to emergency response. Where appropriate environmental and community emergency response plans should be integrated with other site emergency response plans such as the Health and Safety Emergency Code of Practice. The emergency response plan will be tested at least annually for every area.

The HSEC manager is to oversee the investigations of emergency incidents, and recommend any further action required to manage the incident and mitigate against further incidents. Emergency call numbers are listed in Table 4.

An environmental incident is defined as "*an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed*".

Some environmental emergencies have been identified that could occur during the project, in the event of which immediate remedial action must be undertaken, namely:

- Occurrence of surface fires, including veldt fires
- Compromising of dirty water management structures
- Hydrocarbon spills or leaks from machinery on the surface
- Incident or accident during the transportation of hazardous waste

4.1.1 Surface Fires

In the event of a fire, the procedure to be followed is provided in Section 18 of the National Veld and Forest Fires Act, 1998 (Act 101 of 1998). The said Act provides for the notification of relevant affected parties, access to land on which a fire is burning for the purpose of extinguishing it and requires that the fire protection officer of the area be informed, as well as those of surrounding areas to which the fire may spread. An emergency procedure will be developed in conjunction with the landowners and the local fire department to ensure in the event of a surface fire, the requirements of the National Veld and Forest Fires Act will be met.

4.1.2 Compromising of Surface or Groundwater Protection Measures

All compromised canals / berms and other surface or groundwater protection measures will immediately be repaired and stabilised to avoid further contamination of clean areas with dirty water and the impacts associated therewith. Also refer to *Spill Management Procedure* below.

4.1.3 Hydrocarbon Spills or Leaks from Machinery

All areas affected by spills of hydrocarbons will be remedied immediately. Soil rehabilitation by land farming, or other means will be initiated immediately, and the necessary measures will be taken to ensure that pollution of surface water and groundwater does not occur. Also refer to *Spill Management Procedure* below.

Table 4: GGV Complex Emergency Call Numbers

EMERGENCY CALL NUMBERS			
GGV MINING CONTROL ROOM	**071 313 6133**	**013 643 4125**	**4192**
GGV SURFACE CONTROL ROOM	**071 313 6344**	**013 643 4186**	
ER24			
TWEEFONTEIN BASE STATION	**013 686 3350 (9231)**	**084 460 7113 (9232)** **084 356 6026 (9232)**	
ER24 – Willem Muller (Operations Manager)		**082 929 0252** **084 460 7113**	
NATIONAL CALL NUMBER (Ask for Mpumalanga Dispatcher)		**084 124**	
OCCUPATIONAL LIFE CLINIC			
TAVISTOCK CLINIC		**013 686 4253**	
COSMOS HOSPITAL		**013 653 8000 (9235)**	
WITBANK HOSPITAL		**013 653 2000 (9236)**	
AMCOAL / HIGHVELD HOSPITAL		**013 656 9519 (9237)**	
OMEGA RISK SOLUTIONS - SECURITY			
SECURITY CONTROL ROOM (ML)		**013 643 4339**	**N/A**
SECURITY MANAGER GGV	**Jacques Dannhauser**	**076 631 5737**	**9172**
ASSISTANT SECURITY MANAGER	**Archies Olivier**	**060 784 4394**	**9148**
GGV FIRE CAPTAIN			
Pieter Etsebeth	**072 850 7576**		
EMERGENCY PROTECTION SERVICES			
SAPS – WITBANK	**013 655 5000**	**10111**	
SAPS – OGIES		**013 643 1111 (9239)**	
WITBANK FIRE BRIGADE	**013 690 6333 (9240)**	**10177** **REGIONAL NUMBER FOR ALL EMERGENCIES**	
WITBANK AMBULANCE SERVICES	**10177**		
WITBANK TRAFFIC DEPARTMENT	**013 690 6444 (9241)**		
MINES RESCUE SERVICES TRAINING STATION - EVANDER		**017 632 4671 (9242)** **017 632 1122 (9243)**	
F SWANEPOEL (SUPERINTENDENT)	**017 632 3840 (H)**	**082 576 6957**	
(ASST SUPERINTENDENTS) **E P HORN** **W JACOBS** **J JOUBERT**	 **017 631 4333 (H)** **017 631 5306 (H)** **017 631 5269 (H)**	 **083 629 7091** **076 575 6292** **082 491 5902**	
HELICOPTER CO-ORDINATES			
S 26^0 05′ 52.1″ : E 029^0 04′ 25.1″			
NEIGHBOURING MINES			
Khutala Mine		**013 648 5000**	
Klipspruit Mine		**013 643 1518 / 013 643 3800**	
TOC (Victor Masoma - Fire Team Co-ordinator)		**082 337 6363**	

4.1.4 Transportation of Hazardous Waste

In the event of an incident or accident during the transportation of hazardous waste, the following must be done:

- When a spill occurs, isolate the area to prevent people from entering the spill area and spreading the contamination. This is done with warning signs and barrier tape, or other similar actions. Seal off the area until assistance arrives.
- Women who might be pregnant, or people with a history of kidney damage, should be kept away from the spill area until the clean-up is finished.
- The driver must notify his supervisor who will in turn contact clean-up services for a large spill.
- For a large spill call: 0800 147 112 – Enviroserv National Oil and Chemical Spill Response (24 hours)
- For a small to medium spill (from 30ml up to 20-40L), the following types of spill kits may be used depending on the type of waste spilled:

Product Description	Inventory List
240L Oil Spill Kit Wheelie Bin Complete (1 Unit)	1 x 240 Litre Wheelie bin
	1 x Bag of Abzorbit Hydrocarbon Absorbent – absorbs 170 liters of hydrocarbon
	2 x 2m booms (to contain or re-route spillage)
	10 x Oil Absorbent Mat Pads
	1 x Spark Proof Broom
	1 x Spark Proof Shovel
	5 x Recovery Bags and Ties
	1 x Pair of PVC Gloves
	1 x Dust Masks and 1 x Safety Glasses
	1 x Spill Training Manual
240lt Chemical spill kit bin complete (1 Unit)	1 x 240lt blue wheelie bin
	1 x 25lt bucket minrosorb
	1 x 25lt bucket organogel
	2 x 2m chemical boom
	10 x chemical mat pads
	1 x Dust masks and 1x Safety Glasses
	1 x Nitrile glove
	1 x Broom
	1 x Spark proof shovel
	5 x Recovery bags and cable ties

- Follow the clean-up procedures in the spill kit.

4.2 SPILL MANAGEMENT

4.2.1 Recording of Incidents

All environmental incidents/accidents or disasters will be reported immediately or during the shift to the responsible manager or immediate supervisor. Contractors and employees will be trained in environmental awareness to assist in identifying such events. The immediate action will be to contain/stop the incident/accident or disaster and the next steps will depend on the nature and magnitude of the event.

These steps may include:

- Stop the spill
- Investigate the incidents/accident/disaster
- Clean contaminated areas
- Pump and store affected water
- Construct emergency water management structures
- Treat contaminated natural resources
- Rehabilitation of the affected environment
- Notifying the relevant IAPs (including DWS and DMRE) of moderate, major and critical incidents. The definition of incident categories is described in Table 5. Incidents/ accidents that fall within those ranges may have an impact on the affected downstream users, the regional users and the national users and it is therefore essential that it be reported to authorities and IAPs.
- Low and minor incidents however may have an impact on the natural and physical environment on site and it is therefore required to mitigate and rehabilitate the effect of the incident to reach the objectives set in the EMPr.

Notification will be done by the fastest possible means and the following information will be supplied:

- The date and time of the incident.
- A description of the incident.
- The source of the pollution or potential pollution.
- The impact or potential impact on the water resource and the relevant water users.
- Remedial action taken or to be taken or activity to remedy the effects of the incident.

As soon as reasonably possible after the date of the incident/accident or disaster a written report will be forwarded to the relevant government department stating what measures will be taken to correct and prevent a recurrence of the event.

To prevent the occurrence of such incidents/accidents the proposed management measures will be implemented and the monitoring be done.

An incident reporting database/impact register exist at the mine and all incidents are entered into a central database by the person reporting the incident or another designated person. These incidents will then also be reported to the DMRE/DWS and other relevant authorities and parties as required.

Table 5: Incident Categories

Risk level	Description
Low	Impact zone small with no lasting effect. Low-level impacts on biological or physical environment. Limited damage to minimal area of low significance.
Minor	Larger impact zone but still within the boundaries of the mine. Minor effects on biological or physical environment. Minor short-term to medium-term damage to small area of limited significance.
Moderate	Impact zone extends over the boundaries of the mine, influencing the downstream and/or neighbouring users. Moderate effects on biological or physical environment but not affecting ecosystem function.
Major	Impact zone extends over the region. Serious environmental effects with some impairment of ecosystem function. Widespread medium-term to long-term impacts.
Critical	Impact zone extent is national. Very serious environmental effects with impairment of ecosystem function. Long-term widespread effects on the environment.

4.2.2 Reporting

The reporting and control of an emergency incident should be dealt with in terms of Section 20 of the NWA and in the event of a Major Spill the following agencies should be notified immediately:

- DWS: Emergency Toll-free 0800 200 200; Nelspruit (013) 759 7300; Bronkhorstspruit (013) 932 2061
- Emalahleni Fire Department: Emergency Call Centre – (013) 690 6222 / 6333 / 6444
- Emalahleni South African Police Services: (013) 655 5000
- Police Emergency Helpline: 10111
- Emalahleni Local Municipality: Emergency (013) 690 6222 / 6911

5 ENVIRONMENTAL MONITORING AND AUDITING

5.1 MONITORING

GGV Complex has a comprehensive standalone monitoring programme that has been implemented – refer to Table 6. The objective of the environmental monitoring system is to:

- Prevent and/or minimise the environmental impact associated with the mining operation;
- Ensure that the environmental management system at GGV Complex performs according to specifications;
- Ensure conformance with the environmental objectives;
- Ensure timeous implementation of the environmental strategies and implementation programme;
- Act as a pollution early-warning system;
- Obtain the necessary data required to address knowledge gaps;
- Check compliance with license requirements; and
- Ensure consistent auditing and reporting protocols.

It must be noted that the monitoring programme is a dynamic system changing over the different life-cycle phases of the mine. The programme will be reviewed on an annual basis and revised if necessary.

EMPr performance assessments, as required in terms of the MPRDA, will be performed as required and submitted to the DMRE for distribution to other relevant authorities. Monitoring reports for all sampling with trends and interpretation of data will be submitted to the DMRE and the DWS on an annual basis.

The GGV Complex auditing and reporting protocol is summarised in Table 8.

Table 6: Environmental Monitoring Programme for the GGV Complex

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling method	Variables
Climate	Weather Station	To obtain detailed weather records for the LOM	GGV Complex MRA area	Continuous	Air Quality Monitor	Wind speed and direction Temperature and rainfall Humidity and atmospheric pressure
Surface water	Zaaiwaterspruit and tributaries	Determine any deterioration in water quality because of the mining related activities	As per existing monitoring plan based on IWUL and IWWMP (App 3)	Monthly	Grab sampling	EC, pH, TDS, SS, Cl, SO_4, NO_3, Na, F, Fe, Al, Mn, Zn, Total Alkalinity, Ca, Mg, K, Total Hardness.
				Six monthly	Grab sampling	Analyses to 95% charge balance, including all metals and hydrocarbons.
	Clean water stream diversion	Determine any deterioration in water quality because of the mining related activities	As per existing monitoring plan based on IWUL and IWWMP (App 3)	Monthly	Grab sampling	EC, pH, TDS, SS, Cl, SO_4, NO_3, Na, F, Fe, Al, Mn, Zn, Total Alkalinity, Ca, Mg, K, Total Hardness.
	Dirty water systems	Determine the water quality and long-term chemical changes in the dirty water systems	As per existing monitoring plan based on IWUL and IWWMP (App 3)	Monthly	Grab sampling	EC, pH, TDS, SS, Cl, SO_4, NO_3, Na, F, Fe, Al, Mn, Zn, Total Alkalinity, Ca, Mg, K, Total Hardness.
	Water management infrastructure	Monitoring of condition, identifying areas that require maintenance	River diversions, road/conveyor crossings, discharge points, clean and dirty water canals, dirty water dams	Quarterly After a big rain event.	Visual inspection	Evidence of erosion, cracks, subsidence, overgrowth, etc.
	Overburden stockpiles	Determine any seepages from the overburden stockpiles that could impact on the water quality of the Zaaiwaterspruit	Along full extent of the overburden stockpiles and flood protection berms	Quarterly	Visual inspection	Evidence of salt precipitation or water seeps.
	Dragline and haul road crossings	To identify and mitigate any spillages into the clean water system	All crossings over clean water canals	Monthly	Visual inspection	Evidence of spillages

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling method	Variables
	Biomonitoring	Determine ecological integrity of the Zaaiwaterspruit and remaining wetland systems	Zaaiwaterspruit diversion and other river diversions, remaining wetland systems and pans As per IWUL and IWWMP (App 3)	Quarterly (wet and dry)	SASS4/5 IHAS	SASS4/5 IHAS Diatoms
				Annually	FAII	FAII
Groundwater	Groundwater quality	To determine any impact on the groundwater quality because of mining	As per existing monitoring plan based on IWUL and IWWMP (App 3)	Quarterly	High integrity grab sampler (double valve)	EC, pH, TDS, total hardness, total alkalinity, calcium, magnesium, sodium, potassium, chloride, sulphate, fluoride, nitrate, iron, manganese, aluminium and turbidity
						Acidic pH-environments: All of the above parameters and including a full range of heavy metals.
	Groundwater levels	To determine any impact on the groundwater quantity because of mining	As per existing monitoring plan based on IWUL and IWWMP (App 3)	As above	High integrity dip meter	Water level
	Groundwater inflows	To determine the inflows into the underground workings leading to reduction in surface flows	Seepages especially seepages from vertical to near vertical discontinuities in the roof Flow in the wetlands upstream and downstream of underground workings	As per specialist advise		
Mine water balance	Rainfall and evaporation	To obtain long-term data records to verify the water balance model	Weather Station	Daily	Visual	Volume (mm)
	Water levels in dams	To verify water balance and volume of dirty water stored	All dirty water dams	Monthly	Survey	Height (m)

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling method	Variables
	Dirty water volumes	To determine volume of dirty water pumped and stored	All dirty water containment areas	Monthly reading	Water meters	Volume (m^3)
	Water volumes abstracted	To determine volume of dirty water abstracted for processing and dust suppression	At all water abstraction points	Monthly reading	Water meters	Volume (m^3)
Inter-mine flow	Barrier pillars	To confirm barrier pillar geometry	Selected points (to be finalised) once barriers are established between pits	Once off	Survey	Thickness distribution Coal seam floor elevations Structural integrity
Land use management	Concurrent rehabilitation	To determine conformance with environmental objective for concurrent rehabilitation	Mining area	Monthly	Survey	Hectares disturbed Hectares levelled Hectares topsoiled Hectares revegetated
	Topsoil placement	To ensure compliance with rehabilitation standards	Rehabilitated areas	Per area topsoiled	Survey	Thickness of topsoil
	Rehabilitation plan	To ensure conformance to final rehabilitation plan and free-draining standard	Rehabilitated areas	Monthly	Survey	Final level of rehabilitation
	Soil analysis	To determine any deficiencies in soil fertility prior to seeding	Topsoiled areas	Ongoing (prior to seeding)	Soil samples	As per specialist advise
	Vegetation monitoring	To ensure successful establishment of vegetation	Revegetated areas	Annually	Specialist evaluation	Sustainable vegetation basal cover
	Alien vegetation	To monitor conformance with alien vegetation programme	Total mining area, including rehabilitated areas	As per the recommendations in the AIPCP	Survey	Area (hectares)
Air quality	Dust outfall	To determine the levels of dust outfall because of the mining activities	As per existing monitoring plan (Figure 10)	Continuous	Dust outfall buckets	Settleable particles ($mg/m^2/day$)
		Determine the levels of PM_{10} and $PM_{2.5}$	Ogies Church building	Continuous	Real-time monitoring system	Settleable particles (µg/m3)

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling method	Variables
Blasting	Air blast and ground vibration	To determine the effectiveness of the blasting procedure and early identification of potential infrastructural damage		As per specialist advise Close to sensitive receptors, varying as mining progresses		
	Pre-blast surveys of infrastructure within 1 km radius of mining	To determine baseline structural damage at the Mosque and Madrassah prior to mining activities		As per specialist advice		
Heritage resources	Unidentified (unknown) sites	To identify any heritage and/or grave sites prior to construction or mining that could be impacted by mining		Ongoing monitoring during construction and/or mining by a qualified heritage specialist		
Natural resources	Energy conservation Carbon footprint	To measure conformance to Pollution Prevention Plans and approved carbon budget		As per approved PPP		
	Waste minimisation	To measure conformance to waste minimisation objectives		As per Waste Minimisation Strategy		

5.1.1 Water Resource Monitoring

The existing monitoring programmes for surface water, groundwater and biomonitoring (aquatic/ wetland resources) are detailed in the IWWMP for the GGV Complex and are not repeated here. These monitoring programmes are reviewed and updated (if required) annually with the revision of the IWWMP. Refer to the attached 2022 IWWMP (Jones & Wagener, Appendix 3).

5.1.2 Air Quality Monitoring

5.1.2.1 Dust fall-out

GGV Complex has an established dust fall-out monitoring network. The monitoring programme is re-evaluated on a regular basis as mining and infrastructure development progresses. Dust fall-out are recorded monthly, with an annual monitoring report.

The existing monitoring points are shown in Figure 10.

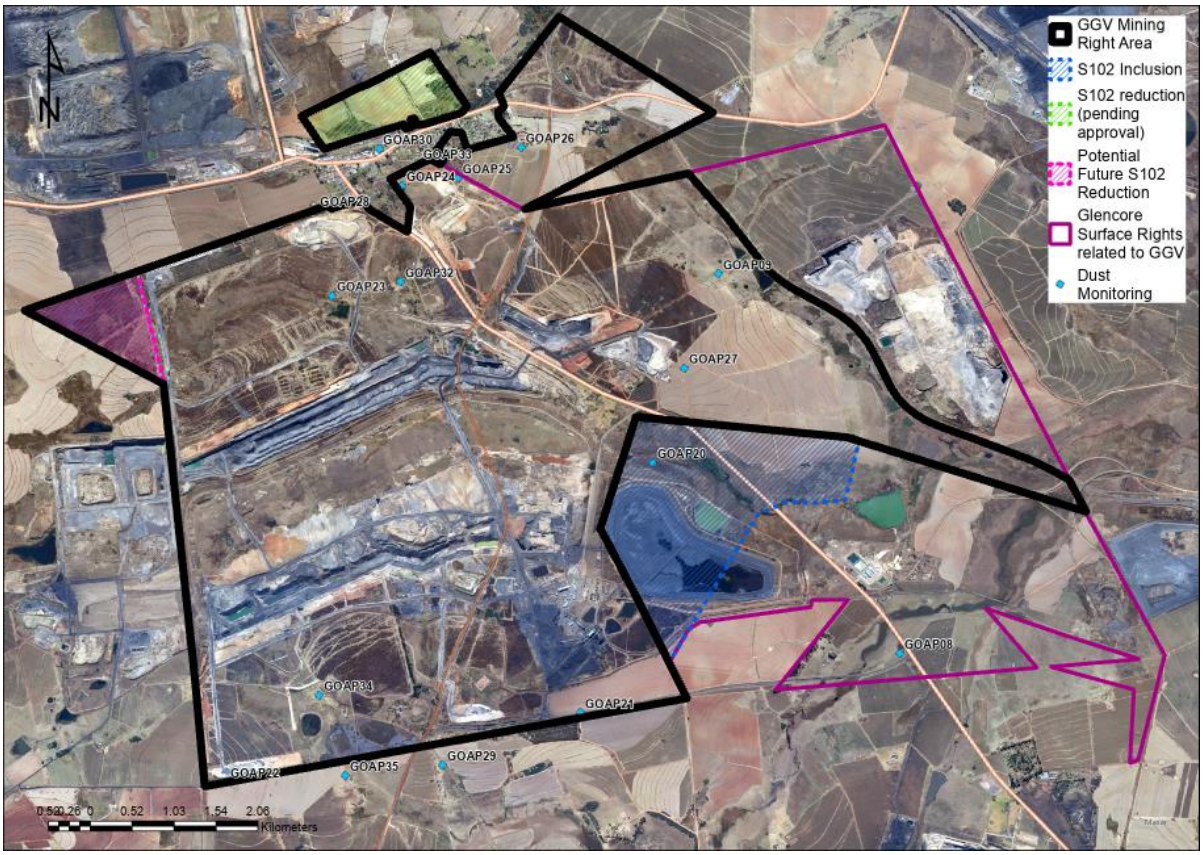

Figure 10: Air quality monitoring points

5.1.2.2 Particulate matter (PM)

A real-time PM monitoring system has been installed in Ogies, at the church building. This monitoring is conducted by means of the Aeroqual Dust Sentry Pro system, capable of measuring meteorological data and delivers simultaneous measurement of PM_{10}, $PM_{2.5}$, and Total Suspended Particles (TSP).

5.1.3 Air Blast and Vibration

Ground vibration and air blast monitoring is conducted for all blasts near sensitive receptors to ensure that the limits are being achieved and to provide an indication of when modification are needed to the blasting method to correct for increased ground vibration and air blast levels.

No fixed monitoring points are proposed, as these will change as mining progresses.

5.1.4 Waste Monitoring

There is no official waste monitoring programme at the mine as it stands, but information is gathered from the contractors who remove the waste. Domestic and hazardous waste is removed and taken to an appropriate waste disposal site.

Contractors are responsible for the removal of these waste skips, which should be emptied regularly (once a month or when full) and replaced with empty skips.

The contractors keep record of the volumes of waste removed from Goedgevonden and the volumes dumped at the disposal facility, which is then reported to the mine.

5.2 SUSTAINABLE DEVELOPMENT (SD) MANAGEMENT SYSTEM

Glencore's Sustainability Strategy sets out its ambitions against four core pillars: health, safety, environment, and community and human rights (HSEC&HR) and drives positive change throughout the business. Each pillar has clearly defined strategic imperatives, objectives, policies, priority areas and targets. Glencore review the approach annually to confirm that it continues to fulfil the needs of the business.

Governance of the Group Sustainability Strategy and framework rests with the Board's HSEC Committee, who sets the strategic direction for sustainability activities and oversees the development and implementation of the strategic HSEC&HR programmes. Oversight and ultimate responsibility for the Group Sustainability Strategy and framework and its implementation across the Group, rests with the senior management team, including the CEO and heads of the Commodity Departments. They take a hands-on approach to monitoring and managing sustainability activities around the Group. The approach adopted for the SD Management System is also aligned with that of OHSAS 18000 and ISO 14001.

5.3 AUDITING AND REPORTING

Internal and external reporting involves the monitoring and formal reporting of performance on a regular basis. Glencore and its sites produce regular monthly reports on SD performance. These reports include, or form part of the statutory and voluntary reports to stakeholders (including government) and community newsletters.

To ensure consistent reporting, a standard monthly reporting form has been produced for site and group reporting (Monthly SD Report) in line with Glencore.HSEC.Proc.01 and Glencore.HSEC.Proc.02. The minimum internal GOSA reporting requirements are summarised in Table 7.

Table 7: Internal GOSA Corporate Reporting Schedule

Report	Responsible	Report to	Frequency
GOSA incident / complaint report	Group HSEC Department	GM, GOSA	Monthly
Group audit reports	Group HSEC Department	GM, GOSA	Scheduled
Group SD summary	Group HSEC Department	GM, GOSA	Quarterly
Public SD report (HSEC)	Group HSEC Department	GM, GOSA	Annually

Reports detailing SD performance should include as a minimum:

- Details of incidents and accidents;
- Non-compliance with legal and other requirements;
- Details of complaints;
- Number and details of HSEC incidents;
- Details of any pending/upcoming approvals; and
- Details of any other significant HSEC issues.

An independently verified Commodity Sustainability Report that meets international standards is published annually by Glencore. The report is supplemented, where applicable, by reports at a commodity, division, site and project level and communicates with identified stakeholder groups.

Table 8: GGV Complex Implementation, auditing and reporting protocol

Aspect	Programme/Audit	Schedule/Frequency
PROGRAMMES/PLANS		
Land use management Natural resources	Revision of land use management plan	Any substantial changes to mining plan/schedule
	Off-site wetland rehabilitation	As per the off-site programme agreed to with DWS
	Alien and Invasive Plant Control and Management Plan (AIPCP)	Ongoing implementation Annual review and progress audit
	Rescue and Relocation Plan for floral SCC	Annually for area to be disturbed in the next 12-24 months
Geology	Update/revision of geological/structural plans	Annually
Mining plan/schedule	Revision of mining plan/schedule and materials balance	Monthly
Rehabilitation and Closure	Rehabilitation, Decommissioning and Closure Plan	Annual revision as stipulated in *Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations* (GN1147), or as agreed to with the DMRE
Monitoring programme	Revision of monitoring programme, including inter-mine flow monitoring protocol	Annually
IWWMP	IWWMP inclusive of Storm Water Management Plan, operational surface and groundwater balance and water conservation strategy	Annual revision in line with WUL requirement
Post-closure water- and salt-balance	Post-closure water balance Inter-mine flow Long-term water quality	At least every 2 years Any substantial changes to mining plan/schedule
Waste management	Waste Management procedure, including a waste minimisation strategy	Regular review in line with changes in legal requirements
Energy conservation/climate change strategy	Pollution Prevention Plans and carbon targets Carbon abatement strategies	Annual reporting and auditing
Standard Operating Procedures (SOPs)	Revision of all environmental SOPs to include the proposed new mining area, ensuring that the environmental objectives and strategies are addressed adequately.	Any substantial changes to mining plan/schedule

Aspect	Programme/Audit	Schedule/Frequency
AUDITING PROGRAMME		
Implementation programme	Conformance to environmental objectives and strategies and the implementation thereof	As part of the GOSA HSEC assurance and reporting schedule
EMPr performance assessment	To determine conformance with the GGV EMPr, including effectiveness and appropriateness of EMPr	Biennially or as required
Biodiversity (vegetation) audit	To determine effectiveness of land use management plan and long-term sustainability of vegetated areas	Annually
Legal compliance	Environmental legal compliance audit	As per legal requirements and licence conditions
Financial provision	Revision of closure cost assessment for immediate (unplanned) closure	Annually
REPORTING SCHEDULE		
Environmental monitoring	Review and analyses of monitoring data for: - Surface water - Mine water balance - Land use management - Air quality - Blasting - Natural resources	Monthly
	Review and analyses of monitoring data for: - Groundwater - Inter-mine flow - Biomonitoring	Annually
EMPr performance	Reporting to DMRE	Biennially
HSEC performance	Reporting to GOSA Corporate	As per GOSA assurance schedule

6 FINANCIAL PROVISION

The financial provision is updated annually and submitted to the DMRE for consideration and approval.

Glencore has a procedure protocol and guideline documents which is within standards compatible with the closure objectives determined in accordance with the baseline studies completed. The intent of those documents is to provide guidance for rehabilitation planning, resourcing and execution of the individual operations. Rehabilitation can be divided into two different phases, namely concurrent rehabilitation, and final rehabilitation. Concurrent rehabilitation must be carried out along with the operations on the coal mine and will decrease the final liability that the mine will carry at the time of closure. This concurrent rehabilitation will be carried out within the context of the EMPr. Final rehabilitation will be carried out once the mine goes into its closure phase for the various sections of the mine. This final rehabilitation will be carried out within the context of the Rehabilitation, Decommissioning and Closure Plan.

According to the DMRE Closure Liability Guideline, a mine must provide for eventual closure of its mine according to its planned closure date. In addition to this planned closure, there must be sufficient funds available at any one time to allow the DMRE to close the mine should the mine operator become insolvent or otherwise cease operations. The provision for final closure of all facilities and for aftercare and maintenance can be from a trust fund established for this purpose. The balance should be funded using a mechanism acceptable to the DMRE, such as a bank guarantee.

Rehabilitation of the various areas should be conducted while the mine is in operation, wherever possible. If done in this manner, management fees are saved as personnel are on the mine and extra costs are not incurred, and accurate assessment of costs can be made as real rehabilitation expenditure is used and, in several cases, maintenance is practiced as part of the mining operation.

7 ENVIRONMENTAL AWARENESS PLAN

GOSA will provide the necessary tools and training for its employees and contractors to enable the effective implementation and maintenance of the SD Management System. Training forms an integral part of any management system and is required at both the corporate and site levels. It is the means by which personnel are informed of the components of the system and how it is to be implemented and of their responsibilities with regards to the management of sustainable development.

SD awareness training will be conducted as part of induction done by the Group Training Centre and will incorporate the following:

- SD Policy and Framework Management System
- Relevant legislation and other requirements
- Objectives and targets
- Responsibilities
- Any corporate management plans and procedures
- Other topics as required.

At site level, specific training on specific roles and responsibilities will be determined to address matters such as major legislation changes or if other significant issues arise the training will be done at the Group Training Centre.

Training will be competency based, with programmes revised regularly to ensure they continue to meet requirements of the SD management system. All business units shall have a program to ensure that all personnel and contractors working on the site are adequately trained regarding SD awareness. This shall be facilitated through induction and SD awareness training.

The Group Training Centre is responsible for coordinating and maintaining records of all training undertaken by employees and contractors. Training programmes shall be developed to ensure all personnel and contractors are aware of the following:

- The importance of conformance with the SD policy and procedures and with the requirements of the SD Management System;
- The potential HSEC impacts and associated controls for their work activities;
- Their roles and responsibilities in achieving conformance with the SD policy and requirements of the management system, including emergency preparedness and response requirements; and
- The potential consequences of non-compliance.

A process for assessing the competence of all personnel with regard to SD awareness and roles and responsibilities shall be developed and implemented. This will include planned task observations for the assessment of competence.

Improving SD performance requires the cooperation of all employees and contractors and effective communication between all levels of management. The knowledge and experience of the workforce is a valuable resource and employees are encouraged to participate in the development and implementation of site SD Management Systems through consultation and involvement in the setting of objectives and targets. Maintaining an effective site SD Management System and positive SD culture requires that the workforce is informed of SD information relevant to their activities in accordance with the Glencore PLC Standard. Communication methods include:

- Personal contact between managers, supervisors and employees and contractors
- Notices and signage
- Daily Information Bulletin
- Monthly talk topics
- Employee suggestion facilities
- Notification of incidents, their causes, consequences and follow up actions
- “Hazard flashes” for all lost time injuries, property damage exceeding R50,000, significant community complaints, and level 2 and 3 environmental incidents
- Specific launch campaigns for new initiatives
- Incentive and reward systems
- Special functions, such as HSEC awards

The Social Involvement Framework outlines the Glencore approach to stakeholder engagement and community development.

8 APPENDICES

Appendix 1: Environmental Assessment Practitioner (EAP)

Appendix 2: Alien and Invasive Plant Control and Management Plan (AIPCP)

Appendix 3: Integrated Water and Wastewater Management Plan (IWWMP)

Appendix 4: Cultural Heritage Management Plan (CHMP)

APPENDIX 1: ENVIRONMENTAL ASSESSMENT PRACTITIONER

Independent EAP	Jacana Environmentals cc
Responsible person	Marietjie Eksteen
Physical address	7 Landdros Maré Street, Polokwane
Postal Address	PO Box 31675, Superbia, 0759
Telephone	015 291 4015
Facsimile	015 291 5035
E-mail	marietjie@jacanacc.co.za
Professional Affiliation	Registered Environmental Assessment Practitioner at the Environmental Assessment Practitioners Association of South Africa (EAPASA) – Number 2020/1800 Registered as a Professional Environmental Scientist (Pr.Sci.Nat.) at the South African Council for Natural Scientific Professions – Registration No. 400090/02 Member of the Land Rehabilitation Society of Southern Africa (LaRSSA): Membership ID 30835
Abbreviated Curriculum Vitae	Marietjie Eksteen is the Managing Member of the consulting firm Jacana Enviromentals cc, an environmental consulting firm based in Polokwane. She is an environmental scientist with more than 30 years' experience, her main fields of expertise being water quality management, mine water management, environmental legal compliance, and project management. She obtained a Masters' degree in Exploration Geophysics (MSc) from the University of Pretoria in 1993. Since establishing Jacana Enviromentals in 2006, she has been involved in a variety of mine- and industry-related environmental projects serving clients such as MC Mining Limited, South32 SA Coal Holdings, Glencore Operations South Africa, Consol Glass and Silicon Smelters, amongst others. Prior to 2006 she was employed by Pulles Howard & De Lange Inc as an environmental consultant for 2 years. Before consulting, Ms. Eksteen was employed by BHP Billiton as a mine environmental manager at their operations in Mpumalanga, as well as the Department of Water Affairs where she was appointed as a water quality specialist for the mining industry. Her career started off as a geophysicist at Genmin in 1990.

CURRICULUM VITAE

Name:	**MARIA CATHARINA EKSTEEN (VAN DALSEN)**
Date of birth:	March 21, 1968
Years of experience:	31
Nationality:	South African
Profession:	Environmental scientist

MEMBERSHIPS IN PROFESSIONAL SOCIETY:

Registered Environmental Assessment Practitioner at the Environmental Assessment Practitioners Association of South Africa (EAPASA) – Number 2020/1800

Registered as a Professional Environmental Scientist (Pr.Sci.Nat.) at the South African Council for Natural Scientific Professions – Registration No. 400090/02

Member of the Land Rehabilitation Society of Southern Africa (LaRSSA): Membership ID 30835

KEY EXPERIENCE:

Water Quality Management – Water use licencing (WUL). Ground and surface water impact assessments. Water quality objectives. Water quality management strategies. Management options. Mitigation measures. Waste discharge charges.

Mine Environmental Management – Best practice guidelines. Water use and waste management assessment. Environmental impact assessments (EIA) and management plans (EMP) and options. Mine rehabilitation. Closure risk assessments. Mine closure costing.

Environmental Management – Environmental legal compliance. Social and environmental impact assessments (S&EIA). Screening risk assessments. Ground and surface water pollution control. Policy development. Waste Management Licences.

EDUCATION*:*

1992 MSc Exploration Geophysics, University of Pretoria, RSA.

CAREER:

Jacana Environmentals cc (January 2006 -) – Managing Member.

Pulles Howard & de Lange Inc. (January 2004 - December 2005) – Associate Director, managing the Mine Water Division and associated projects.

Ingwe Collieries Limited (August 2001 - December 2003) – Environmental Manager at Khutala and Douglas Collieries situated in Mpumalanga Province.

Department of Water Affairs and Forestry (March 1993 - July 2001) – Water quality manager in the mining division.

Genmin (August 1990 - March 1993) – Exploration geophysicist.

TECHNICAL COURSES

- Water Quality Management Short Courses – UP (1994 & 1995)
- Integrated Environmental Management (IEM): Theory and Practice – UCT (1995)
- Integrated Environmental and Water Management Course (IEWM) – Denmark (1997)
- Environmental Law Course – UP for CHE (1998)

- Managing Conflict: Public Involvement in EIA – UP for CHE (1999)
- Study Tour to France on Catchment Management – France (1999)
- ISO training: Integrated SHEQ Management Systems – Wynleigh International (2001)
- Introduction to Life Cycle Assessment – Technicon of Pretoria (2002)
- Facilitator Leadership Skills / Accelerating Change & Transitions – Destra Consulting Group (2003)

PUBLICATIONS:

Van Dalsen, M.C. and Hinds, R.C., 1991. Evaluation of dip move-out algorithms on South African seismic data. Presented at the SAGA Technical Conference at the University of the Witwatersrand.

Van Dalsen, M.C., 1992. A comparison of dip move-out algorithms - a South African case history. MSc Thesis

Eksteen, M.C., Rothmann, J.F., Tuffin, A. and Totman, D., 1997. Wasbank River Water Quality Management Plan - Community Consultation and Facilitation. Presented at the Water Africa '97 Conference, Harare.

Eksteen, M.C., 1997. Water Quality Management Plan - Nkongolwana River Catchment. Presented at the WISA Mine Water Division one-day seminar on Catchment Management Plans, Randfontein.

Glendinning, J., Waygood, C. and Eksteen, M., 1998. Assessment of contamination resulting from defunct coal mines in the Ermelo area. Poster presentation at the Water Institute of Southern Africa Biennial Conference, Cape Town.

Eksteen, M.C. and Schwab, R., 2005. DWAF best practice guideline on mine closure – Practical implications and guidance, WISA Mine Water Division Conference, Randfontein, April 2005.

Heath, R. and Eksteen, M.C., 2005. Regulating the mining industry, addressing the legacy of abandoned mines and prevent new environmental problems

Schwab, R. and Eksteen, M.C., 2005. Development of best practice guidelines for water quality management in the SA mining industry - current status, WISA Mine Water Division Conference, Randfontein, October 2005.

SELECTED KEY EXPERIENCE:

Appointment Date	Client	Project	Details and Level of Responsibility	Status
2022	Valoyi Royal Council	Nwamitwa Recreational Park	EAP for EIA process (Basic Assessment)	In progress
2021	Harry Gwala DM	Creighton Bulk Water Supply Scheme	Environmental Analysis and Fatal Flaw Assessment	Completed
2021	Platinum Group Metals	PTM Waterberg Project – Contractors' Camp	EAP for EIA process (Basic Assessment)	In progress
2021	Nhlabathi Minerals	Rietkol Re-application project	EAP for S&EIA, EMPr and WUL processes as part of new Mining Right application Compilation of GN1147 Rehabilitation & Closure Plan	Completed, awaiting decision
2021	Platinum Group Metals	PTM Waterberg Project – Water Supply Pipeline System	EAP for EIA process (Basic Assessment)	In progress
2020	LEDA	Musina Dam Prefeasibility Study	Environmental Analysis and Fatal Flaw Assessment	Completed
2020	Magalies Water	Northam-Vaalkop Pipeline	Closure application for borrow pit mining permits, full process	In progress
2020	Bosveld Mines	Klipwal Gold Mine	Full responsibility for EMP amendment and S&EIA process	In progress
2019	Glencore	Goedgevonden Colliery EMPr amendment	Full responsibility for EMP amendment and S&EIA process	In progress
2019	Bosveld Mines	Klipwal Gold Mine	Environmental Legal Compliance audit, Financial Provision determination	Completed
2019	South32	VDDC Lifex Project: Feasibility Study	Environmental Licensing Lead on Feasibility Team	Completed
2019	Platinum Group Metals	PTM Waterberg Project	External Environmental Review – S&EIA, EMP and WUL for new Mining Right application	Completed
2019	Catnis	Uitkoms Silica Quartz Mining	Environmental Legal Compliance audit, Financial Provision determination	Completed
2019	South32	VDDC dewatering project	ECO for construction phase	Completed
2019	Subiflex	The Duel Coal Project	EAP for re-application for S&EIA process	Completed, EA approved
2018	MIT Logistics Hub	Mactransco Siding IWUL	External Water Use Licence Compliance Audit, annual review of Remediation Plan	Completed
2018	Nozala Coal	Gruisfontein Project, Lephalale	EAP for S&EIA, EMPr and WUL processes as part of new Mining Right application	Completed, awaiting decision

Appointment Date	Client	Project	Details and Level of Responsibility	Status
2018	Aqua Optima	Brits Tilapia Aquaculture Hub	EAP: EIA application for listed activities and public participation	Completed, EA approved
2017	MAC Group	Mactransco Siding IWUL	External Water Use Licence Compliance Audit, compilation of Remediation Plan	Completed
2017	Bushbuckridge LM	Belfast Community Water Supply Project	EAP: EIA application for number of listed activities, specialist studies and public participation	Completed, EA approved
2017	MC Mining	Makhado EMPr amendment	Full responsibility for EMP amendment and S&EIA process	Completed, EA amendment approved
2016	South32	KLX Feasibility Study: Feasibility Study	Environmental Contract for 36 months, overall responsibility for all environmental aspects during Feasibility Phase and for environmental authorisations	Completed
2016	Anglo Platinum	Amandelbult Schilpadsnest Opencast	Strategic advisor to Aurecon, lead on the compilation of WUL	Completed
2015	Consol	Rietkol Silicon Quarry	Project manager for S&EIA and WUL process	Process halted by client
2015	South32	MMS Rising Main	ECO for construction phase	Completed
2015	Coal of Africa	Vele River Diversion project	EA application and WUL for additional listed activities, consolidation of EMPs	Completed, EA and WUL granted
2015	Subiflex	The Duel Coal Project	Project manager for S&EIA process as part of new MRA	Process completed
2014	Glencore	Overvaal IWULA	Compilation of WUL for Overvaal Mining Project and public participation	Process completed
2014	Silicon Smelters	Silicon DC Furnace	EA and AEL application	Completed, EA approved and AEL granted
2014	Glencore	Vlakfontein Project	Project manager for S&EIA process as part of new MRA	Process halted by client prior to application
2014	BECSA (South32)	Leandra Environmental Authorisation	Project manager for S&EIA and WUL processes as part of new MRA	Process halted by client prior to application
2013	XCSA	Goedgevonden Expansion Project	Project manager for S&EIA process and EMP amendment	Completed, EA approved
2013	Ibutho Coal	Fuleni Anthracite Mine	Project manager for S&EIA process as part of new MRA	Process halted by client
2012	XCSA	Goedgevonden EMP amendment	Overall responsibility	Completed, EMPr approved
2012	Coal of Africa	Greater Soutpansberg Project	Project manager for S&EIA process as part of new MRA	EIA completed, awaiting decision
2012	Optimum Coal	TNC EMP amendment	Public participation	Completed

Appointment Date	Client	Project	Details and Level of Responsibility	Status
2012	BECSA	Middelburg Water Reclamation Project	ECO for construction phase	Completed
2012	Tshipise Energy	EMP performance assessment	Audit and review of EMP compliance	Completed
2012	Thandululo Coal	EMP performance assessment	Audit and review of EMP compliance	Completed
2012	Cousins Coal	Vogelspruit prospecting EMP amendment	Report compilation and coordination	Completed, PR approved
2012	Metmar	Sefateng Chrome Mine	Project manager for S&EIA process as part of new MRA	Completed, EMP approved and mining licence granted
2012	Coal of Africa	Greater Soutpansberg EMP amendments (6)	Report compilation and coordination for PR amendments	Completed
2011	MAC Group	Mactransco Siding IWULA	Compilation of WUL application	Completed, IWUL granted
2011	Coal of Africa	Morgenster Prospecting EMP	Report compilation and coordination	Completed
2011	BECSA	BECSA Coal Processing Dust Fall-out Plan	Compilation of the dust fall out plan and gap analysis	Completed
2011	Ferrox Holdings	EMP for Tivani Project	Project manager for S&EIA process as part of new MRA	Completed, EMr approved and mining licence granted
2011	Silicon Smelters	EMP performance assessment	Audit and review of EMP compliance	Completed
2011	Tshipise Energy	EMP for coal bed methane	Report compilation and coordination	Completed
2010	Optimum Coal	Overvaal Project EMP	Project manager of 7 sub-consultants, with overall responsibility for delivery	Completed, EA and MR granted
2010	Coal of Africa	EMP / WUL for Makhado Colliery Project	Project manager of 7 sub-consultants, with overall responsibility for delivery	Completed, EA and MR granted, WUL approved
2010	Silicon Smelters	Integrated Water & Waste Management Plan	Overall responsibility	Completed
2009	BECSA	EMP for Weltevreden Colliery	Project manager of 6 sub-consultants, with overall responsibility for delivery	Process halted by client
2009	Silicon Smelters	EMP for Mahale Quartzite Mine	Overall responsibility	Completed, EMP approved
2008	Coal of Africa	EMP / IWULA for Vele Colliery Project	Project manager of 7 sub-consultants, with overall responsibility for delivery	Completed, EA and MR granted, WUL approved
2008	Optimum Coal	EMP for Vlakfontein Coal Mine	Project manager of 8 sub-consultants, with overall responsibility for delivery	Completed, decision pending
2007	Siyanda Coal	Koornfontein Mine EMP performance assessment	Audit and review of EMP compliance in conjunction with African EPA	Completed

Appointment Date	Client	Project	Details and Level of Responsibility	Status
2007	XCSA	Rehabilitation plan for Impunzi #5 seam opencast	Design and rehabilitation plan	Completed
2007	BHP Billiton	Environmental Manager: DMO Execution	Overall responsibility for all environmental aspects during Execution	Completed.
2007	XCSA	Zaaiwater East EMP amendment	Overall responsibility	Completed, EMP approved
2007	BHP Billiton	Middelburg Water Reclamation Scheme	Specialist input into feasibility study	Completed
2006	XCSA	Atcom rehabilitation plan	Design and budget for rehabilitation plan, management of rehabilitation process	Completed
2006	XCSA	EIA for new TCP raillink	Managing EIA process, including public participation, negotiations with authorities and sub-consultants	Completed, EA approved
2006	XCSA	EIA for potable & raw water pipelines to new Goedgevonden Colliery	Managing S&EIA process, including public participation, negotiations with authorities and sub-consultants	Completed, EA approved
2006	Silicon Smelters	EIA for Spoornet railway siding	Managing EIA process, including public participation and negotiations with authorities	Completed, EA approved
2006	Silicon Smelters	EIA for the upgrading of raw materials stockpiles	Managing EIA process, including public participation and negotiations with authorities	Completed, EA approved
2006	EVN Africa	SDA3 sewage pipeline and pumpstation	Managing EIA process, including application for exemptions, public participation and negotiations with authorities	Completed, EA approved
2006	XCSA	Long-term water management strategy	Legal assessment & strategic development	Completed
2006	Vametco	IWWMP for Vametco Minerals Corporation	Overall responsibility	Completed
2006	Ingwe	Douglas-Middelburg Optimisation Project	Overall responsibility for environmental aspects for Feasibility Study	Completed
2005	De Beers	IWWMP for Cullinan Diamond Mine	Overall responsibility	Completed
2005	EVN Africa	EIA Scoping report for Bushbuckridge bulk water supply pipelines	EIA process for 4 bulk water supply pipeline in Bushbuckridge, including application for exemptions, public participation and negotiations with authorities	Completed, EA approved
2005	XCSA	Goedgevonden Colliery Project EMP	Project manager of 7 sub-consultants, with overall responsibility for delivery	Completed, EMP approved
2004	Ingwe	Douglas EMP amendment	Project manager of 8 sub-consultants, with overall responsibility for delivery	Completed, EMP approved
2004	Ingwe	Boschmanskrans EMP amendment	Project manager of 5 sub-consultants, with overall responsibility for delivery	Completed, EMP approved
2004	DWAF	Development of Best Practice guidelines for the mining industry	Project manager of the project, responsible for final delivery	Completed

Appointment Date	Client	Project	Details and Level of Responsibility	Status
2004	De Beers	Closure cost assessment for Cullinan Mine	Technical inputs, risk assessment	Completed
2004	Ingwe	Closure cost assessment for Douglas Colliery	Overall responsibility	Completed
2004	De Beers	Water use and waste management assessments for Cullinan and Kimberley Diamond Mines	Overall responsibility	Completed
2004	Xstrata	Rehabilitation plan for Atcom	Project leader, final rehabilitation strategy	Completed
2002	Ingwe	Environmental Manager: Douglas Colliery	Overall responsibility and management of the environmental division, rehabilitation projects and environmental budget	N/A
2002	Ingwe	Rehabilitation plan for Vlaklaagte Open Pit	Overall responsible for project - Development of rehabilitation plan and final designs, tender procedure and appointment of contractor, management and monitoring of contractor, standards and project schedule and finances	N/A
1999	DWAF	Development of a Waste Discharge Charge System for South Africa	DWAF project leader – Managing appointed sub-consultants, project management (financial, technical & public consultation), quality control, technical input	N/A
1997	DWAF	Development of GN704 (mining regulations)	DWAF project coordinator – Development of regulations, internal & external consultation	N/A
1995-	DWAF	Development and implementation of water quality management strategies for catchments where mining activities have an adverse effect on water quality, e.g. Wasbank, Mkuze, Nkongolwana, Enyati, Mooi River, Grootdraai Dam catchments	DWAF project manager – Managing of sub-consultants, technical input, public liaison	N/A

EAPASA
Unit 19 Oxford Office Park
3 Bauhinia Street
Highveld Techno Park
Centurion
0157
Tel. (+27) 12 880 2154

Email: registrar@eapasa.org / Website: www.eapasa.org

Environmental Assessment Practitioners Association of South Africa
Advancing environmental assessment practice in South Africa

Mrs Maria Eksteen
7 Landdros Mare Street
Polokwane
0699

Sent by email to: marietjie@jacanacc.co.za

Dear Mrs Eksteen

Registered Environmental Assessment Practitioner: Number 2020/1800
Maria Catharina Eksteen : South African ID 6803210173085

The Environmental Assessment Practitioners Association of South Africa (EAPASA) herewith certifies that Maria Catharina Eksteen is a Registered Environmental Assessment Practitioner (EAP) in accordance with the prescribed criteria of Regulation 15.(1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Your registration is duly authorised by EAPASA as the single Registration Authority for EAPs in South Africa (appointed as per Regulation No. 104, Gazette No. 41434 of 8 February 2018, in terms of section 24H(3)(a) of the NEMA). Your status as a Registered EAP is displayed in the 'EAP Register' - please find your name and contact email address at

https://registration.eapasa.org/registered-practitioners

Your registration is effective for a period of five years from 23 April 2020, and expires on 23 April 2025. The renewal of your registration in 2025 will be contingent on you having met the requirements of EAPASA's Continuing Professional Development (CPD) policy during each year of registration.

As a Registered EAP you are required to uphold the EAPASA Code of Ethical Conduct and Practice in your professional endeavours, towards the goal of quality assurance in environmental assessment practice.

Please accept my congratulations on your registration.

Best regards

RCHill

Dr Richard Hill
Registrar
Date: 23 April 2020

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Maria Catharina Eksteen

Registration Number: 400090/02

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Environmental Science (Professional Natural Scientist)

Effective **15 May 2002** Expires **31 March 2023**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

LaRSSA

LAND REHABILITATION SOCIETY
OF SOUTHERN AFRICA

Land Rehabilitation Society of Southern Africa

hereby certifies that

Mrs Marietjie Eksteen

is a fully paid-up member of the Society having all the
rights and privileges of a

Regular Member

I.D: 30835

on behalf of the Executive Council

President
M. Aken

Vice-President
A. van Deventer