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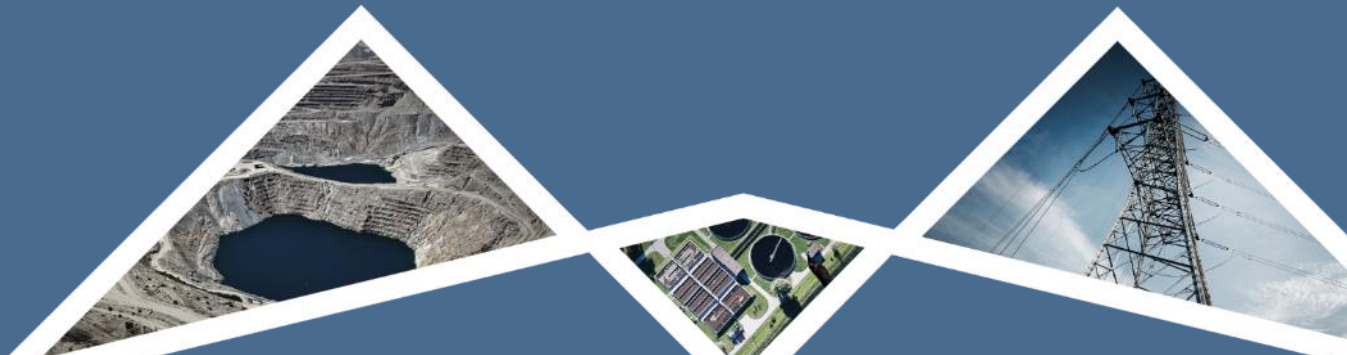
ENVIRONMENTAL MANAGEMENT PROGRAMME

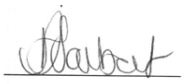
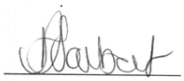
MANUNGU COLLIERY



DOCUMENT DETAILS

REFERENCE:	1177
DOCUMENT TITLE:	MANUNGU COLLIERY EMPr
COMPANY:	TSHEDZA MINING RESOURCES (PTY) LTD
MINING RIGHT:	MP 30/5/1/2/2/297 MR

DOCUMENT CONTROL

	NAME	SIGNATURE	DATE
COMPILED:	Brian Whitfield		2020/01/09
CHECKED:	Adri Joubert		2020/01/17
AUTHORIZED:	Adri Joubert		2020/01/17

REVISION AND AMENDMENTS

REVISION DATE:	REV # 1	STATUS
2020/01/17	ORIGINAL DOCUMENT	Version 1

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1 INTRODUCTION

1.1 REPORT STRUCTURE

This report reflects an amendment and update to the existing approved Environmental Management Programme (EMPr) and is compliant with the EMPr content requirements contained in the regulations promulgated under the National Environmental Management Act (Act 107 of 1998) (NEMA as amended). Table 1 below provides a summary of the NEMA requirements in terms of Appendix 4 of the Environmental Impact Assessment (EIA) Regulations (GNR 982 as amended), and an indication in which section of this EMPr the relevant information can be found.

Table 1: Report Structure as per NEMA Regulation 982 Appendix 4.

Environmental Regulation	Description	Section in Report
Appendix 4(1)(1)(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;	Section 1.8
Appendix 4(1)(1)(b):	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 4
Appendix 4(1)(1)(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;	Figure 5
Appendix 4(1)(1)(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 though 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, operation activities;	Section 4
Appendix 4(1)(1)(f):	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (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 ac regarding closure, where applicable; and iv. Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	Section 6

Environmental Regulation	Description	Section in Report
Appendix 4(1)(1)(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 4.2
Appendix 4(1)(1)(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 4.3
Appendix 4(1)(1)(i):	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 4.1 and 4.4
Appendix 4(1)(1)(j):	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 6
Appendix 4(1)(1)(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 4.4
Appendix 4(1)(1)(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 3.4
Appendix 4(1)(1)(m):	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 3.7
Appendix 4(1)(1)(n):	Any specific information that may be required by the competent authority.	N/A

1.2 INTRODUCTION TO THE PROJECT

Manungu Colliery is owned by Tshedza Mining Resources (Pty) Ltd which is a subsidiary of Mbuyelo Coal and this mine has been in operation and producing coal since early 2015. Manungu Colliery is situated ~10km to the south of the town Delmas and will deliver most of its coal to the Kusile Power Station by 34 tonne side tipping coal trucks.

Tshedza is planning to extend their opencast and underground mining area to the south of the current operations and within the existing mining right area to extend the life-of-mine (LoM) up to 2042. Furthermore, Tshedza wishes to establish a coal processing facility (wash plant) at Manungu Colliery to complement the existing beneficiation facility (crushing and screening plant). The proposed new processing facility will include a coal wash plant with associated residue discard and water management infrastructure. The proposed processing facility and discard will be located within the mining right boundary and at the existing ROM processing area.

Figure 1 indicates the typical mining sequence and can be summarized as; initial topsoil removal with subsequent removal of the overburden which will then be stockpiled behind the mining area to ensure it can be replaced back in the initial box cut. The physical mining of the coal seam follows, which is then placed into trucks to be taken to the processing facility. From here discard coal will be extracted and replaced in the bottom of the opencast pit, while the product will be taken to the weighbridge via trucks and then removed off site. The overburden is replaced back into the pit as mining progress leaving a minimum area open at a single time. The topsoil which was stripped and stockpiled separately before mining commenced is then replaced and rehabilitated to ensure the environment can be restored to grazing land.

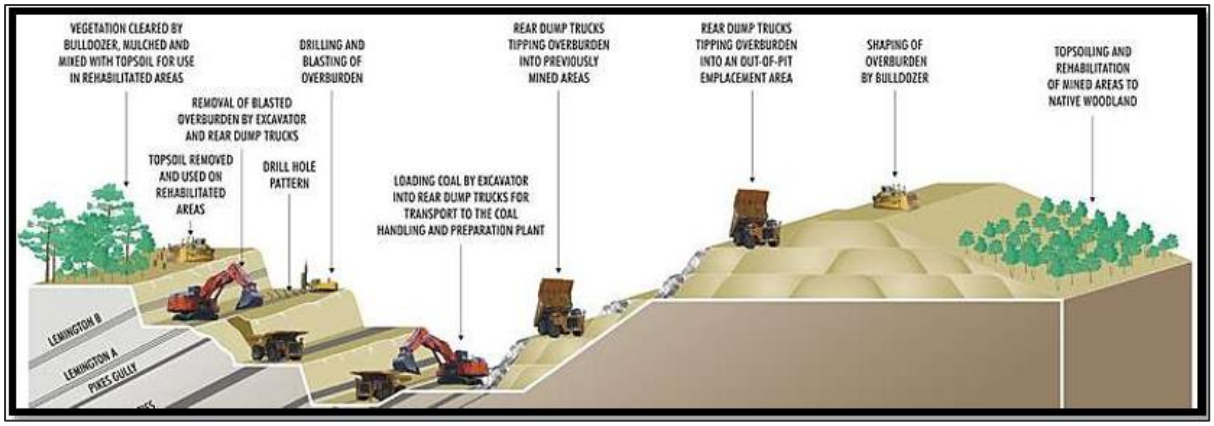


Figure 1: Typical coal surface mining opencast sequence indicating rollover backfill rehabilitation methodology.

The following rights, authorisations and approvals are currently in place and have been considered in the compilation of the report:

- Mining Right (MR) MP 30/5/1/2/2/297 MR, granted to Tshedza Mining Resources (Pty) Ltd, in terms of Section 23 (1) of the MPRDA on 4 May 2009 which covers all portions of the farms Weilaagte 271 IR and Welgevonden 272 IR;
- An approved EMPr dated June 2008 and approved on 24 February 2011;
- NEMA EA, NEAS Ref No: MPP/EIA/0000665/2012 granted on 19 March 2014, (Ref: 17/2/3N-266) which covers Portions 5, 6, 7, 8 and 9 of the farm Weilaagte 271 IR; and
- NWA IWUL application, File No. 27/2/2/B120/6/4 granted on 23 February 2015, (Licence No. 04/B20A/ACGIJ/2621) which covers Portions 5, 6, 7, 8 and 9 of the farm Weilaagte 271 IR.

1.3 MINE INFRASTRUCTURE

At present the mine consists of the following main infrastructure:

- Opencast pit;
- Stockpiles;
- Offices;
- Plant area (crushing and screening);
- Contractors yard;
- Weighbridge;
- Access and haul roads;
- Security point and fencing;
- Pumps and sumps;
- Clean water trenches;
- Dirty water trenches;
- PCD; and
- Storm water control trenches

A general overview of the current mining operations is depicted in Figure 2.

Additional new infrastructure proposed as part of the mine extension includes:

- New boreholes;
- New roads;
- New stockpiles;
- New stormwater infrastructure;
- Relocation of the contractors' camp; and
- Underground mining areas with associated adits and PCDs;
- Wash plant;
- Water treatment plant and transfer sump.

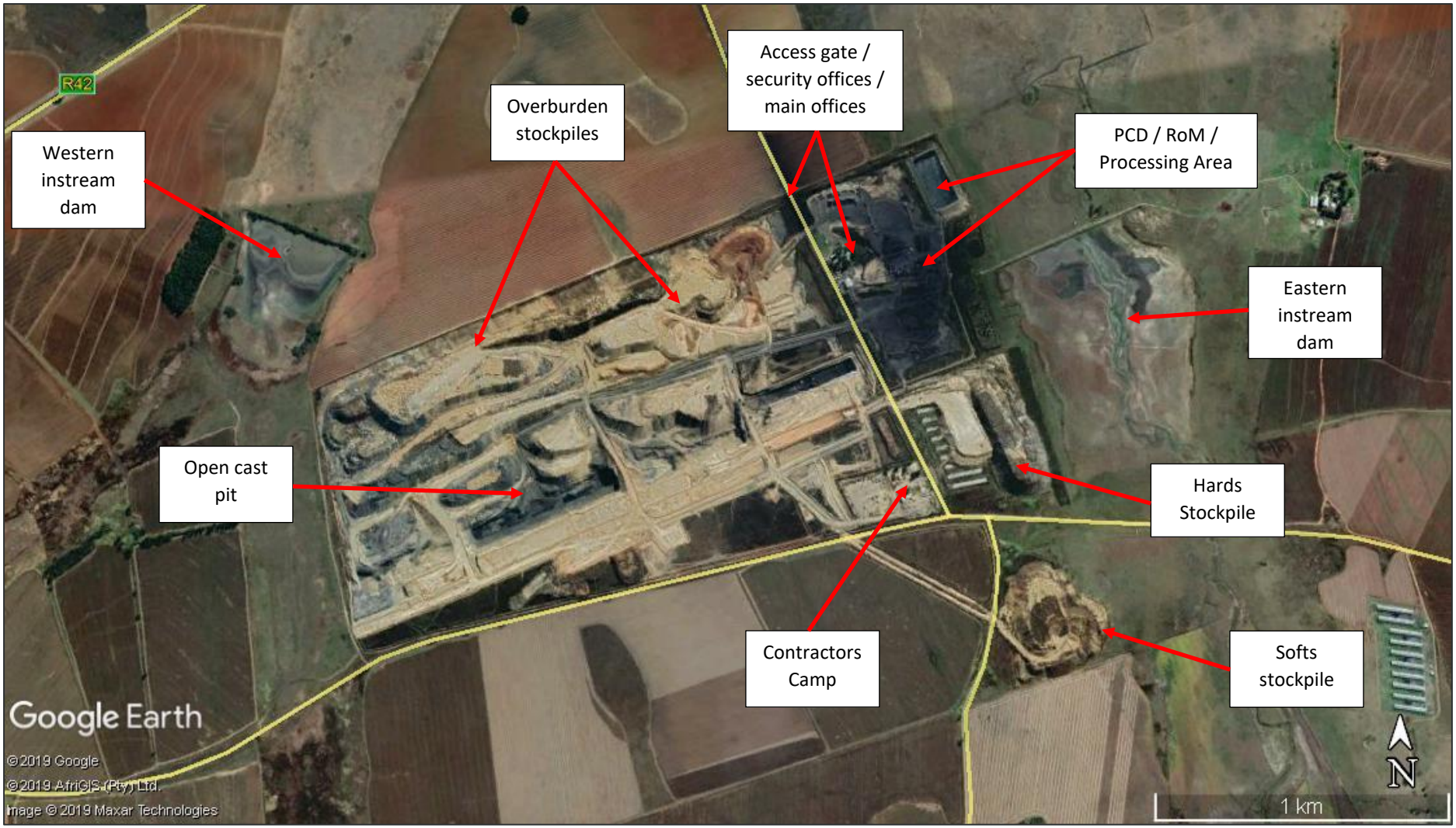


Figure 2: Manungu Colliery overview (Google Earth 2019 imagery).

1.4 DESCRIPTION OF THE PROPERTY

Table 2 provides a summary of the properties that fall within the mining right area and those properties covered under this EMPr. A locality map showing the affected farm portions is included in Figure 3.

Table 2: Property description

Farm Name	Mining Right holder Tshedza Mining Resources (Pty) Ltd. is the holder of a Mining Right in respect of the following properties: Weilaagte 271 IR: all Portions. Welgevonden 272 IR: all Portions.					
Application Area (Ha)	The properties over which this EMPr applies are ~2 287 hectares (ha) in extent. The mining footprint (existing and future infrastructure) cover an area ~1 481 hectares (ha).					
Magisterial District	The Manungu Colliery is situated in the Victor Khanye Local Municipality, situated in the Nkangala District Municipality.					
Distance and direction from nearest town	Manungu Colliery is situated approximately 60 km southwest of Witbank, ~10 km south of Delmas and ~16 km north-west of Devon.					
21-digit Surveyor General Code for each Portion	Properties within approved Mining Right area			**Properties affected by future mine plan and covered by this EMPr**		
	Farm Name:	Portion:	SG Codes:	Farm Name:	Portion:	SG Codes:
	Weilaagte 271 IR	271 (RE)	T0IR000000000027100000	Weilaagte 271 IR	Portion 1	T0IR000000000027100001
	Weilaagte 271 IR	Portion 1	T0IR000000000027100001	Weilaagte 271 IR	Portion 3	T0IR000000000027100003
	Weilaagte 271 IR	Portion 2	T0IR000000000027100002	Weilaagte 271 IR	Portion 4	T0IR000000000027100004
	Weilaagte 271 IR	Portion 3	T0IR000000000027100003	Weilaagte 271 IR	Portion 5	T0IR000000000027100005
	Weilaagte 271 IR	Portion 4	T0IR000000000027100004	Weilaagte 271 IR	Portion 6	T0IR000000000027100006
	Weilaagte 271 IR	Portion 5	T0IR000000000027100005	Weilaagte 271 IR	Portion 7	T0IR000000000027100007
	Weilaagte 271 IR	Portion 6	T0IR000000000027100006	Weilaagte 271 IR	Portion 8	T0IR000000000027100008
	Weilaagte 271 IR	Portion 7	T0IR000000000027100007	Weilaagte 271 IR	Portion 9	T0IR000000000027100009
	Weilaagte 271 IR	Portion 8	T0IR000000000027100008	Weilaagte 271 IR	Portion 12	T0IR000000000027100012
	Weilaagte 271 IR	Portion 9	T0IR000000000027100009	Welgevonden 272 IR	Portion 1	T0IR000000000027200001
	Weilaagte 271 IR	Portion 10	T0IR000000000027100010	Welgevonden 272 IR	Portion 2	T0IR000000000027200002

	Weilaagte 271 IR	Portion 11	T0IR00000000027100011	Welgevonden 272 IR	Portion 3	T0IR00000000027200003
	Weilaagte 271 IR	Portion 12	T0IR00000000027100012	Welgevonden 272 IR	Portion 4	T0IR00000000027200004
	Welgevonden 272 IR	272 (RE)	T0IR00000000027200000	Welgevonden 272 IR	Portion 6	T0IR00000000027200006
	Welgevonden 272 IR	Portion 1	T0IR00000000027200001	Welgevonden 272 IR	Portion 10	T0IR00000000027200010
	Welgevonden 272 IR	Portion 2	T0IR00000000027200002	Welgevonden 272 IR	Portion 11	T0IR00000000027200011
	Welgevonden 272 IR	Portion 3	T0IR00000000027200003	Welgevonden 272 IR	Portion 12	T0IR00000000027200012
	Welgevonden 272 IR	Portion 4	T0IR00000000027200004	Welgevonden 272 IR	Portion 16	T0IR00000000027200016
	Welgevonden 272 IR	Portion 5	T0IR00000000027200005	Welgevonden 272 IR	Portion 17	T0IR00000000027200017
	Welgevonden 272 IR	Portion 6	T0IR00000000027200006	Welgevonden 272 IR	Portion 18	T0IR00000000027200018
	Welgevonden 272 IR	Portion 7	T0IR00000000027200007	Welgevonden 272 IR	Portion 19	T0IR00000000027200019
	Welgevonden 272 IR	Portion 8	T0IR00000000027200008			
	Welgevonden 272 IR	Portion 9	T0IR00000000027200009			
	Welgevonden 272 IR	Portion 10	T0IR00000000027200010			
	Welgevonden 272 IR	Portion 11	T0IR00000000027200011			
	Welgevonden 272 IR	Portion 12	T0IR00000000027200012			
	Welgevonden 272 IR	Portion 13	T0IR00000000027200013			
	Welgevonden 272 IR	Portion 14	T0IR00000000027200014			
	Welgevonden 272 IR	Portion 15	T0IR00000000027200015			
	Welgevonden 272 IR	Portion 16	T0IR00000000027200016			
	Welgevonden 272 IR	Portion 17	T0IR00000000027200017			
	Welgevonden 272 IR	Portion 18	T0IR00000000027200018			

	Welgevonden 272 IR	Portion 19	T0IR00000000027200019			
	Welgevonden 272 IR	Portion 20	T0IR00000000027200020			
	Welgevonden 272 IR	Portion 21	T0IR00000000027200021			

1.5 SENSITIVITY MAP

A consolidated sensitivity map with the proposed activity superimposed thereon is provided in Figure 5. The design of the mine minimises the impacts on the highly sensitive areas through underground mining in those locations. The location of the underground adits are indicative at this stage and the final placement should take cognisance of the sensitivities and adjusted accordingly. The opencast pit extension does impact on localised and isolated wetlands which are unable to be adequately avoided, mitigated and/or rehabilitated due to the hydrological and hydropedological disturbances caused by opencast mining. As such, a wetland offset strategy must be investigated and implemented to account for the loss of these wetland areas.

1.6 LOCALITY MAP

Figure 3 and Figure 4 below indicates the locality of Manungu Colliery, the approved Mining Right boundary and the proposed expansion areas.

1.7 COMPOSITE MAP / LIFE OF MINE

Figure 6 below provides an overview of the Life of Mine (LoM) planning for Manungu Colliery up to the year 2042.

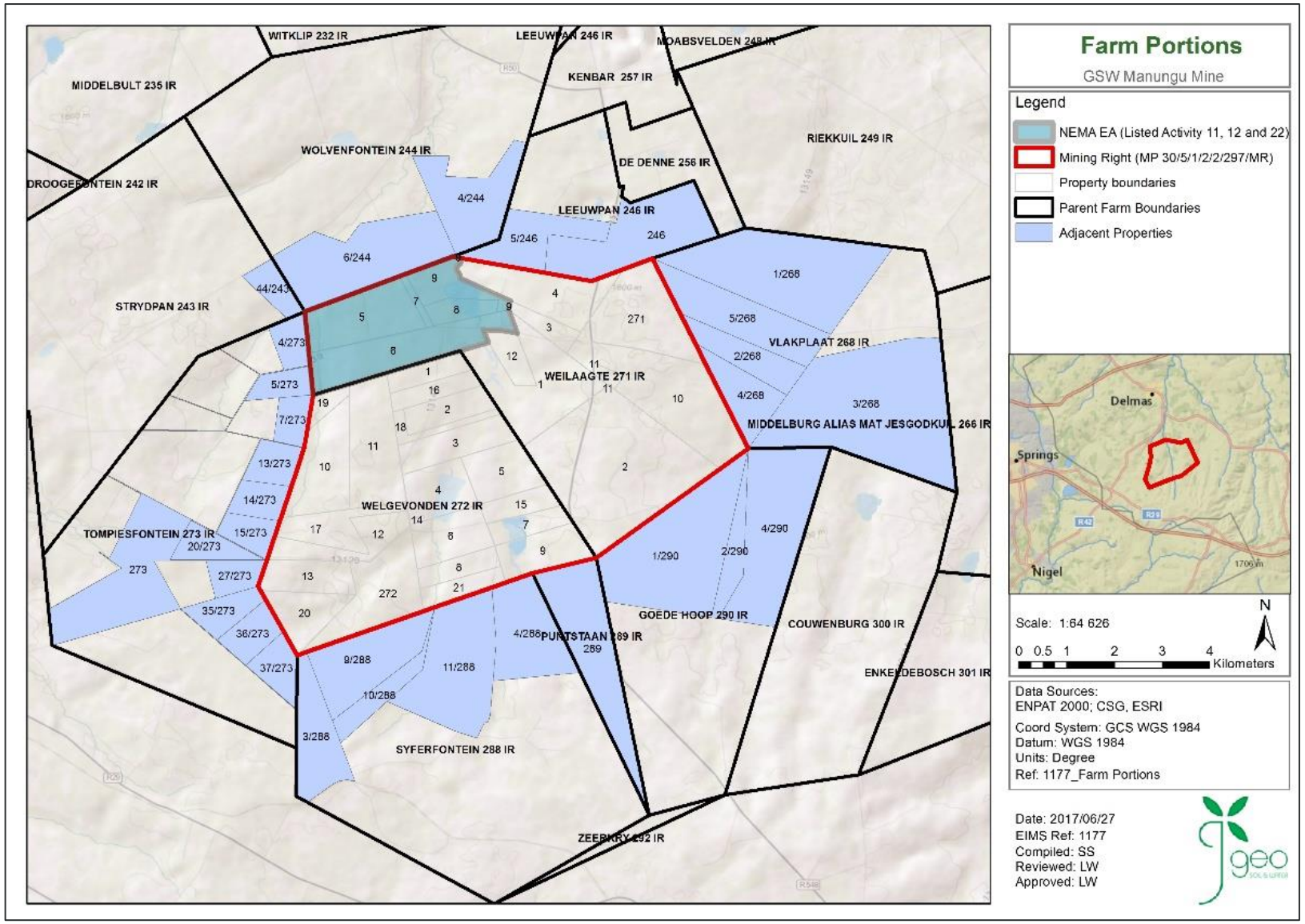


Figure 3: Locality map showing mining right boundary, farms and portions.

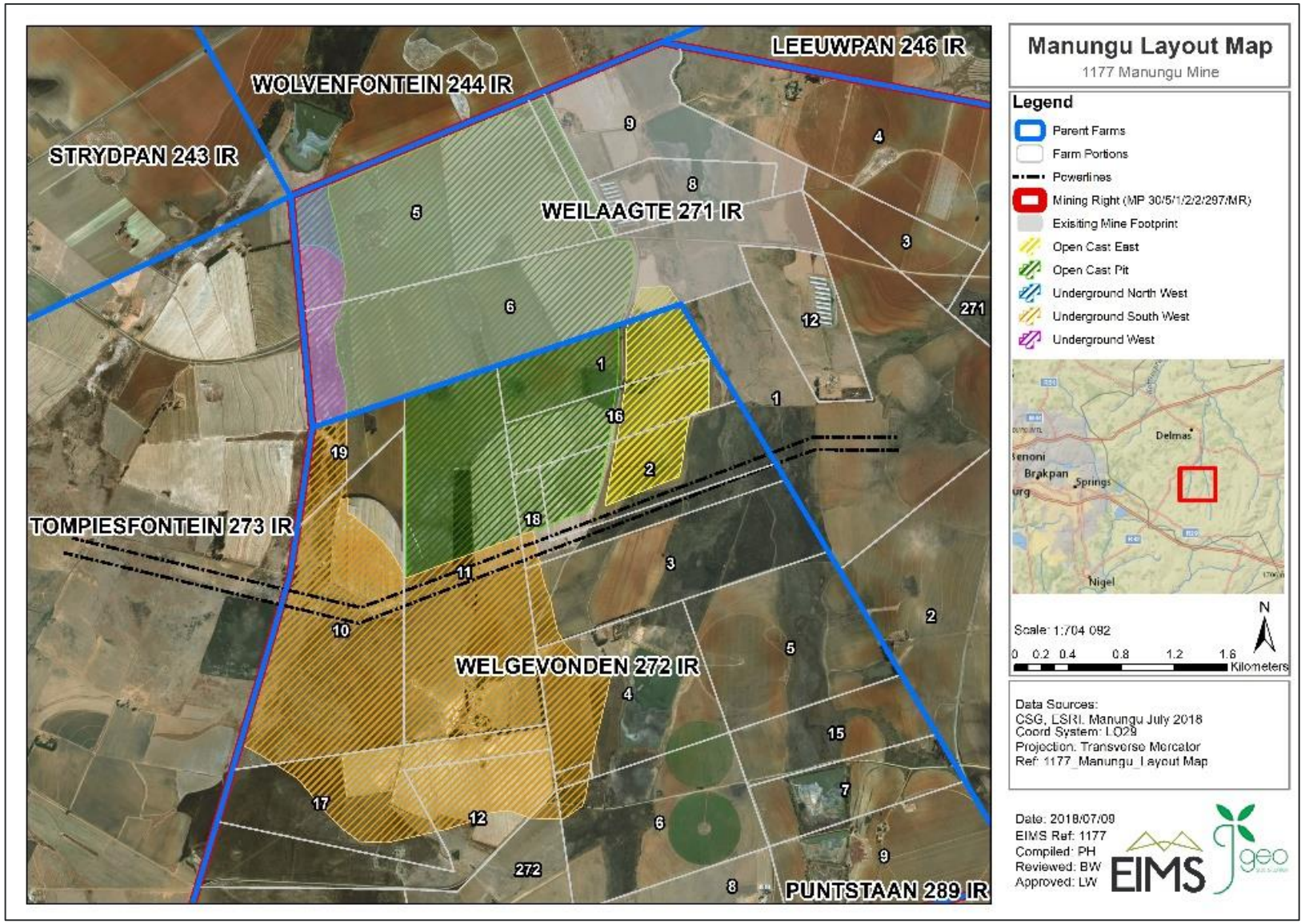


Figure 4: Layout map showing the extent of the current and future mining areas.

Figure 5: Sensitivity Map

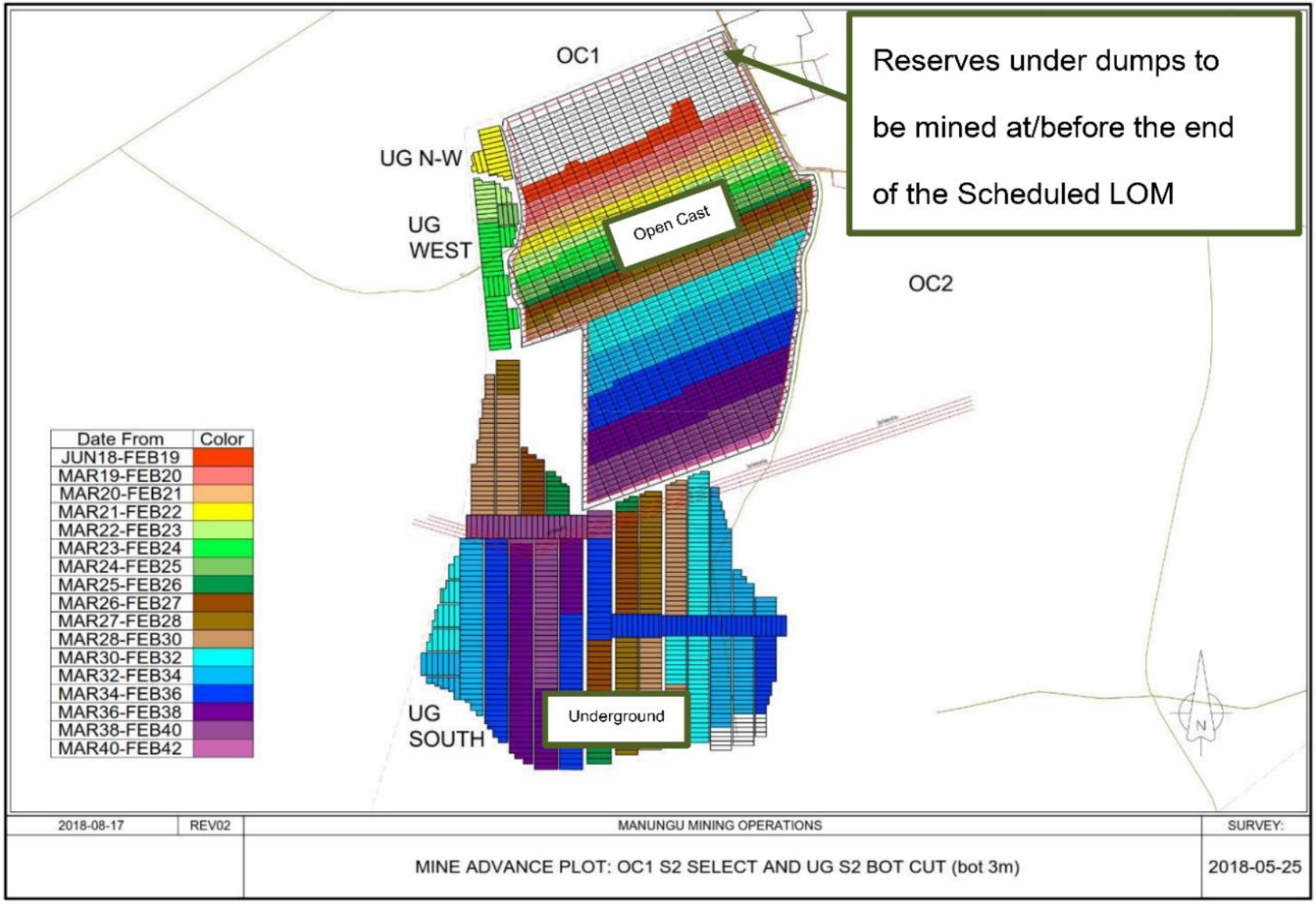


Figure 6: Two Seam–Select progress plot for LoM – OC1 S2 and UG S2 Bottom cut.

1.8 DETAILS OF THE EAP

GSW was founded in 2008 and has steadily grown to be a significant player in the Environmental Management Consulting industry in South Africa. GSW and its resources have been involved with many EIA projects and offers access to a broad body of knowledge and experience with the various Integrated Environmental Management tools (EIA; EMPr; EMP; SEA; EMF; etc.). GSW is responsible for project management and the compilation of the relevant reports for the Manungu project. Details of the EAP are provided below:

- EAP Name: Adri Joubert
- SACNASP Registration Number: 400058/01
- Contact no: 082 926 8460
- Email address: adri@geosoilwater.co.za

1.9 EXPERTISE OF THE EAP

1.9.1 QUALIFICATIONS OF THE EAP

In terms of Regulation 13 of the EIA Regulations (Government Notice R. 982), an independent Environmental Assessment Practitioner (EAP), must be appointed by the applicant to manage the application. GSW has been appointed by the Applicant as the EAP and is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations and Section 1 of the NEMA. This includes, *inter alia*, the requirement that GSW is:

1) Objective and independent;
2) Has expertise in conducting EIA's;
3) Comply with the NEMA, the Regulations and all other applicable legislation;
4) Takes into account all relevant factors relating to the application; and
5) Provides full disclosure to the applicant and the relevant environmental authority.

The declaration of independence of the EAP and the Curriculum Vitae (indicating the experience with environmental impact assessments and relevant application processes) are attached as Appendix A.

1.9.2 SUMMARY OF THE EAP'S PAST EXPERIENCE

GSW is a private and independent environmental management-consulting firm that was founded in 2008. GSW has significant experience in conducting EIAs, including many EIA's for mines and mining related projects. Please refer to the GSW website (www.geosoilwater.co.za) for examples.

Adri Joubert is the sole owner and project manager at GSW and has been involved in numerous significant projects over the past 20 years. She has extensive experience in Project Management as well as with undertaking Environmental Impact Assessments and Environmental Auditing. Adri has acted as Project Manager and Quality Reviewer for several mining related projects for clients including but not limited to Mashala Resources, Continental Coal and Pembani Coal Carolina.

1.9.3 SPECIALIST CONSULTANTS

The specialist studies involved the gathering of data relevant to identifying and assessing environmental impacts that may occur as a result of the proposed project. These impacts were then assessed according to pre-defined rating scales. Specialists also recommended appropriate mitigation / control or optimisation measures /actions to minimise potential negative impacts or enhance potential benefits, respectively. The specialist consultants that provided inputs into this EMPr are summarised in Table 3 below.

Table 3: List of specialists appointed to the project

Specialist Discipline	Specialist Details
Agricultural Potential	Ivan Baker of The Biodiversity Company
Air Quality Assessment	Renee von Gruenewaldt of Airshed
Biodiversity Assessment	Michael Adams & Martinus Erasmus of The Biodiversity Company
Closure Costing	Riaan de Beer of BEAL Consulting Engineering and Project Management
Groundwater Assessment	Louis Botha of GW2
Heritage Impact Assessment	Wouter Fourie of PGS
Hydropedological Assessment	Ivan Baker of The Biodiversity Company
Palaeontology Assessment	Elize Butler of Banzai Environmental (Pty) Ltd
Stormwater Management Plan and Water Balance	Bruce Randal of BEAL Consulting Engineering and Project Management
Surface Water Assessment	Bruce Randal of BEAL Consulting Engineering and Project Management
Waste Classification	Adam Sanderson of WSP
Water Resource and Aquatic Ecology Assessment	Andrew Husted of The Biodiversity Company

2 ENVIRONMENTAL MANAGEMENT PRINCIPLES

It is extremely important for effective environmental management that the mine be aware of the general principles upon which sound environmental management is based and that these principles are considered in all aspects of the operation. NEMA establishes a general framework for environmental law, in part by prescribing national environmental management principles that must be applied when making decisions that may have a significant impact on the environment. These principles are briefly summarised in the sections that follow.

2.1 HOLISTIC PRINCIPLE

The Holistic principle, as defined by NEMA (Section 2(4)(b)) requires that environmental management must be integrated, acknowledging that all elements of the environment are linked and inter-related and it must take into account the effect of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option (defined below). Holistic evaluation does not mean that a project must be looked at as a whole. It rather means that it must be accepted that there is a whole into which a project is introduced. If the indications are that the project could have major adverse effects, the project must be reconsidered and where appropriate re-planned or relocated to avoid an adverse impact or to ensure a beneficial impact.

2.2 BEST PRACTICABLE ENVIRONMENTAL OPTION

When it is necessary to undertake any action with environmental impacts, the different options that could be considered for the purpose must be identified and defined. The Best Practicable Environmental Option (BPEO) is defined in NEMA as *"the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term."* Other guidelines typically used for environmental management in terms of other legislation include: BPM which is the Best Practicable Means and BAT which is the Best Available Technology.

2.3 SUSTAINABLE DEVELOPMENT

The concept of sustainable development was introduced in the 1980's with the aim to ensure that the use of natural resources is such that our present needs are provided without compromising the ability of future generations to meet their own needs. The constitution of South Africa is built around the fact that everyone has the right to have the environment protected through reasonable legislative and other measures that secure ecologically sustainable development. The National Environmental Principles included in the NEMA require development to be socially, environmentally and economically sustainable.

2.4 PREVENTATIVE PRINCIPLES

The preventative principle is fundamental to sustainable development and requires that the disturbance to ecosystems and the pollution, degradation of the environment and negative impacts on the environment be avoided, or, where they cannot be altogether avoided, are minimised and remedied.

2.5 THE PRECAUTIONARY PRINCIPLES

The precautionary principle requires that where there is uncertainty, based on available information, that an impact will be harmful to the environment, it is assumed, as a matter of precaution, that said impact will be harmful to the environment until such time that it can be proven otherwise. The precautionary principle requires that decisions by the private sector, governments, institutions and individuals need to allow for and recognise conditions of uncertainty, particularly with respect to the possible environmental consequences of those decisions. In South Africa, the DWA (then DWAF, now DWS) adopted a BPEO guideline in 1991 for water quality management and in 1994 in the Minimum Requirements document for waste management.

In terms of the Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, the precautionary principle is defined as, *"Where a risk is unknown; the assumption of the worst-case situation and the making of provision for such a situation."* Here the precautionary principle assumes that a waste or an identified contaminant of a waste is *"both highly hazardous and toxic until proven otherwise."*

In the context of the EIA process in South Africa, the precautionary principle also translates to a requirement to provide sound, scientifically based, information that is sufficient to provide the decision-making authority with reasonable grounds to understand the potential impacts on the environment, the extent thereof and how impacts could be mitigated. If such information is not adequate for this purpose, the relevant authority cannot be satisfied as is required and then the authority should require that further information be collected and provided.

2.6 DUTY OF CARE AND CRADLE TO GRAVE PRINCIPLE

In terms of the NEMA Section 28, "Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment."

By way of example, the principle of "duty of care" in terms of waste management emphasises the responsibility to make sure that waste is correctly stored and correctly transported, as it passes through the chain of custody to final point of disposal. This means that waste must always be stored safely and securely. The company removing and disposing of waste also holds the responsibility to hold the relevant licenses, and that waste is transported alongside the necessary paperwork.

"Cradle to Grave" refers to the responsibility a company takes for the entire life cycle of a product, service or program, from design to disposal or termination. In terms of the DWS Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, "any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorised transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, he retains responsibility for the waste generated or handled." This places responsibility for a waste on the Generator and is supported by the "Cradle to Grave" principle, according to which a "manifest" accompanies each load of Hazardous Waste until it is responsibly and legally disposed. This manifest is transferred from one transporter to the next along with the load, should more than one transporter be involved. Once the waste is properly disposed of at a suitable, permitted facility, a copy of the manifest must be returned to the point of origin." Duty of Care offers one strategy to implement sustainable development.

2.7 POLLUTER PAYS PRINCIPLE

The "polluter pays principle" holds that the person or organisation causing pollution is liable for any costs involved in cleaning it up or rehabilitating its effects. It is noted that the polluter will not always necessarily be

the generator, as it is possible for responsibility for the safe handling, treatment or disposal of waste to pass from one competent contracting party to another. The polluter may therefore not be the generator but could be a disposal site operator or a transporter. Through the 'duty of care' principle, however, the generator will always be one of the parties held accountable for the pollution caused by the waste. Accordingly, the generator must be able to prove that the transferral of management of the waste was a responsible action. The polluter pays principle acceding to NEMA dictates that *"the cost of remedying pollution, environmental degradation and consequent adverse effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment."*

2.8 DUTY OF CARE RESPONSIBILITIES

The principle of duty of care is especially important to understand when it comes to pollution that arises as a result of mining. Notwithstanding any licences or permits that may exist, the mine still has a responsibility to take suitable measures should pollution arise as a result of the mining activities.

Training and awareness should be fostered in all staff working to ensure that they can perform their duties. Failure to comply with the provisions in the EMPr and NEMA would be a contravention of the Act. The relevant sections of NEMA are provided below, to outline the duty of care and responsibility that the applicant and all employees have towards the environment. The National Environmental Management Act (Act 107 of 1998) (NEMA) Section 28 makes provision for Duty of care and remediation of environmental damage. The binding principals are described below:

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

2. Without limiting the generality of the duty in subsection (1), the persons on whom subsection (1) imposes an obligation to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in which-

    a) any activity or process is or was performed or undertaken; or

    b) any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.

3. The measures required in terms of subsection (1) may include measures to-

    a) investigate, assess and evaluate the impact on the environment;

    b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;

    c) cease, modify or control any act, activity or process causing the pollution or degradation;

    d) contain or prevent the movement of pollutants or the cause of degradation;

    e) eliminate any source of the pollution or degradation; or

    f) remedy the effects of the pollution or degradation.

4. No person may-

    a) unlawfully and intentionally or negligently commit any act or omission which causes significant or is likely to cause significant pollution or degradation of the environment;

b) unlawfully and intentionally or negligently commit any act or omission which detrimentally affects or is likely to affect the environment in such manner; or

c) refuse to comply with a directive issued under this section.

Any person who contravenes or fails to comply with subsection (14) is guilty of an offence and liable on conviction to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years or to both such a fine and such imprisonment.

3 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

Management of operational risk is a key consideration for Mines operating within the social and economic context of South Africa. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. Operational risks and impacts are usually managed through the implementation of the Environmental and Social Management System (ESMS) and Health and Safety (HS) system. A formal, effective ESMS is an important requirement for establishing and maintaining effective environmental management and should be undertaken during the planning phase of the Project. As such the Applicant shall be required to appoint a suitably qualified specialist to develop the ESMS to be implemented on the mine. Adequate resources (people, financial and technical) need to be made available to ensure effective establishment, implementation, maintenance and continual improvements of the ESMS. The roles and responsibilities for these key environmental personnel should be clearly defined and communicated throughout the organisation. The ESMS should include the requirement to constantly monitor environmental performance and assess the adequacy of environmental resources provided for the Mine. If required, the Mine would need to procure further environmental resources to ensure the successful implementation of the ESMS and EMPr. The development and implementation of an ESMS will guide compliance with relevant regulatory and other requirements.

3.1 ESMS FRAMEWORK

The ESMS will be based on:

- Manungu Collieries corporate vision;
- South African legal requirements; and
- Mining best practice.

The ESMS to be developed for the Mine should incorporate and provide for:

- A project specific Environmental Policy;
- Organisational capacity and competency;
- The ESMS shall identify roles and responsibilities of key role players;
- The ESMS shall incorporate a mechanism for ongoing identification of risks and impacts.
- Integration of the ESMS with the HS management system may be undertaken to form a holistic SHE risk management system;
- The ESMS shall comprise appropriate management plans and procedures to ensure effective operational control;
- The ESMS shall provide for emergency response and also make provision for emergency protocols;
- Effective communication (both internal and external) is a key requirement for successful implementation of the ESMS and an appropriate communication procedure to this effect shall be developed;

- The ESMS shall involve engagement between the client, its workers, local communities directly affected by the project (the affected communities) and where appropriate, other stakeholders. It is therefore imperative that there is integration between Stakeholder Engagement procedures and the ESMS;
- The ESMS shall make provision for ongoing compliance monitoring, performance assessment and external audits; and
- The ESMS shall make provision for internal auditing and continual improvement which should be incorporated into internal management review processes. The ESMS should provide for setting and reviewing objectives and targets to demonstrate continual SHE improvements associated with the project.

Ultimately an effective ESMS should provide for effective management of social and environmental risks and impacts whilst maintaining legal compliance and meeting international standards of best practise where these are feasible and appropriate.

3.1.1 STAKEHOLDER ENGAGEMENT

Social impacts occur immediately in the planning phase of a project and as such it is imperative to start with stakeholder engagement as early in the process as possible. This report will be placed out for public review in order to encourage stakeholder engagement, in accordance with the relevant legislation. Stakeholder engagement is however required on an ongoing basis throughout the operation of the facility. As such, the mine will need to develop and implement a detailed Stakeholder Engagement Plan, designed to work as a living document for implementation over the entire LoM.

The following stakeholder engagement framework outlines the principles and objectives for stakeholder engagement during all phases of the mining operation.

- To identify and assess the processes and/or mechanisms that will improve the communication between local communities, the wider community and the colliery;
- To improve relations between mine staff and the people living in the local communities;
- To provide a guideline for the dissemination of information crucial to the local communities in a timely, respectful and efficient manner; and
- To provide a format for the timely recollection of information from the local communities in such a way that the communities are included in the decision-making process.

This stakeholder engagement plan will assist the colliery to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the project. Such a plan cannot be considered a once off activity and should be updated on a regular basis to ensure that it stays relevant and to capture new information. The Stakeholder Engagement Plan should consist of the following components:

- Stakeholder Identification and Analysis – time should be invested in identifying and prioritising stakeholders and assessing their interests and concerns.
- Information Disclosure – information must be communicated to stakeholders early in the decision-making process in ways that are meaningful and accessible, and this communication should be continued throughout the life of the project.
- Stakeholder Consultation – each consultation process should be planned out, consultation should be inclusive, the process should be documented, and follow-up should be communicated.
- Negotiation and Partnerships – add value to mitigation or project benefits by forming strategic partnerships and for controversial and complex issues, enter into good faith negotiations that satisfy the interest of all parties.

- Grievance Management – accessible and responsive means for stakeholders to raise concerns and grievances about the project must be established throughout the life of the project.
- Stakeholder Involvement in Project Monitoring – directly affected stakeholders must be involved in monitoring project impacts, mitigation and benefits. External monitors must be involved where they can enhance transparency and credibility.
- Reporting to Stakeholders – report back to stakeholders on environmental, social and economic performance, both those consulted and those with more general interests in the project and parent company.
- Management Functions – sufficient capacity within the company must be built and maintained to manage processes of stakeholder engagement, track commitments and report on progress.

It is of critical importance that stakeholder engagement takes place in each phase of the project cycle and it must be noted that the approach will differ according to each phase.

3.1.2 GRIEVANCE MECHANISM

Manungu Colliery shall establish a specific mechanism for dealing with grievances. A grievance is a complaint or concern raised by an individual or organisation that judges that they have been adversely affected by the project during any stage of its development. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts, or perceived impacts. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

The proposed grievance mechanism shall be based on the following principles:

- Transparency and fairness;
- Accessibility and cultural appropriateness;
- Openness and communication regularity;
- Written records;
- Dialogue and site visits; and
- Timely resolution.

Based on the principles described above, the grievance mechanism process involves four stages:

- Receiving and recording the grievance;
- Acknowledgement and registration;
- Site inspection and investigation; and
- Response.

3.1.3 INTERNAL GRIEVANCE PROCEDURE

Manungu Colliery shall develop a detailed internal grievance mechanism designed to receive and facilitate resolution of workplace concerns and grievances raised by employees (and their organizations, where they exist). Employees must be informed of the grievance mechanism at the time of recruitment and it must be made easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those

concerned, without any retribution. The mechanism should also allow for anonymous complaints to be raised and addressed. The mechanism should not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.

3.2 DOCUMENT CONTROL

A formal document control system should be established during the development of the ESMS. The document control system must provide for the following requirements;

- Documents are approved for adequacy prior to use;
- Review and update documents as necessary and re-approve documents;
- Ensure that changes and the current version status of documents are identified;
- Ensure that relevant versions of applicable documents are available at points of use;
- Ensure that documents remain legible and readily identifiable;
- Ensure that documents of external origin necessary for the ESMS are identified and their distribution controlled; and
- Prevent unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

3.3 RECORD KEEPING

It is essential that an official procedure for control of records be developed to ensure records required to demonstrate conformity to environmental and social standards are maintained. Manungu Colliery is therefore required to develop and maintain a procedure for the identification, storage, protection, retrieval, retention and disposal of records as part of the ESMS. Records must be legible, identifiable and traceable.

3.4 AUDITING AND REPORTING PROCEDURES

The Applicant shall develop and auditing and reporting procedure, for conveying information from the compliance monitoring activities and to ensure that management is able to take rapid corrective action should certain thresholds be exceeded. The sections below present a framework for the development of the necessary procedures.

Different reporting mechanisms may include:

- Inspections;
- Accidents and emergencies;
- Measuring performance indicators and interpreting and acting on the indicators;
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes; and
- Training programmes and evidence of appropriate levels/amount of skills/capacities created.

All monitoring and auditing must be accompanied by applicable records and evidence (e.g. delivery slips, photographic records, etc.). All reports must be retained and made available for inspection by the ECO, the Applicant and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to ensure accountability. The applicant must use the audit report findings to continually ensure that environmental protection measures are working effectively on site through a system of self-checking. The EMPr should be viewed as a dynamic document aimed at continual environmental performance improvement.

3.5 RESPONDING TO NON-COMPLIANCES

Non-compliance will be identified and managed through the following four key activities including;

- **Inspections** of the site and activities across the site;
- **Monitoring** of selected environmental quality variables;
- **Audits** of the site and relevant documentation as well as specific activities;
- **Reporting** on a quarterly basis.

An environmental non-conformance and incident register must be prepared and maintained by the EO/ECO throughout the lifespan of the mine in order to monitor environmental concerns, incidents, and non-conformances. The register must include details of date, location, description of the NC or Incident, applicable environmental commitment/standard, corrective action taken, adequacy of corrective action, date rectified, etc.

Non-compliance with the EMPr or any other environmental legislation, specifications or standards shall be recorded by the EO/ECO in the non-conformance register. This register shall be maintained by the EO/ECO and will be sent to the Applicant/EM on a regular basis (at least quarterly), and the Applicant/EM shall ensure that the responsible party takes the necessary corrective actions. Non-conformances may only be closed out in the register by the EO/ECO upon confirmation that adequate corrective action has been taken. The register should be utilised to measure overall environmental performance.

3.6 ENVIRONMENTAL INCIDENTS

For the purposes of this project, an environmental incident can be divided into three levels, i.e. major, medium and minor. All major and medium environmental incidents shall be recorded in the incident register. Minor incidents do not need to be reported but require immediate rectification on site. Definitions and examples of environmental incidents are provided in Table 4 below.

Table 4: Description of incidents and non-conformances for the purpose of the project

Non-Conformance	Any deviation from work standards, practices, procedures, regulations, management system performance etc. that could either directly or indirectly lead to injury or illness, property damage, damage to the workplace environment, or a combination of these.
Major Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread, long-term, irreversible significant negative impact on the environment and/or has a high risk of legal liability. A major environmental incident usually results in a significant pollution and may entail risk of public danger. Major environmental incidents usually remain an irreversible impact even with the involvement of long-term external intervention i.e. expertise, best available technology, remedial actions, excessive financial cost etc. Major environmental incidents may be required to be reported to the authorities. The ECO shall make the final decision as to whether a particular incident should be classified as a Major incident.
Medium Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread or localised, short term, reversible significant negative impact on the environment and/or has a risk of legal liability. A medium environmental incident may be reported to the authorities, can result in significant pollution or may entail risk of public danger. The impact of medium environmental incidents should be reversible within a short to medium term with or

	without intervention. The ECO shall make the final decision as to whether a particular incident should be classified as a Medium incident.
Minor Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, where the environmental impact is negligible immediately after occurrence and/or once-off intervention on the day of occurrence. An incident where there is unnecessary wastage of a natural resource is also classified as a minor environmental incident. An example would be leaking water pipes that result in the wastage of water. A minor environmental incident is not reportable to authorities.

The following incident reporting procedures shall apply to this project:

- All environmental incidents shall be reported to the Mine EO who shall ensure that the appropriate rectification is undertaken;
- The Mine EO shall record all medium and major incidents in the incident register and advise on the appropriate measures and timeframes for corrective action;
- An incident report shall be completed by party responsible for the incident for all medium and major incidents and the report shall be submitted to the Mine Manager and Mine EO within 5 calendar days of the incident; and
- The Mine EO shall investigate all medium and minor incidents and identify any required actions to prevent a recurrence of such incidents.

In the event of an emergency incident (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, the Applicant shall notify the relevant authorities in accordance with legal requirements (e.g. Section 30 of NEMA and Section 20 of the NWA). In the event of a dispute in terms of the classification of a such an incident, the Applicant shall engage the ECO to advise on the potential reporting requirements in terms of the above.

3.7 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

Training and environmental awareness is an integral part of a complete EMPr. The overall aim of the training will be to ensure that all site staff are informed of their relevant requirements and obligations pertaining to the relevant authorisations, licences, permits and the approved EMPr and protection of the environment.

The applicant must ensure that all relevant employees are trained and capable of carrying out their duties in an environmentally responsible and compliant manner and can comply with the relevant environmental requirements. To obtain buy-in from staff, individual employees need to be involved in:

- Identifying the relevant risk;
- Understanding the nature of risks;
- Devising risk controls; and
- Given incentive to implement the controls in terms of legal obligations.

The applicant shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees. All training must be formally recorded, and attendance registers retained. The environmental training should, as a minimum, include the following:

- General background and definition to the environment;

- The importance of compliance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- Compliance with mitigation measures proposed for sensitive areas;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving compliance with the environmental policy and procedures and with the requirement of the applicant's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences (legal and/or other) of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities; and
- All operational risks must be identified, and processes established to mitigate such risk, proactively. Thus, the applicant needs to inform the employees of any environmental risks that may result from their work, and how these risks must be dealt with in order to avoid pollution and/or degradation of the environment.

In the case of permanent staff required during the operational phase of the project, the applicant shall provide evidence that such induction courses have been presented. In the case of new staff (including contract labour) the applicant shall keep a record of adequate environmental induction training.

3.7.1 MANNER IN WHICH EMPLOYEES WILL BE INFORMED OF ENVIRONMENTAL RISKS

The specific requirements for environmental training include:

- Site Environmental Induction Training: All site staff and employees will receive induction training which will be presented by the Health and Safety Manager Representatives. The induction training must include an environmental management component which will be prepared by the Mine EO and presented where possible by the Mine EO. The training material must include general environmental awareness and an overview of the EMPr and EA requirements. The Induction Training Material must be reviewed and approved by the ECO;
- Regular Environmental Toolbox Talks: Environmental toolbox talks will be prepared by the Mine EO to cover a range of environmental topics and must be presented to relevant staff during applicable times during all relevant phases. The aim of these toolbox talks will be to inform site employees of environmental requirements pertaining to specific activities, as well as specific EMPr and EA requirements and obligations;
- Informal training of all staff on site is also required on an on-going basis through informal discussions, on-site supervision and through facilitation of day to day activities. Such training must be given or otherwise facilitated by the Mine EO; and
- The Mine EO must review all safe work procedures/risk assessments/DSTI's (daily safe task instruction) from the safety department and include the relevant environmental risks and appropriate mitigation measures. Since the above procedures are specific to the applicable activity being undertaken, the inclusion of environmental measures aims to ensure each activity is undertaken in an environmentally responsible manner.

3.7.2 MANNER IN WHICH RISKS WILL BE DEALT WITH TO AVOID POLLUTION OR DEGRADATION

Manungu Colliery will be required to develop an ESMS which provides a mechanism for ongoing assessment of operational risks and impacts associated with their activities and any new activities that may arise. The impacts and risks identified will be managed through the framework of internal procedures which specify the

mechanisms and actions required to effectively manage the risks and impacts on the ground. Where any unexpected events occur that have the potential to result in environmental damage, these shall be manged through the emergency response procedure. The framework for the emergency response procedure is provided below.

3.7.3 EMERGENCY RESPONSE PLAN

Manungu Colliery must identify potential emergencies and develop procedures for preventing and responding to them. There are several options for dealing with high priority impacts and risks, as the paradigm has two components, probability and consequence. The design of control measures rest on the understanding the cause and effect. Best practise is to intervene with the ultimate factors were feasible, rather than treat the outcomes. Emergency response therefore has the option of reducing probability, or reducing the consequence, reducing the probability is the preferred option. Below are some common emergency preparedness approaches:

- Threat consequence if and when the risk eventuates, when the risk becomes an issue;
- Combine reducing the probability and treating the consequence;
- Offset environmental losses by investing in other assets;
- Not manage some of the risks because there are too many; and
- Make provision to manage residual impacts or issues that arise because of shortcomings in risk identification and rating, avoidance and mitigation or because a rare event has occurred.

Residual impacts are those impacts that despite reducing the probability and consequence might still occur. In these cases, parties will have to be compensated, pollution cleaned up and damage to the environment remediated.

The Applicant shall be required to develop and implement an Emergency Preparedness and Response Plan prior to commencing work. The Emergency Preparedness and Response Plan should be based on a baseline Hazard and Risk Assessment and should provide for the following as a minimum:

- Risk assessment (identification of areas where accidents and emergency situations may occur, communities and individuals that may be impacted);
- Response procedures;
- Provision of equipment and resources;
- Designation of responsibilities;
- Communication and reporting (including that with potentially Affected Communities);
- Periodic training to ensure effective response; and
- Periodic review and revision, as necessary, to reflect changing conditions.

The Applicant must ensure that the Emergency Preparedness and Response Plan makes provision for environmental emergencies, including, but not limited to;

- Fire Prevention;
- Fire Emergency Response;
- Spill prevention;
- Spill Response;
- Contamination of a water resource;
- Accidents to employees; and

- Use of hazardous substances and materials, etc.

The Applicant must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the project.

3.7.3.1 FIRE

Fires represent a significant risk to mining operations and require special attention in the Emergency Response Plan. Sparks generated during welding, spontaneous combustion, cutting of metal or gas cutting can result in fires. Every possible precaution shall therefore be taken when working with this equipment near potential sources of combustion. The Applicant must take all reasonable measures to ensure that fires are not started as a result of activities on site. No smoking is allowed near containers with flammable contents or at areas that are highly flammable. Smoking is only permitted at areas designated for smoking. No open fires are permitted on site and no burning of waste is to be allowed on site. The Applicant shall ensure that there is always sufficient fire-fighting equipment available on site. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities. The Applicant is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. Appropriate and correctly serviced equipment must be available for all activities that are likely to generate fire.

It is further anticipated that firebreaks will be required around the site perimeter. It is recommended that such fire prevention measures are implemented in consultation with adjacent landowners and where necessary that the Applicant coordinate fire prevention efforts with local Fire Protection Agency (FPA).

3.7.3.2 HEALTH AND SAFETY

The Applicant shall make allowance for the supply, erection, maintenance and removal of the information boards. Information boards shall also provide the name of the process managers, relevant contact person and contact number. This will ensure that the public access to request information and/or to lodge any complaints. The boards will essentially be to advise the public of the construction activities to be undertaken or being undertaken and to advise of the prohibition of entering demarcated “no-go” areas.

The Applicant must ensure that compliance with the Mine Health and Safety Act (Act No. 29 of 1996) and the Occupational Health and Safety Act (Act No. 85 of 1993) is strictly adhered to. All reasonable measures must be taken to ensure the safety of all site staff and the surrounding community is not compromised. No weapons may be brought onto the property by any person unless the carrying of a weapon is required and approved in carrying out their specific duties. Where fencing is temporarily affected, temporary security must be provided at all times until the fence is reinstated.

The Applicant must ensure that all vehicles using public roads are in a roadworthy condition, that drivers adhere to the speed limits and that their loads are secured and that all local, provincial and national regulations are adhered to. The Mine shall make provision for flagmen to regulate traffic and construction vehicles when necessary.

The Applicant must ensure that all accidents and incidents are recorded and reported to the EO/ECO. The Applicant must have easy access to all relevant emergency numbers for example, spill response teams, fire authorities, fire protection associations, medical emergency, nearest emergency rooms (hospitals) to the site, of both private and public hospitals. The Applicant must take all reasonable measures to ensure the health and safety of all employees, visitors and the public.

3.7.3.3 SPILL RESPONSE PROCEDURE

All relevant employees, staff and labourers must be instructed regarding implementation of spill prevention measures and spill response procedures. In the event of a spill, the following general requirements shall apply, and the detailed spill procedure must cater for these requirements;

- Immediately reporting of spills by all employees and/or visitors to the relevant supervisor and EO (this requirement must be including in induction training);

- Take immediate action to contain or stop the spill where it is safe to do so;
- Contain the spill and prevent its further spread (e.g. earth berm or oil absorbent materials for spill to land or by deploying booms and/or absorbent material for a spill to water);
- Dispose of any contaminated soil or materials according to appropriate waste disposal procedure (waste from spills of hazardous materials shall be disposed of as hazardous waste at a suitably licensed waste disposal facility);
- The Mine EO shall record details of the spill in their respective incident registers; and
- Photographic evidence shall be obtained of the spill clean-up.

In the case of large spills, the services of a specialist spill response agency shall be required, who shall advise on appropriate clean-up procedures and follow-up monitoring (if required).

In the event of any spills which are classified as medium or major incidents, the Mine EO shall immediately inform the ECO/EM. The EO/ECO shall record the incident in the non-conformance and incident register and advise on the appropriate measures and timeframes for corrective action. Environmental incident reports shall be completed and submitted to the Mine Manger and ECO/EM within 5 working days for all medium and major incidents. If there is a requirement to report the incident to the authorities, this shall be done by the Applicant in consultation with the ECO/EM.

The Applicant must also, (as per Section 30 of the NEMA) notify the Director-General (DWS, DEA and DMR), South African Police Services and Local Municipality and any persons whose health may be affected of the nature of an incident including:

- Any risks posed to public health, safety and property,
- Toxicity of the substance or by products released by the incident; and
- Any step taken to avoid or minimise the effects of the incident on public health and the environment.

The Applicant must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the project.

3.7.3.4 MEASURES TO CONTROL OR REMEDY ANY CAUSES OF POLLUTION OR DEGRADATION

The broad measures to control or remedy any causes of pollution or environmental degradation as a result of the proposed activities taking place are provided below:

- Limit the size of the area to be disturbed as far as is practically possible;
- Design and construct infrastructure such as the PCD and pit dewatering dams with both decant and drainage systems inclusive of storm water runoff measures;
- Conduct regular dam inspections in line with the regulatory requirements;
- Design and construct waste rock dumps and overburden dumps with adequate storm water runoff measures;
- Establish and maintain dirty and clean water systems in line with the regulatory requirements;
- Treat all contaminated water prior to discharge;
- Contain potential pollutants and contaminants (where possible) at source;
- Handling of potential pollutants and contaminants (where possible) must be conducted in bunded areas and on impermeable substrates;

- Ensure the timeous clean-up of any spills;
- Implement a waste management system for all waste stream present on site;
- Investigate any I&AP claims of pollution or contamination as a result of mining activities;
- Continue with concurrent rehabilitation;
- Operate the mine in line with the proposed closure goals and objectives;
- Rehabilitate the proposed mining site in line with the requirements of the detailed rehabilitation and closure plan; and
- Implement the impact management objectives, outcomes and actions, as described in Section 0 above.

It is of critical importance that the broad measures to control or remedy any causes of pollution or environmental degradation are applied during all phases of the proposed mining operation. This is essential and allows for the operation to be conducted in a manner that will allow for the post mining closure goals and objectives to be met.

4 COMPLIANCE MONITORING

4.1 RESPONSIBLE PERSONS

Table 5: Roles and responsibilities for environmental resources on site

Environmental Resource	Key Responsibility	Tasks	Reporting
Environmental Manager (EM)	Overall responsibility for environmental management at the mine	Develop and implement the ESMS Develop procedures for the ESMS Review compliance monitoring reports and audit reports Assign responsibilities for corrective actions and addressing non-compliance Liaison with authorities Issuance of NCR's Reporting KPI's to mine management Liaison with landowners and Key stakeholders with regards to environmental issues Supervise Environmental Monitoring Programmes	Reports to Mine management
Environmental Control Officer (ECO)	Responsible for **external** compliance monitoring. *Note: Should the ECO not be retained by the mine as a full-time resource, the EM will take over the responsibilities of the ECO as presented in this EMPr.*	Acts as an external assurance of environmental compliance Review EO reports Conduct inspections and report on environmental compliance Advise EM in corrective actions for non-compliance Recommendations for improvement Environmental training and support	Reports to EM

Environmental Resource	Key Responsibility	Tasks	Reporting
Environmental Officer (EO)	The EO is responsible for **internal** monitoring compliance against the conditions of the EMPr and other licenses and permits. The EO is only responsible for implementation of management measures that are the responsibility of the Applicant	Undertake regular (at least weekly) site inspections Report on compliance and advise applicant on corrective actions Implement corrective actions where the responsibility lies with Applicant Coordinate and Implement Environmental Monitoring Programmes Environmental record keeping	Reports to EM
Independent Environmental Auditor (IEA)	Responsible for external compliance audits and annual Performance Assessments	Conducting Auditing Recommendations for improvement	Reports to authorities

4.2 METHOD OF MONITORING IMPACT MANAGEMENT ACTIONS

Manungu Colliery is required to develop an auditing and reporting procedure in support of the ESMS to be developed and implemented. The purpose of the auditing and reporting procedure is to clearly define the requirements for compliance monitoring and audits and the reporting of the information gathered. Through integration with the ESMS, the procedure will allow management to take rapid corrective action for concerns and non-conformances identified during inspections and audits. This section provides a framework for the detailed procedure which will be developed by the mine.

Different reporting mechanisms may include:

- Inspections;
- Reporting accidents and emergencies;
- Measuring performance indicators and interpreting and acting on the indicators;
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes; and
- Training programmes and evidence of appropriate levels/amount of skills/capacities created.

All monitoring and auditing must be accompanied by applicable records and evidence (e.g. delivery slips, photographic records, etc.). All reports must be retained and made available for inspection by the ECO, the Applicant and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to ensure accountability. Manungu Colliery must use the audit report findings to continually ensure that environmental protection measures are working effectively on site through a system of self-checking. The framework for compliance monitoring and auditing is summarised in the sections below.

Table 6: Proposed framework for compliance monitoring and audits

Resource	Document	Implementation		Checking/Monitoring/Audit			Reporting		
		Responsible Party	Frequency	Responsible Party	Type	Frequency	To	Type	Frequency
Environmental Manager	ESMS Procedures	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
	EMP/EMPr	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
	IWULA	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
	NEMA EA	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
	Other Licences, Permits or Approvals	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
Environmental Officer	ESMS Procedures	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly
	EMP/EMPr	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly
	IWULA	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly
	NEMA EA	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly

	Other Licences, Permits or Approvals	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly
Environmental Control Officer	ESMS Procedures	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report	Monthly
	EMP/EMPr	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report	Monthly
	IWULA	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report	Monthly
	NEMA EA	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report t	Monthly
	Other Licences, Permits or Approvals	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report	Monthly
Independent Environmental Auditor	ESMS Procedures	No	-	No					
	EMP/EMPr	No	-	Yes	Performance Assessment	Annual	Environmental Manager		Annual
	IWULA	No	-	Yes	Audit	Annual	Environmental Manager		Annual
	NEMA EA	No	-	Yes	Audit	Annual	Environmental Manager		Annual

	Other Licences, Permits or Approvals	No	-	Yes	Audit	As Per Licence	As Per Licence

4.3 MONITORING AND REPORTING FREQUENCY

The following auditing and reporting shall be required during operations:

- Weekly Compliance Reports: These reports must be prepared by the designated Mine EO and must aim to monitor and report on-site environmental performance;
- Monthly Compliance Audits: These audits must be undertaken by the mine EO and must aim to monitor and report on compliance with the requirements of the relevant authorisations. licences and permits, the approved EMPr; and
- Quarterly Audit Reports: The ECO must compile quarterly compliance reports (audits) which are to be submitted to the applicant for his review and correction of non-compliance issues. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified.

4.4 MECHANISMS FOR MONITORING COMPLIANCE

Table 7 below provides a summary of the functional requirements for monitoring that needs to be implemented, identifies who is responsible for the monitoring and the frequency of monitoring and reporting.

Table 7: Mechanisms for monitoring compliance

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementation
Mine Planning and Design	None	None		
Mine Infrastructure Construction	All Impacts Identified during the EIA	Site Inspections and checklists	Environmental Officer	Daily inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required
		Site Inspections and Audits	Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Opencast Mining	All Impacts Identified during the EIA	Site Inspections and checklists	Environmental Officer	Daily inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementation
		Site Inspections and Audits	Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Mineral Processing	All Impacts Identified during the EIA	Site Inspections and checklists	Environmental Officer	Daily inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required
		Site Inspections and Audits	Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Decommissioning Activities	All Impacts Identified during the EIA	Site Inspections and checklists	Environmental Officer	Daily inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementation
		Site Inspections and Audits	Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Rehabilitation	All Impacts Identified during the EIA	Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required
		Site Inspections and Audits	Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Closure - Aftercare and Maintenance	All Impacts Identified during the EIA	Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required
		Site Inspections and Audits	Environmental Officer	Bi-Monthly inspections
				Bi-Monthly Reports
			Environmental Control Officer	Bi-Annual Audit Reports

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementation
			Independent Environmental Auditor	Annual Performance Assessment

4.5 THE EMPR PERFORMANCE ASSESSMENT / AUDIT REPORT

According to Regulation 55 of the MPDRA regulations compliance with the EMPr must be monitored on a continuous basis. This requirement shall be accomplished through the continuous monitoring of compliance undertaken by the Mine EO and independent auditor (when relevant). The performance assessment will focus on the following Key Aspects:

- Compliance with the Approved EMPr;
- Compliance with the approved SLP; and
- Appropriateness and validity (technical content) of the EMPr.

Scheduled Environmental Compliance Audits are required to be undertaken in terms of Regulation 34 of the National Environmental Management Act, Act 107 of 1998 (NEMA) Environmental Impact Assessment (EIA) Regulations, 2014. Regulation 34 states:

1) *"The holder of an environmental authorisation must, for the period during which the environmental authorisation and EMPr, and where applicable the closure plan, remain valid-*
   (a) Ensure that the compliance with the conditions of the environmental authorisation and the EMPr, and where applicable the closure plan, is audited; and
   (b) Submit an environmental audit report to the relevant competent authority.
2) *The environmental audit report contemplated in sub-regulation (1) must-*
   (a) be prepared by an independent person with the relevant environmental auditing expertise;
   (b) provide verifiable findings, in a structured and systematic manner, on
      i) The level of performance against and compliance of an organisation or project with the provisions of the requisite environmental authorisation or EMPr and, where applicable, the closure plan; and
      ii) The ability of the measures contained in the EMPr, and where applicable the closure plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;
   (c) Contain the information set out in Appendix 7; and
   (d) Be conducted and submitted to the competent authority at intervals as indicated in the environmental authorisation".

An EMPr performance assessment audit report shall be submitted to the Department of Mineral Resources (DMR) on an annual basis (each year of mining and before applying for closure). The holder of the mining right must appoint an independent qualified person for the monitoring and to compile a report, but the responsibilities remain the holders. The performance assessment will include:

- The period when the performance assessment was conducted;
- The scope of the assessment;
- The procedures used for conducting the assessment;
- Interpreted information gained from monitoring the EMPr (e.g. monitoring reports);
- Evaluation criteria used during the assessment; and
- Results of the assessment are to be discussed and mention must be made of any gaps in the EMPr (adequacy of the EMPr) and how it can be rectified.

4.6 REVIEW AND REVISION OF THE EMPR

It is important to note that this EMPr is made legally binding on the applicant at such time as the EMPr is approved by the decision-making authority. Since this is a mining project, the overarching legislation is the MPRDA, and it is important to note that in accordance with Section 102 of the MPRDA, no EMPr may be amended or varied without the written consent of the minister. It is however also important to consider that the EMPr is a dynamic document which may require such alteration and /or amendment as the project evolves. Conditions under which the EMPr would require revision include:

- Changes in legislation;
- Occurrence of unanticipated impacts or impacts of greater intensity, extent and significance than predicted;
- Inadequate mitigation measures (i.e. where environmental performance does not meet the required level despite the implementation of the mitigation measure); and
- Secondary impacts occur as a result of the mitigation measures.

The Applicant in consultation with the ECO should be responsible for ensuring that the registration and updating of all relevant EMPr documentation is carried out. It shall be the responsibility of the Applicant/Mine Manager to ensure that all personnel are performing according to the requirements of this procedure and to initiate the revision of controlled documents, when required by changes in process or operations and shall notify the ECO of such changes.

It is recommended that a risk assessment protocol must be developed and implemented by the ECO which shall be utilised to evaluate the environmental risk associated with the potential proposed alterations and/or amendments. The results of the risk assessment must then be included in the submission to the competent authority for the amendment process. It is important to note that if alterations and/or amendments are required, these may only be effected with written approval from the competent authority and in accordance with the then-in-effect relevant legal processes.

5 IMPACT MANAGEMENT OUTCOMES

This section of the EMPr provides the impact management outcomes identified for the Mine. The impact management objectives, including the standard to be achieved, are summarised in Table 8 below.

Table 8: Impact Management Outcomes

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
General Surface Rehabilitation **Mine area site preparation** **Opencast mining** **Opencast Voids** **Underground mining adits and camps** **Site establishment – Contractors Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction**	Alteration of topography	Topography and Landform	Construction Operation Decommissioning Rehabilitation and Closure	Control through site planning and design	Original topography and landform serve as a reference for rehabilitation
General Surface Rehabilitation **Infrastructure removal** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast mining** **Opencast Voids** **Underground mining adits and camps** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure**	Altered drainage patterns	Topography and Landform	Construction Operation Decommissioning Rehabilitation and Closure	Control through proper soil management procedures	Rehabilitation and closure plan DWS best practice Guidelines

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Storm water management **Water management Infrastructure construction**					
Opencast mining **Opencast Voids** **Underground mining adits and camps** **Post Closure Monitoring and Maintenance** **Water management Infrastructure construction**	Soil surface change	Topography and Landform	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities)	Appropriate safety factors (Salomon and Monroe) as calculated by engineers and in consultation with DWS/DMR
Opencast mining **Underground mining**	Impacts on Geology	Geology	Operation	Modify through mine planning, design and rehabilitation	MPRDA Rehabilitation and Closure Plan
General Surface Rehabilitation **Infrastructure removal** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast mining** **Underground mining adits and camps** **Post Closure Monitoring and Maintenance** **Site establishment – Camp**	Erosion and sedimentation	Soils	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	CARA

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Site establishment – Permanent site office Infrastructure **Storm water management** **Water management Infrastructure construction** **Water Treatment**					
Infrastructure removal **Mine area site preparation** **Mineral Processing** **Opencast mining** **Underground mining adits and camps** **Post Closure Monitoring and Maintenance** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Storm water management** **Water management Infrastructure construction** **Water Treatment**	Soil compaction	Soils	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of EMPr mitigation measures Remedy through application of treatment measures (e.g. ripping)	Principles of CARA Rehabilitation and Closure Plan Ripping to 30cm where soil depth permits
General decommissioning activities **General Surface Rehabilitation** **Infrastructure removal**	Soil Pollution/Contamination	Soils	Construction Operation Decommissioning	Avoid through preventative measures (e.g. bunding, spill kits)	Hazardous Substances Act NWA NEMA Duty of Care NEMWA

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Maintenance and operation of site infrastructure and facilities **Mine area site preparation** **Mineral Processing** **Opencast/underground mining** **Opencast Voids** **Post Closure Monitoring and Maintenance** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Storm water management** **Water management Infrastructure construction** **Water Treatment**			Rehabilitation and Closure	Remedy through clean-up and waste disposal Modify through soil treatment if required	Incident reporting procedures DWS minimum standards for waste disposal
General Surface Rehabilitation **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Opencast/underground mining** **Opencast Voids** **Site establishment – Camp**	Loss of soil fertility (denitrification, loss of soil nutrient store and organic carbon stores) and loss of land capability	Land Capability	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	CARA Rehabilitation and Closure Plan

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Site establishment – Permanent site office Infrastructure **Storm water management** **Water management Infrastructure construction** **Water Treatment**					
General Surface Rehabilitation **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Opencast/underground mining** **Opencast Voids** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Storm water management** **Water management Infrastructure construction** **Water Treatment**	Loss of soil resource and its utilisation potential	Land Capability	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	CARA Rehabilitation and Closure Plan

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Infrastructure removal **Mine area site preparation** **Opencast/underground mining** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction** **Water Treatment**	Damage/Disruption of Ecosystem Services	Land Use	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of EMPr mitigation measures (e.g. service detection and communication with landowners) Remedy through repair or reinstatement of services if required Control through implementation of ESMS	Stakeholder Engagement Plan Rehabilitation and Closure Plan Grievance Mechanism
General Surface Rehabilitation **Infrastructure removal** **Mine area site preparation** **Opencast/underground mining** **Opencast Voids** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Storm water management** **Water management Infrastructure construction**	Interference with existing land uses	Land Use	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of EMPr mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	Stakeholder Engagement Plan Rehabilitation and Closure Plan Grievance Mechanism

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
General Surface Rehabilitation **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast mining** **Underground mining adit and camps** **Post Closure Monitoring and Maintenance** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Site visits** **Storm water management** **Water management Infrastructure construction** **Water Treatment**	Direct and indirect mortality of flora and fauna	Fauna and Flora	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Control through implementation of EMPr mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	NEMBA TOPS
Maintenance and operation of site infrastructure and facilities **Mine area site preparation** **Opencast mining** **Underground mining adit and camps** **Site establishment – Camp**	Habitat fragmentation and blockage of seasonal and dispersal movements	Fauna and Flora	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMPr mitigation measures (e.g. shape of disturbed areas, maintaining corridors)	NEMBA

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Site establishment – Permanent site office Infrastructure **Storm water management** **Water management Infrastructure construction** **Water Treatment**					
General Surface Rehabilitation **Infrastructure removal** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast mining** **Underground mining adit and camps** **Opencast Voids** **Post Closure Monitoring and Maintenance** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Site visits** **Storm water management** **Water management Infrastructure construction**	Introduction/invasion by alien (non-native) species	Fauna and Flora	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Control through implementation of EMPr mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	NEMBA TOPS Alien vegetation management plan Hazardous Substances Act SANS 10206

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Water Treatment					
Maintenance and operation of site infrastructure and facilities **Mine area site preparation** **Mineral Processing** **Opencast/underground mining** **Opencast Voids** **Post Closure Monitoring and Maintenance** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction**	Pollution of surface water resources/decreased water quality	Surface Water	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation measures (water treatment when required)	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines
Maintenance and operation of site infrastructure and facilities **Water management Infrastructure construction** **Opencast and underground mining**	Decrease in Surface Water Availability	Surface Water	Construction Operation	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines.

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
General Surface Rehabilitation **Opencast/underground mining dewatering** **Storm water management**	Dewatering of groundwater aquifers	Groundwater	Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines
General decommissioning activities **Mineral Processing** **Opencast/underground mining dewatering** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction**	Decrease in groundwater quantity/availability	Groundwater	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines
Post Closure Monitoring and Maintenance	Acid Mine Drainage	Groundwater	Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. AMD mitigation strategy, mine design and	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
				progressive rehabilitation) Remedy through water treatment when required	DWS best practice guidelines Rehabilitation and closure plan AMD mitigation Strategy
Maintenance and operation of site infrastructure and facilities **Mine area site preparation** **Mineral Processing** **Opencast/underground mining** **Post Closure Monitoring and Maintenance** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Opencast Voids**	Pollution of groundwater/ decreased water quality	Groundwater	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation)	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines Rehabilitation and closure plan AMD mitigation Strategy
Maintenance and operation of site infrastructure and facilities **Opencast/underground mining** **Water management Infrastructure construction**	Decreased water to adjacent wetlands	Wetlands	Construction Operation Decommissioning	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
				wetland disturbance – i.e.: avoid wetlands and wetland buffer areas) Remedy/modify through wetland rehabilitation	DWS best practice guidelines Rehabilitation and closure plan
Maintenance and operation of site infrastructure and facilities **Opencast mining** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction** **Water Treatment**	Loss and disturbance of wetland habitat	Wetlands	Construction Operation Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas) Remedy/modify through wetland rehabilitation	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines Rehabilitation and closure plan
Post Closure Monitoring and Maintenance	Decant from workings	Environmental Pollution	Rehabilitation and Closure	Avoid through implementation of suitable progressive rehabilitation and soil management	MPRDA NWA NEMA Duty of Care

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
				Control/Remedy through interception of decant and treatment of polluted water where required	NEMA Polluter Pays Principle NEMWA GN704 DWS best practice guidelines Rehabilitation and closure plan
General decommissioning activities **Infrastructure removal** **Mineral Processing** **Water Treatment**	General Environmental Pollution	Environmental Pollution	Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMPr mitigation measures (e.g. Spill prevention, Hydrocarbon Storage)	Hazardous Substances Act NWA MSDS OHSA MHSA NEMA Duty of Care NEMA Polluter Pays Principle NEMWA Incident reporting procedures DWS minimum standards for waste disposal
General decommissioning activities **General Surface Rehabilitation**	Hydrocarbon spills/contamination	Environmental Pollution	Planning and Design Construction	Avoid through preventative	Hazardous Substances Act NWA

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Infrastructure removal **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast/underground mining** **Opencast Voids** **Post Closure Monitoring and Maintenance** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Storm water management** **Water management Infrastructure construction** **Water Treatment**			Operation Decommissioning Rehabilitation and Closure	measures (e.g. bunding, spill kits) Remedy through clean-up and waste disposal Modify through soil treatment if required	MSDS OHSA MHSA NEMA Duty of Care NEMWA Incident reporting procedures DWS minimum standards for waste disposal
General decommissioning activities **Maintenance and operation of site infrastructure and facilities** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water Treatment**	Sewage spills/contamination	Environmental Pollution	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. location of toilets, spill prevention, waste management)	NWA NEMA Duty of Care NEMA Polluter Pays Principle OHSA MHSA

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Mine area site preparation **Opencast/underground mining**	Discovery and preservation of fossils	Heritage	Operation	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils	NEMA MPRDA NHRA SAHRA permitting requirements
Mine area site preparation **Opencast mining** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction** **Water Treatment**	Destruction/damage of palaeontological resources	Heritage	Construction Operation Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils	NEMA MPRDA NHRA SAHRA permitting requirements
General Surface Rehabilitation **Mine area site preparation** **Opencast/underground mining** **Site establishment – Camp**	Destruction/damage of heritage resources	Heritage	Construction Operation Decommissioning	Avoid and control through implementation of preventative measures (e.g. fencing of	NEMA MPRDA NHRA

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Site establishment – Permanent site office Infrastructure **Storm water management** **Water management Infrastructure construction** **Water Treatment**			Rehabilitation and Closure	graveyards, watching brief, chance finds procedure) Stop through relocation of graves if required	SAHRA permitting requirements
General Construction Management **General Mine Management**	Crime and violence	Social	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through preventative measures (e.g. site security, code of conduct)	Health and Safety Plan ESMS MHSA OHSA Code of Conduct
General Construction Management **General Mine Management**	Influx of migrant workers	Social	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism) Control through implementation of ESMS and stakeholder engagement plan	Labour Act Basic Conditions of Employment Act SLP Commitments
General Construction Management **General Mine Management**	Loss of sense of place	Social	Construction Operation	Modify through reduction of visual impact	Rehabilitation and Closure Plan

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Mineral Processing **Opencast mining** **Site establishment – Permanent site office Infrastructure** **Water Treatment**			Decommissioning Rehabilitation and Closure		ESMS
General Construction Management **General Mine Management**	Relocation / resettlement	Social	Construction Operation Decommissioning Rehabilitation and Closure	Modify and control through mitigation measures (e.g. grievance mechanism, Relocation plan)	Constitution of South Africa SLP Commitments
General Construction Management **General Mine Management** **Maintenance and operation of site infrastructure and facilities**	Social vices	Social	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct) Control through implementation of ESMS and stakeholder engagement plan	Labour Act Basic Conditions of Employment Act SLP Commitments Code of Conduct Livelihood restoration plan
General Construction Management **General Mine Management**	Economic growth	Socio-Economic	Construction Operation	Maximise through optimisation of	SLP Commitments

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
			Decommissioning Rehabilitation and Closure	economic growth opportunities	
General Construction Management **General Mine Management**	Education, Skills Development and Training	Socio-Economic	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Maximise skills development and training through implementation of SLP	SLP Commitments
General Construction Management **General decommissioning activities** **General Mine Management** **Maintenance and operation of site infrastructure and facilities** **Opencast/underground mining** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction**	Employment Opportunities	Socio-Economic	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Maximise employment opportunities through implementation of SLP	SLP Commitments
General Construction Management **General Mine Management**	Loss of jobs and economic opportunities	Socio-Economic	Construction Operation	Minimise impacts of job loss through skills development	SLP Commitments

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
			Decommissioning Rehabilitation and Closure	and livelihood restoration	
General Mine Management	Re-instatement of livelihoods	Socio-Economic	Operation Decommissioning Rehabilitation and Closure	Minimise impacts of job loss through skills development and livelihood restoration	SLP Commitments
Opencast/underground mining	Coal supply for energy security	Socio-Economic	Operation	Maximise security of coal supply through sound and responsible mine management	Legal register SLP Commitments ESMS
General Construction Management **General decommissioning activities** **General Mine Management** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Opencast/underground mining** **Opencast Voids** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure**	Community health and safety	Health and Safety	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	OHSA MHSA SLP Commitments Grievance Mechanism

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Water management Infrastructure construction					
General Construction Management **General decommissioning activities** **General Mine Management** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast/underground mining** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction**	Health impacts	Health and Safety	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	OHSA MHSA SLP Commitments Grievance Mechanism
Maintenance and operation of site infrastructure and facilities **Mine area site preparation** **Mineral Processing** **Opencast/underground mining** **Site establishment – Camp**	Fire and explosion hazard	Health and Safety	Construction Operation	Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Site establishment – Permanent site office Infrastructure					recommendations on air blast
Opencast mining	Fly Rock	Health and Safety	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure
Mine area site preparation **Opencast/underground mining** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction**	Damage to road infrastructure	Transportation, Infrastructure and Traffic	Construction Operation Decommissioning	Avoid and control through implementation of EMPr mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	National Road Traffic Act OHSA MHSA
Mine area site preparation **Opencast/underground mining**	Increased traffic	Transportation, Infrastructure and Traffic	Construction Operation	Avoid and control through implementation of	National Road Traffic Act OHSA

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Site establishment – Camp **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction**				EMPr mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	MHSA
Mine area site preparation **Mineral Processing** **Opencast mining.**	Visual impact of light at night	Visual	Construction Operation	Avoid and control through implementation of EMPr mitigation measures (e.g. directional down lighting)	Security specifications
General Surface Rehabilitation **Mine area site preparation** **Mineral Processing** **Opencast/underground mining** **Site establishment –Camp** **Site establishment – Permanent site office Infrastructure** **Storm water management** **Water management Infrastructure construction** **Water Treatment**	Visual impact of mine infrastructure, stockpiles and dust	Visual	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMPr mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation)	Rehabilitation and Closure Plan Final land use objectives

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
General decommissioning activities **Infrastructure removal** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast/underground mining** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Water management Infrastructure construction** **General Surface Rehabilitation** **Opencast Voids** **Storm water management** **Water Treatment**	Greenhouse gas emissions	Air Quality	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMPr mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	NEMAQA
Drilling monitoring boreholes **General decommissioning activities** **General Surface Rehabilitation** **Infrastructure removal** **Mine area site preparation** **Mineral Processing**	Fugitive emissions (Dust)	Air Quality	Planning and Design Construction Operation Decommissioning	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMPr mitigation	Road Traffic Act NEMAQA Dust regulations

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Opencast mining **Opencast Voids** **Post Closure Monitoring and Maintenance** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Storm water management** **Water management Infrastructure construction** **Water Treatment**			Rehabilitation and Closure	measures (e.g. dust suppression)	
Drilling monitoring boreholes **General decommissioning activities** **General Surface Rehabilitation** **Infrastructure removal** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast mining** **Opencast Voids** **Re-vegetation** **Site establishment – Camp**	Disturbing and/or nuisance noise	Noise	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMPr mitigation measures (e.g. Noise abatement measures)	ECA noise regulations SANS 10103 OHSA MHSA

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
Site establishment – Permanent site office Infrastructure **Storm water management** **Water management Infrastructure construction** **Water Treatment**					
Opencast mining	Air Blast	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure
Opencast/underground mining	Ground Vibration and human perception	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
				with landowners, emergency response procedures)	safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure
Opencast/underground mining	Ground Vibration Impacts on productivity of farm animals (cattle, chickens, pigs, etc.)	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure
Opencast/underground mining	Impacts on Infrastructure (roads, communications infrastructure, services,	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. structural surveys, blast procedures,	Explosives Act MHSA OHSA MPRDA

Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	houses, boreholes)			monitoring, communication with landowners)	United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure
Opencast/underground mining	Noxious fumes	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. structural surveys, blast procedures, monitoring, communication with landowners)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure

6 IMPACT MANAGEMENT ACTIONS: MANAGEMENT PROGRAMME

Table 9 below provides measures for management of the environmental aspects that are impacted on during the different phases of the project.

Table 9: Description of the proposed impact management actions.

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Environmental Management System					
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall develop an effective Environmental and Social Management System (ESMS) that is appropriate to the nature and scale of the project. The ESMS should include and provide for the following as a minimum: • Environmental Policy; • Ongoing Identification of risks and impacts; • Social and Environmental Management programs; • Organisational capacity and competency; • Emergency preparedness; • Stakeholder engagement; and • Monitoring and review.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall ensure that Social and Environmental human resources have the knowledge, skills, and experience necessary to perform their work with competence and efficiency.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
General Mine Management	Planning and Design Construction	No direct physical disturbance	The mine shall appoint a suitably qualified and competent ECO or EM who shall preferably be independent from the Applicant. The ECO must preferably have a tertiary qualification in an Environmental Management or appropriate	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Operation Decommissioning Rehabilitation and Closure		field. The ECO should have appropriate qualification and experience in the implementation of environmental management specifications. The ECO shall be tasked with auditing the mines environmental compliance on a regular basis (at least quarterly). The Applicant shall provide the ECO with the necessary support to ensure that the environmental aspects relating to the development is adhered to.		
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine must have a copy of this EMPr at the point of use and should be briefed by the Mine EO or ECO with regards to the use and implementation of the EMPr.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The EMPr must be made binding on all sub-contractors operating on behalf of the Mining Right Holder.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
General Mine Management	Planning and Design Construction Operation	No direct physical disturbance	The mine shall ensure that all sub-contractors abide by the requirements of the EMPr through the inclusion of the EMPr and applicable environmental requirements in contractual agreements for all sub-contractors.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Decommissioning Rehabilitation and Closure				
Emergency Response					
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Emergencies have the potential for large scale and high significance impacts	The mine shall develop and implement an Emergency Preparedness and Response Plan which shall include and provide for the following as a minimum: • Risk assessment; • Response procedures; • Provision of equipment and resources; • Designation of responsibilities; • Communication and reporting (including that with potentially affected communities) • Periodic training to ensure effective response; and • Periodic review and revision, as necessary, to reflect changing conditions.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The necessary provisions (financial, resources, materials) shall be made in order to ensure compliance with the Emergency Preparedness and Response Plan.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
Health and Safety					
General Mine Management	Planning and Design Construction	Health and safety risks are classified as high significance due to	The mine shall ensure that reasonable measures are taken to ensure the safety of all site staff, including induction training for all employees and visitors.	OHS and MHSA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Operation Decommissioning Rehabilitation and Closure	the value of human life			
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	All staff and sub-contractors must be informed about the community concerns, especially during the construction phase. Toolbox talks can be used for this. Speed limits on the road to the mine must be enforced. People that do not adhere to the speed limits must receive written warnings.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	The mine shall provide appropriate Personal Protective Equipment (PPE) to employees wherever required and in accordance with the risks associated with their activities.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	The mine shall undertake safety audits to ensure compliance with the; • Occupational Health and Safety Act (Act No. 85 of 1993) and associated regulations; and • Mine Health and Safety Act (Act 29 of 1996) as amended and associated regulations.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation	Health and safety risks are classified as high	The mine shall implement a safety reporting procedure to ensure that all accidents and incidents (safety and	OHS and MHSA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Decommissioning Rehabilitation and Closure	significance due to the value of human life	environmental) are recorded and reported to the Mine manager and EO.		
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Health risks are classified as high significance due to the value of human life	The mine shall develop and implement an infectious diseases management plan to address health issues with the workforce. The mine shall align the strategy with a community HIV strategy.	OHS	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	Any containers in which hazardous substances (e.g. fuel, paints, solvents) are stored shall be clearly marked as to the contents therein (in accordance with OHSA regulations). Material Safety Data Sheets (MSDS) must be available at the hazardous stores for all chemicals stored therein.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	SANS Code of Practice for Mine Residue Deposits (SANS 10286, previously SABS 0286:1998) should be used to do a safety classification on any waste rock dumps.	SANS Code of Practice for Mine Residue Deposits (SANS 10286, previously SABS 0286:1998)	Throughout LoM
Site Access and Security					
General Mine Management	Construction Operation Decommissioning	Security risks can have a highly significant impact although localized	On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site to minimise excessive environmental disturbance to the soil and vegetation off site, and to minimise disruption of traffic.	OHS and MHSA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure				
General Mine Management	Construction Operation	The creation of roads can have a significant and relatively widespread impact, especially as roads create corridors	Any new access (if required) shall first be approved by the Mine Manager and ECO (method statement may be required) and should be provided with erosion and silt pollution prevention measures where required.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Security risks can have a highly significant impact although localized	No person will be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects on-site, or to enter the site while under the influence of alcohol or drugs.	OHS and MHSA	Throughout LoM
Environmental Awareness					
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	All employees and visitors to the site must undergo a site induction which shall include basic environmental awareness and site-specific environmental requirements (e.g. site sensitivities and relevant protocols/procedures). This induction should be presented or otherwise facilitated by the Mine EO wherever possible.	NEMA	Throughout LoM
Social and Socio-Economic					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall develop and implement a recruitment policy that allows equal opportunity to all people (woman, disabled) and give preference to local labour where possible.	Adherence to corporate policies (e.g.: SLP) and compliance with legislation including Labour Act and Employment Act	Throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	A stakeholder engagement plan will assist the mine to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the project. Such a plan cannot be considered a once off activity and should be updated on a yearly basis to ensure that it stays relevant and to capture new information. Stakeholders must provide input in the Stakeholder Engagement Plan.	Adherence to corporate policies (e.g.: SLP) and compliance with legislation including Labour Act and Employment Act	Throughout LoM
General Mine Management	Planning	No direct physical disturbance	Skilling and training of local community members should take place to equip people to become eligible for positions at the mine.	SLP commitments	Prior to construction
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The procurement policy for the mine should focus on utilising service providers from the local area as far as reasonably possible to encourage the growth of local businesses.	Adherence to corporate policies and compliance with legislation including Labour Act and Employment Act SLP Commitments	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall attempt, where possible, to recruit local service providers and subcontractors to assist with construction activities.	Adherence to corporate policies and compliance with legislation including Labour Act and Employment Act SLP Commitments	Throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall comply with the conditions of the SLP developed for the mine to ensure the socio-economic benefits of the mine are maximised.	SLP commitments	Throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall comply with all relevant legislation pertaining to labour recruitment and employment.	Compliance with legislation including Labour Act and Employment Act	Throughout LoM
General Mine Management	Planning Construction Operation Decommissioning	No direct physical disturbance	The mine shall develop and implement a Stakeholder Engagement Plan in consultation with a suitably qualified specialist. This plan shall include a strategy to actively manage expectations. This includes the sharing of relevant information in a way that is accessible to all members of the local	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Developed as early as possible and implemented throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure		communities. Frequent communication is a key aspect in the management of expectations.		
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall designate a community liaison officer that deals specifically with the surrounding communities. The Mine shall communicate frequently with the affected stakeholders to ensure that they understand the processes and do not develop unrealistic expectations.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Appointment as early as possible and implemented throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall establish a detailed grievance mechanism for local communities to lodge concerns, suggestions and grievances which can be dealt with in a timely manner. The grievance mechanism shall aim to accomplish the following objectives; • Receive and register external communications from the public; • Screen and assess the issues raised and determine how to address them; • Identify roles and responsibilities relating to the reporting, recording and addressing of grievances; • Maintenance of a grievance register to record and track, and document responses and actions taken to address grievances; • Reporting of grievances to DMR; and • Adjust the management program, as appropriate. The local communities must be informed that they can complain about perceived unsafe behaviour through the grievance mechanism.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Developed as early as possible and implemented throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	A grievance register must be maintained by the mine to log grievances from landowners, communities, occupants and other Interested and Affected Parties, and respond to such grievances accordingly. The grievance register should be provided to authorities at any point in time if so requested. The grievance register shall contain, at a minimum, the following information; • Date of the grievance being lodged, • Location relating to the grievance, • Contact details of the complainant, • Grievance description (detailed as possible), • Person receiving grievance, • Agreed corrective action, • Responsible party for corrective action, • Summary of actions taken (and date action was taken), • Status of grievance (open, closed-out, awaiting feedback etc.). The grievance mechanism must be communicated to all stakeholders and communities.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Developed as early as possible and implemented throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	Open channels of communication between the mine and surrounding landowners/communities are essential. The mine shall establish a community liaison forum (CLF) that meet on a regular basis (at least quarterly). At this forum the mine can give feedback on its activities and keep the communities informed about matters that concern them in a transparent manner. The relevant authorities should also be invited to attend CLF meetings. This forum is an important mechanism to manage expectations and build relationships. Meeting minutes must be captured and forwarded to all attendees.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	As early as possible in the process and implemented throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	Employees should be sourced from the local area where possible.	Adherence to corporate policies and compliance with legislation including Labour Act and Employment Act SLP Commitments	Throughout LoM
General Mine Management	Construction Operation	No direct physical disturbance	The mine shall encourage the continuation of agricultural activities in the area surrounding the mining activities that are not affected by mining.	SLP	Throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall provide training, where necessary to the local work force as per the Environmental Awareness Plan. Skills development plans must be focussed on skills that the mine needs, and that are also transferable. As part of the Local Economic Development (LED) plan required as part of the SLP, the mine should identify projects that can assist more community members with earning a livelihood. The community should be involved in the identification of suitable programmes if possible, and the training programmes must include business development skills. Support should be given to people after the training to ensure that their newly acquired skills can be implemented.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
General Mine Management	Planning Construction Operation Decommissioning	No direct physical disturbance	Should relocation become necessary the mine must appoint a relocation specialist to compile a relocation action plan.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure				
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The Community Relations manager (CRM) should establish relationships with the surrounding commercial farmers. This can include a yearly courtesy visit and sharing of environmental data to keep the farmers informed. All meetings should be recorded, and records must be included in the communication register. The names and contact details of surrounding landowners must be kept up to date.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	Stakeholder Engagement should continue throughout the life of the mine to ensure local communities are kept informed and allowed to raise issues. These issues will then be addressed through the grievance mechanism.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
General Mine Management	Operation	No direct physical disturbance	Where retrenchments are unavoidable, they should be managed according to legislative requirements.		When retrenchments are required
Site Establishment					
Construction camp sewage management	Construction	Construction impacts are temporary in nature and have a limited extent but	The physical footprint of any construction or site camp shall be minimised and vegetation clearance should be kept to the minimum required area. The location of the temporary contractors' workshop should be selected based on minimising disturbance to the natural environment. Topsoil shall be handled in accordance with the soil management	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout construction

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Dust suppression		may include significant impacts	principles presented in this EMPr and the soil management guide developed for the Mine.	OHSA	
Earthworks **Fencing** **Fuel Storage and refuelling**			All construction and/or site camps shall be enclosed with a fence. The mesh size should be small enough for the fence to act as a catch net for blown debris and as a demarcation of the site. The fence shall be maintained as required to ensure access control remains effective. All temporary fences erected by the Mine shall be removed and the site restored on completion of construction, unless otherwise agreed in writing with the Applicant.	MHSA NEMA MPRDA	
Hazardous substances management **Site security**			Site and construction camps must be kept in a clean, neat and tidy condition at all times. The Mine shall maintain good housekeeping practices and shall comply with the relevant HSE regulations in terms of materials storage. Stockpiles of construction materials may only be placed within demarcated areas within the construction camp. Laydown areas must be kept neat and tidy and free of litter or waste at all times.		
Soil Management **Truck and heavy machinery operation**			A waste storage area must be established within the site camp/construction camp that provides for appropriate and adequate waste storage and waste separation for recycling. All waste must be adequately contained to prevent ground and/or water pollution. The total volume of general waste stored shall not exceed 100m^3. In the case that a storage capacity exceeding this amount is required or planned for, the necessary waste permits must be obtained in accordance with the NEMWA beforehand.		
			The site camp/construction camp shall have adequate provision for the storage of hazardous waste (e.g. old oil		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Utilization of portable toilets and generation of sewage **Vegetation clearance**			filters, soil from spills etc.) and the waste shall be contained within closed containers to prevent the possibility of spillages. All fuel storage areas shall be bunded to contain at least 110% of the volume stored and will comply with the relevant safety regulations. Fuel storage areas may not be located within 100m of a watercourse and the total volume of fuel stored on site may not exceed 80 cubic metres (80 000l) without the necessary authorisation in terms of the NEMA. Fuel storage areas must be provided with an impervious surface with the provision to contain any potential fuel spillages during refuelling (e.g. a bunded, sealed concrete slab which drains to a sump/oil separator). No person may smoke or take part in any activity that may results in sparks near fuels and other flammable substances to prevent ignition. All hazardous substances shall be stored within designated areas that comply with the relevant HSE standards (e.g. ventilation, access control, HSE signage, firefighting equipment, MSDS, etc.) and that provide for spill prevention and containment. It is recommended that a dedicated, bunded and fenced Hazardous Storage Area is provided within the construction camp for this purpose. Residue stockpiles shall not exceed 60m in height. No open fires shall be permitted within the site camp/construction camp, except where approved by the responsible safety officer and EO/ECO and within a designated structure designed for that purpose. In such cases firefighting equipment must be readily available near the fireplace and an appropriate safety representative should be present at all		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			times during burning of the fire. All fires shall be fully extinguished after use.		
Flora					
Drilling monitoring boreholes **General Surface Rehabilitation** **Infrastructure removal** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing**	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Weeds and invader plants will be controlled in the manner prescribed in the Alien Management Plan that must be developed for the mine. Alien invasive tree species should be eradicated. Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented. Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds (including closure and post closure monitoring). The Plan must clearly define the areas from which alien vegetation must be removed as well as the plant, equipment, materials and methodology to be used (including safe disposal).	NEMA NEMBA CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Development of plan as soon as possible and implementation throughout LoM
	Planning and Design Construction Operation	Impacts on red data species has a very high significance	It is recommended to conduct a biodiversity walk through to locate protected species prior to commencement and relocate species where possible or required. All Red Data Plants within the proposed opencast areas, roads and all other infrastructure areas should be transplanted and relocated within either a nursery or any neighbouring piece of land where it can be conserved until rehabilitation can take place. These species can either be replanted during the rehabilitation process of the opencast mining areas as	NEMBA Threatened or Protected Species (TOPS) regulations National Forests Act DAFF permitting requirements	Prior to commencement of activities or disturbance

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Filling Opencast Voids			rehabilitation of mined out areas progresses or left in their new location if this is not to be disturbed in future.		
Post Closure Monitoring and Maintenance	Planning and Design Construction Operation	Impacts on red data species has a very high significance	The mine shall ensure that the relevant permits are obtained to remove and relocate protected species (if required). Plan activities carefully so that only vegetation that needs to be impacted is impacted. Permit vegetation to establish on topsoil stockpiles to maintain a seed bank. Overburden stockpiles and other residue stockpiles/deposits will not be suitable for vegetation establishment due to the lack of topsoil. Limit activity to area of disturbance and revegetate impacted areas as soon as possible.	NEMBA TOPS regulations National Forests Act DAFF permitting requirements	Prior to commencement of activities or disturbance
Site establishment – Camp **Site establishment – Permanent site office Infrastructure**	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Limit the vegetation disturbance to the designated areas only and the legal minimum requirement width for road and powerline servitudes is strictly adhered to. Where possible locate activities on the boundaries of existing disturbance. Use existing access roads as much as possible and rehabilitate disturbed areas as soon as possible No unnecessary clearing of vegetation may take place. Allow disturbed area to naturally revegetate through natural processes of succession however if deemed necessary, seeding with an appropriate seed mix must be undertaken.	NEMA	Throughout LoM
Site visits **Storm water management**	Planning and Design Construction Operation Decommissioning	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Vegetation clearance should be stripped with the topsoil to retain a more effective seedbank as well as giving the topsoil stockpiles better organic matter content.	NEMA CARA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Water management	Rehabilitation and Closure				
Infrastructure construction **Water Treatment**	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	The harvesting of plants by construction and mine workers is prohibited on site. This includes the harvesting of plants for firewood, construction material, the making of crafts and medicinal purposes.	NEMA	Throughout LoM
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Damage or harm to threatened plant species is illegal in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004). Threatened species are defined in terms of the most recent Red Data list of Southern African Plants. Employees and workers shall be educated with regards to any potential threatened species that may be encountered on site and shall take the necessary actions to prevent harm to any such species found on site.	NEMBA TOPS regulations National Forests Act DAFF permitting requirements	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	All alien vegetation occurring on the site must be controlled in accordance with NEMBA. The area should be assessed, and the alien invasive species controlled. The mining areas should be monitored for the establishment and spread of alien invasive species throughout the LoM. The weed management plan and principles for weed management presented in this EMPr must be implemented throughout the lifespan of the mine.	NEMA NEMBA CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	All soil stockpiles shall be kept free of any weeds or alien invader plant species. Where possible, indigenous flora species should be encouraged to colonise stockpiles.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Alien species removal must take place in an appropriate manner, which includes: • Avoid disturbance to the soil as far as possible. • Use an appropriate control for each species. Some species may require manual and/or herbicide control. • Consult a specialist if necessary.	NEMA NEMBA CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
Fauna					
Drilling monitoring boreholes **General Surface Rehabilitation**	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Visitors and workers will be informed that the killing of fauna is prohibited within the boundaries of the mining area, as well as neighbouring areas.	Induction training shall comply with ESMS Framework	Throughout LoM
Infrastructure removal	Planning and Design	Impacts on fauna has the potential to be a relatively	The mine shall educate and inform all workers, subcontractors and visitors about any rare and endangered species through an environmental awareness plan and the distribution of	NEMA NEMBA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Maintenance and operation of site infrastructure and facilities	Construction Operation Decommissioning Rehabilitation and Closure	high significance especially where threatened or protected species are impacted upon	posters, containing pictures of any potential rare and endangered species. Ensure that environmental awareness training takes place at regular intervals.	CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	
Mine area site preparation **Mineral Processing**	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	The sighting of any rare or endangered species needs to be reported to management which will keep record of all such species. Should there be a risk of an impact to such a species, the mine shall notify a specialist who shall advise on the best course of action. Should relocation or destruction of any species be required, the necessary permits shall be obtained.	NEMBA TOPS Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
Filling Opencast Voids **Post Closure Monitoring and Maintenance**	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Ensure that there are waste disposal and littering prevention procedures in place to ensure decreased contact with humans. A waste management plan must be generated and implemented. The system must be monitored to ensure that the environment is not polluted, and that fauna do not consume the waste. Ensure that the appropriate training is given to staff and management.	NEMA,1998 Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	During LoM
Site establishment – Camp	Planning Construction Operation	Impacts on sensitive landscapes have the potential to be a relatively high significance with	The destruction of sensitive landscape features shall be avoided where possible and otherwise minimised through effective planning. In areas where the destruction cannot be avoided, these features should be re-introduced in the post mining landscape.	In accordance with Rehabilitation and closure plan	During construction and operation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site establishment – Permanent site office Infrastructure **Site visits** **Storm water management**		widespread effects.			
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	No construction workers or mine employees may disturb, hunt, set traps/snares, utilise dead or alive fauna/livestock/wildlife/fish. This includes the killing of any animal caught in construction works. Disciplinary action must be taken if any fauna is wilfully disturbed or killed.	NEMA NEMBA CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
Water management **Infrastructure construction** **Water Treatment**	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Ensure that noise control measures are implemented by reducing speed, ensure that exhaust systems are functioning according to manufacturer's specifications. Ensure that speed limits are enforced	NEMA NEMBA CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Any animals found within excavations should be carefully returned without harm to an adjacent area away from mining activities, but preferably not further than 500m away from where it was found unless otherwise agreed to by the ECO.	NEMA NEMBA CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	The Mine shall ensure that any snakes discovered in excavated areas, on or near the construction site are not killed or otherwise harassed. The Mine EO must be notified should a snake be found on or near the site. The Mine EO will be responsible to ensure that an appropriately skilled person is summoned to remove the snake from the site for relocation to a suitable nearby location.	NEMA NEMBA CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	The mine shall take the necessary measures to limit the speed of trucks and vehicles on the roads on site and enforce these speed limits.	Internal speed limits for haul roads and declared legal speed limits for public roads.	Throughout LoM
	Planning and Design Construction Operation Decommissioning	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Any red data species recorded within the areas that will be cleared should be relocated within re- vegetated areas where a good vegetation cover has been established. The mine must ensure relevant permits are in place if any threatened or protected species are relocated. Conduct a protected fauna species survey prior to commencement and relocate species where possible or required.	NEMA NEMBA CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
	Planning and Design	Impacts on fauna has the potential to be a relatively	No person should wilfully disturb the movement of any mammals, birds, amphibians, insects or reptiles on the mine site.	NEMA NEMBA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation Decommissioning Rehabilitation and Closure	high significance especially where threatened or protected species are impacted upon		CARA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	
Soils					
Decommissioning Mine Infrastructure **Drilling monitoring boreholes**	Construction Operation Decommissioning	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Topsoil shall be removed from all areas where physical disturbance of the surface will occur (up to a maximum of 30 cm depth or as specified by the EO).	CARA NEMA GN704 In accordance with Rehabilitation and closure plan	As required
Filling Opencast Voids **General decommissioning activities**	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Soils must be stripped from the area of activity. Topsoil's and subsoils should be stripped and stored separately. The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate significantly. Compaction of the removed topsoil must be avoided by prohibiting traffic on stockpiles. Stockpiles should only be used for their designated final purposes. The stockpiles will be vegetated where possible (rock stockpiles will not permit adequate vegetation growth) in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil.	CARA NEMA In accordance with Rehabilitation and closure plan	As required

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Surface Rehabilitation **Infrastructure removal** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast mining** **Post Closure Monitoring and Maintenance**	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	To the greatest extent possible topsoil shall only be handled twice, only-once during the initial stripping of topsoil and a second time to replace it. Areas that are stripped should be optimised to limit unnecessary stripping. Storm water from upslope of the stripped areas should be diverted around these areas to limit the amount of storm water flowing over these areas. The timing of the topsoil stripping should be optimised to limit the time between stripping and construction/mining/deposition.	CARA NEMA In accordance with Rehabilitation and closure plan	Throughout LoM
	Construction Operation	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Strip the topsoil and the remaining vegetation as per the rehabilitation guideline and place in the allocated locations for the various soil types.	CARA NEMA In accordance with Rehabilitation and closure plan	Throughout LoM
	Construction Operation	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Areas for stripping need to be delineated and stripping will only occur where soils are to be disturbed by activities that are described in the mine plan, and where a clearly defined end rehabilitation use for the stripped soil has been identified.	CARA NEMA In accordance with Rehabilitation and closure plan	Throughout LoM
	Construction	Impacts on soils can have	Topsoil and sub-soil stockpiles must be located such that the potential for erosion is minimised. Areas with existing erosion	CARA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Re-vegetation **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure**	Operation Decommissioning Rehabilitation and Closure	significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	and stability issues must be avoided. If erosion occurs, corrective actions (erosion berms etc.) must be taken to minimize any further erosion from taking place. All other stockpiles such as subsoil and overburden (excluding topsoil stockpiles) should not exceed 60m in height. If erosion has occurred, topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion. Only the designated access routes are to be used to reduce any unnecessary compaction. Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated. Implement land rehabilitation measures as defined in rehabilitation report.	NEMA GN704 In accordance with Rehabilitation and closure plan	
Storm water management **Water management Infrastructure construction**	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	There must be no contamination of topsoil. Prevent any spills from occurring. Machines must be parked within hard park areas and must be checked daily for fluid leaks.	MPRDA CARA	Throughout LoM
Water Treatment	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Topsoil stockpiles must be kept to a maximum height of 4m if space allows. The viability of topsoil decreases over time with a greater height of the stockpiles which would have cost implications during rehabilitation that should be considered.	MPRDA CARA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Care must be taken to protect topsoil resources on site and thereby avoid the need to obtain additional topsoil from outside the site for rehabilitation. However, if additional topsoil needs to be sourced from outside the site, this shall be done with extreme caution not to introduce any alien or invasive species to the site. The topsoil shall be sourced from a location approved by, and a standard, acceptable to the EO.	NEMBA NEMA	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Trucks, machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks. All leaks will be cleaned up immediately using spill kits or as per the emergency response plan. For large spills a hazardous materials specialist shall be utilised.	NEMA NWA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Ongoing throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Accidental hydrocarbon spillages should be reported immediately, and then the affected soil should be removed, and rehabilitated or if this is not possible, disposed of at a waste sites designated to accept such waste. If soil (whether stockpiled or in its undisturbed natural state) is polluted, the first management priority is to treat the pollution by means of in situ bioremediation. The acceptability of this option must be verified by an appropriate expert and by the local water authority on a case by case basis, before it is implemented. If *in situ* treatment is not possible or acceptable then the polluted soil must be classified according to the Minimum Requirements for the Handling, Classification	NEMWA DWS minimum requirement for waste disposal	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance Standards with	Time Period for Implementation
			and Disposal of Hazardous Waste and disposed of at an appropriate, permitted, off-site waste facility.		
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	All activities should be limited to the necessary area of disturbance. This can be encouraged by pegging out the area of activity. Where required the compacted soils should be disked/ripped to an adequate depth and re- vegetated with an indigenous seed mix.	In accordance with Rehabilitation and closure plan	Throughout LoM
Land use					
Rollover mining and rehabilitation	Operation Decommissioning Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	The post mining land use must be predetermined in order to ensure it is rehabilitated to suit the use of the land.	In accordance with Rehabilitation and closure plan	Established early during operations and implemented during rehabilitation
Pollution Prevention					
All mining activities	Construction Operation Decommissioning Rehabilitation and Closure		Any equipment that may leak, and does not have to be transported regularly, shall be placed on an impermeable surface (e.g.: drip tray, bunded area, etc.) to catch any potential spillages of pollutants. Drip trays shall be of a size that the equipment can be placed inside it. Daily inspections shall be carried out to ensure such spill prevention measures are in place and remain effective. Drip trays shall be cleaned regularly and shall not be allowed to overflow. All spilled	NEMA Polluter Pays Principle NEMA Duty of Care	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			hazardous substances must be collected and adequately disposed of at a suitably licensed facility.	NEMA NWA OHSA MHSA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	
	Construction Operation Decommissioning		Appropriate measures must be implemented to ensure that rainwater does not run into areas containing cement, oil, diesel etc. as this could result in a pollution threat. Storage areas for these substances should be placed on high-lying ground. During operation, the storm water management system shall ensure that water from dirty areas (such as coal contaminated areas) reports to the PCD's.		
	Construction Operation Decommissioning Rehabilitation and Closure		Servicing and maintenance of vehicles may only take place in the workshop area (subject to suitable spill prevention and containment measures). The workshop area should be lined with concrete or suitable material to prevent infiltration. If emergency repairs are required elsewhere on site, this shall be undertaken with the necessary spill prevention measures in place.		
	Construction Operation		Cement and liquid concrete are hazardous to the natural environment on account of the very high pH of the material, and the chemicals contained therein. As a result, the Mine shall ensure that: • Concrete shall only be mixed on mortar boards or suitably lined areas, and not directly on the ground, • The visible remains of concrete, either solid, or from washings, shall be physically removed immediately and disposed of as waste. Washing of visible signs of concrete into the environment is not acceptable. • All excess aggregate shall also be removed.		
	Construction	Small scale and localised	All hazardous substances (e.g. fuel, grease, oil, brake fluid, hydraulic fluid) must be handled, stored and disposed of in a		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Operation Decommissioning Rehabilitation and Closure		safe and responsible manner to prevent pollution of the environment or harm to people or animals. Appropriate measures must be implemented to prevent spillage and appropriate steps must be taken to prevent pollution in the event of a spill.		
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	Hazardous substances shall be confined to specific and secured areas, and in such a way that does not pose any danger of pollution even during times of high rainfall. Hazardous storage areas shall be bunded (impermeable) with adequate containment (at least 110% the total volume stored) for potential spills or leaks. Bunded storage areas shall be either provided with an oil separator or sump. Waste from spillages will then be removed and recycled or disposed of responsibly.	NEMA Polluter Pays Principle NEMA Duty of Care NEMA NWA OHSA MHSA Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	All fuel storage areas shall be bunded to contain at least 110 % of the volume stored and will comply with the relevant environmental and safety regulations. Fuel storage areas must be provided with an impervious surface with the provision to contain any potential fuel spillages during refuelling (e.g. a sealed concrete slab which drains to a sump/oil separator). The applicant must ensure that employees and labourers do not smoke or take part in any activity that may results in sparks in the vicinity of fuels and other flammable substances to prevent ignition.		
	Construction Operation Decommissioning	High significance and potentially a moderate scale disturbance	Refuelling may only take place within a dedicated area inside the mine that is subject to appropriate spill prevention and containment measures Refuelling and transfer of hazardous chemicals and other potentially hazardous substances must be carried out so as to minimise the potential for leakage and to		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure		prevent spillage onto the soil. Drip trays should be utilised in relevant locations (inlets, outlets, points of leakage, etc.) during transfer to prevent such spillage or leakage. Any accidental spillages shall be contained and cleaned up promptly.		
	Construction Operation Decommissioning	High significance and potentially a moderate scale disturbance	Any excess or waste material or chemicals should be removed from the site and should preferably be recycled (e.g. oil and other hydrocarbon waste products). Any waste materials or chemicals that cannot be recycled shall be disposed of at a suitably licensed waste facility.	NEMWA DWS minimum requirement for waste disposal	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	Hazardous waste may only be disposed of at a licensed hazardous waste disposal facility. A specialist waste contractor shall dispose of such waste and shall be required to provide waste manifests and safe disposal certificates. The 'cradle-to-grave' principle must be complied with.	NEMA Polluter Pays Principle NEMA Duty of Care NEMWA DWS minimum requirement for waste disposal	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	Potential health risks are considered high significance	All relevant personnel on site must be properly trained concerning the proper use, handling and disposal of hazardous substances applicable to their line of work. If required, advice shall be obtained from the manufacturer with regard to the safe handling and storage of hazardous materials.	MSDS specifications OHSA MHSA	Throughout operations
	Construction	Small scale and localised	The Mine EO shall maintain a list of all hazardous materials that would be present on site. The Mine EO shall develop and	OHSA	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Operation Decommissioning		maintain a hazardous substance register for all hazardous materials that shall be kept on site during all phases of the project. The register shall be provided to the ECO upon request. Material Safety Data Sheets (MSDS) must be available on site at the point of use and readily accessible for all hazardous substances stored.	MHSA	
Waste Management					
Maintenance and operation of site infrastructure and facilities **Site establishment – Camp**	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The mine shall develop and implement a waste management plan for the Mine which complies with the principles of the NEMWA and provides a mechanism for the effective management of waste throughout the LoM. This plan shall ensure the appropriate management of all solid waste, including construction debris (cement bags, wrapping material, timber, cans, wire, nails, etc.), waste and surplus food, food packaging, organic waste etc.	NEMWA NEMA cradle to grave DWS minimum requirement for waste disposal Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout operations
Site establishment – Permanent site office Infrastructure **Water management Infrastructure construction**	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The waste management system shall provide for adequate waste storage (in the form of waste skips and bins with lids), waste separation for recycling, and frequent removal of non-recyclable waste for permanent disposal at an appropriately licensed waste disposal facility. No waste material is to be disposed of on site.	NEMWA NEMA cradle to grave DWS minimum requirement for waste disposal	Throughout operations
	Construction Operation	Waste has the potential to pollute the	Waste generated on site should be recycled as far as possible and sold/given to interested contractors if possible. Recyclable	NEMWA NEMA cradle to grave	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Construction **Mine area site preparation** **General Mine Management** **Opencast mining** **Mining** **Mineral Processing** **Maintenance and operation of site infrastructure and facilities** **General decommissioning activities**	Decommissioning Rehabilitation and Closure	environment and can vary from localized to large scale impacts.	waste should not be stored on site for excessive periods to reduce risk of environmental contamination	DWS minimum requirement for waste disposal	
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The Mine shall implement a waste removal regime that ensures waste skips do not exceed their capacity before being removed from site for disposal.	NEMWA NEMA cradle to grave	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	Littering shall be strictly prohibited. The site shall remain in a neat and tidy condition at all times. If required, the mine shall make use of regular litter patrols to remove litter and ensure the site remains clean, neat and tidy.	NEMWA NEMA cradle to grave	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The mine shall maintain a waste register which shall be used to track all waste removed from site. Proof of appropriate waste disposal shall be kept on file at the site for auditing purposes.	NEMA cradle to grave	Throughout operations
	Construction Operation Decommissioning	Waste has the potential to pollute the environment and	The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in the prescribed and correct manner.	NEMA cradle to grave	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Infrastructure removal **Decommissioning**	Rehabilitation and Closure	can vary from localized to large scale impacts.			
Sewage and Sanitation					
Site establishment – Permanent site office Infrastructure **Site establishment – Camp** **Water management Infrastructure construction** **General Construction**	Construction Operation Decommissioning Rehabilitation and Closure	Sewage has the potential to result in localized impacts of low to medium significance	There must be adequate provision for safe and effective sanitation (i.e. ablution facilities) at the mine and work sites and these shall conform to all relevant health and safety standards and codes. The Mine shall ensure compliance with the OHSA and MHSA in terms of sewage and sanitation (managed by safety department). Under no circumstances will pit latrines or soak away systems be allowed for raw sewage. Septic tanks are permitted on condition that they are closed units and are serviced regularly to prevent overflows. In the event that the mine constructs a waste treatment plant, the plant must comply with relevant legislation and norms and standards. Disposal or reuse of treated water must be in line with relevant licencing approvals. Portable toilets will be managed by reputable contractors and inspected daily for any potential leaks. The Contractor (or reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. Chemical toilets shall be emptied/serviced frequently to avoid offensive odours (at least weekly). Toilets must be kept in a clean, neat and hygienic condition.	NEMWA NWA NEMA cradle to grave	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Mine area site preparation **General Mine Management** **Opencast mining** **Mining** **Maintenance and operation of site infrastructure and facilities** **General decommissioning activities** **Infrastructure removal**			Ablution facilities must be easily accessible. Portable ablution facilities shall be placed outside areas susceptible to potential flooding and shall not be placed within 50m of any wetland or watercourse. Ablution facilities shall be located a sufficient distance from any offices or eating areas to prevent nuisance from offensive odours. Sanitary arrangements shall also be to the satisfaction of the EO. Disposal of sewage from chemical toilets shall be in a safe and responsible manner and at an approved facility specifically for that purpose. Proof of sewage removal and disposal shall be kept on file for auditing purposes.		
Noise					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General decommissioning activities **General Surface Rehabilitation** **Infrastructure removal** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing**	Construction Operation Decommissioning Rehabilitation and Closure	Noise has the potential to result in significant impacts to sensitive receptors at a small to medium scale	The mine shall take reasonable measures to limit exceedingly noisy activities. Where noise is generated which may impact on sensitive receptors, the mine shall apply measures to control noise that cannot be avoided (e.g.: blasting). Mitigation measures to be applied shall include but is not limited to; • Using the smallest/quietest equipment for the particular purpose; • Ensuring that equipment is well-maintained and fitted with the correct and appropriate noise abatement measures; • All machines should be equipped with appropriate noise reduction equipment; • All machines should be roadworthy (including meeting maximum noise specifications); • The vehicles exhaust and baffle systems must be maintained regularly to ensure that the noise from these vehicles is within the required noise specification; • All plant and equipment must be operated in accordance with the specifications provided by the manufacturer; • Safety measures that generate noise, including reverse gear alarms, should be adjusted to minimise noise where possible; and • Blasting must be undertaken at a suitable time of day with surrounding sensitive receptors notified timeously of the intended blast schedule. Regular noise measurements must be undertaken if mining activities take place within 500 m from a potential noise-	SANS10103 ECA Noise Regulations World Bank EHS guidelines OHSA MHSA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Opencast mining			sensitive receptor. This is particularly important for blast events.		
Filling Opencast Voids			Community involvement needs to continue throughout the project. Good public relations are essential. At all stages surrounding receptors should be educated with respect to the potential increase of noise from the mine (i.e.: when the potential increase is considered of concern to surrounding receptors). The information presented to stakeholders should be factual and should not set unrealistic expectations.		
Site establishment – Camp			Where possible, only operate during the day. If night-time activities are required, do not operate closer than 200m from any receptors (prevent a noise level exceeding 47 dBA at receptors).		
Site establishment – Permanent site office Infrastructure			Trucks, machinery and equipment will be regularly serviced to ensure acceptable noise levels are not exceeded. Quieter equipment will be sought where possible when purchasing new equipment. Silencers will be utilised where relevant. Point sources will be enclosed where possible. Acoustic screens will be considered if repeated I&AP complaints are received.		
Storm water management			A channel of communication should be established and promoted between the mine and surrounding stakeholders as well as the community. The mine must investigate any reasonable and valid noise complaint if registered by a receptor staying within 1,000 m from any mining activities.		
Mine Infrastructure			If necessary, use available material to develop a berm between activities and surrounding noise-sensitive receptors to break the line of sight as soon as possible. The berm should be		
Mining					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Water management and treatment			grassed or rock cladded and fully engineered to ensure it is safe and structurally sound. Operations must comply with the noise standard of the Occupational Health and Safety Act (Act No 85 of 1993).		
Air Quality					
General decommissioning activities **General Surface Rehabilitation**	Construction Operation Decommissioning Rehabilitation and Closure	Localised and low significance	Areas of high risk for spontaneous combustion will be inspected regularly for signs of possible combustion. An emergency procedure will be set up in the case of spontaneous combustion.	NEMAQA Dust regulations	Throughout LoM
Infrastructure removal **Maintenance and operation of site infrastructure and facilities**	Construction Operation Decommissioning Rehabilitation and Closure	Localised and low significance	The EO shall evaluate the condition of the roads and if coal dust is being tracked off site to an unacceptable degree, the mine shall implement measures as necessary to avoid and reduce this impact.	NEMAQA Dust regulations	Throughout LoM
Mine area site preparation **Mineral Processing** **Opencast mining**	Construction Operation Decommissioning Rehabilitation and Closure	Wide scale of disturbance and low to medium significance. Some localized high significant impacts.	It is important to note that dust could be a major disturbance, especially during the dry winter periods to people residing around the site. All reasonable measures must be utilised to minimise the generation of dust as a result of activities on site. Such measures shall include, but shall not be limited to; • Traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes and reducing vehicle speeds.	NEMAQA Dust regulations	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Opencast Voids **Post Closure Monitoring and Maintenance** **Re-vegetation** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Storm water management** **Mine Infrastructure** **Open Cast Mining** **Water management Infrastructure construction** **Water Treatment**			• Regular and effective measures aimed at binding the surface material or enhancing moisture retention, such as wet suppression and chemical stabilisation. • As far as practically possible, avoid dust generating activities during periods of strong winds in the direction of sensitive receptors. • Increase dust suppression efforts during conditions conducive to excessive dust creation (e.g. dry and windy conditions). • Ensure vegetation establishment on rehabilitated areas as well as on topsoil stockpiles. • Limit the height of soil stockpiles where possible (maximum 60m).		
	Construction Operation Decommissioning Rehabilitation and Closure	Wide scale of disturbance and low to medium significance. Some localized high significant impacts.	The mine shall comply with the National Dust Control Regulations, Promulgated under the National Environmental Management: Air Quality Act (Act 39 of 2004). Dust monitoring in and around the mine must be undertaken. If dust levels exceed the specified thresholds in terms of the dust control regulations, the Applicant shall appoint a suitably qualified specialist to identify sources of the excessive dust levels and to suggest suitable and reasonable mitigation measures.	NEMAQA Dust regulations	Throughout LoM
	Construction Operation Decommissioning	Localised and low significance	The mine must ensure that no transported materials escape from vehicles. If necessary, the load bin of the vehicles shall be covered with a tarpaulin to prevent dust.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation Decommissioning	No direct Impacts	The Mine shall maintain open and transparent communication with the community and surrounding landowners regarding air quality and shall supply monitoring records to the public upon request.	NEMAQA Dust regulation	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure				
	Construction Operation Decommissioning Rehabilitation and Closure	Health impacts have a localized but high significance	Employees will receive training on the use of personal dust respirators, whenever high dust levels are experienced.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Wide scale of disturbance and low to medium significance. Some localized high significant impacts.	Speed limits will be established and enforced on the mine to minimise dust generation.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Localised and low significance	Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation	Localised and low significance	Due to the proximity of sensitive receptors to the proposed project activities, it is recommended that chemical suppressants be applied to unpaved haul and access roads to reduce the impacts from this source by 90% control efficiency.	NEMAQA Dust regulation	Throughout LoM
	Construction	Localised and low significance	Water sprayers on the crushing activities should be implemented to control the emission of this source by 50%.	NEMAQA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Operation			Dust regulation	
	Construction Operation	Localised and low significance	Dust fallout rates to be below 1200 mg/m²/day in non-residential areas and 600 mg/m2/day in residential areas, averaged over 30 days.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation	Localised and low significance	Two PM10 sampling campaigns are recommended at the closest sensitive receptors (west or east of operations) before proposed mine extension commences and once proposed mitigated operations take place in order to ensure minimum impacts from the project on the surrounding communities.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation	Localised and low significance	Random carbonaceous stockpiles may not be allowed as this increases the risk of spontaneous combustion and subsequent air pollution.	NEMAQA Dust regulation	Throughout LoM
Heritage					
General decommissioning activities **General Surface Rehabilitation** **Infrastructure removal**	Construction Operation Decommissioning	Impacts on heritage affect a limited extent but have a very high significance due to the value of heritage resources which are protected by law.	Implement chance find procedures in case where possible heritage finds are made. Heritage structures: • MN004, MN009, MN010, and MN011 should be demarcated with a 20m buffer if activities are to occur in close proximity • If the sites are to be directly affected, the sites will need to documented before a destruction permit can be applied for at the provincial heritage authority (Mpumalanga).	NHRA Development Facilitation Act	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Maintenance and operation of site infrastructure and facilities **Mine area site preparation** **Mineral Processing** **Opencast mining** **Opencast Voids** **Post Closure Monitoring and Maintenance** **Re-vegetation** **Site establishment – Camp**			• In the event that any other heritage resources are uncovered SAHRA should be contacted and a qualified archaeologist appointed to evaluate the finds and make appropriate recommendation on mitigation. Burial grounds: • Demarcate sites with a 50-meter buffer and avoid them or alternatively apply for the relevant relocation permits as necessary. • Stakeholder engagement will need to be implemented to determine the possibility of infant burials at MN010. • If this is not possible a detailed grave relocation process must be implemented as required under the NHRA and National Health Act regulations. Palaeontology: • The Mine EO should be informed that the sediments of the Vryheid Formation, Ecca Group contain important fossil remains of plant fossil assemblages and trace fossil. Should any fossils be noted, this must be reported to a suitably qualified specialist for further action if necessary.		
Site establishment – Permanent site office Infrastructure	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limited extent but have a very high significance due to the value of heritage resources	Should artefacts or archaeological items be observed in the area of disturbance, then all activity in this area should cease immediately, the area marked off and a specialist consulted prior to any further activity.	NHRA Development Facilitation Act	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Storm water management		which are protected by law.			
Mine Infrastructure **Open Cast mining** **Water management Infrastructure construction** **Water Treatment**	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limited extent but have a very high significance due to the value of heritage resources which are protected by law.	Should any graves be observed on site during activity progress then all activities in the immediate area should cease, and the area demarcated as a no-go zone. A specialist will need to be consulted and responsible action considered.	NHRA Development Facilitation Act	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limited extent but have a very high significance due to the value of heritage resources which are protected by law.	The Mine EO must be trained on potential heritage or palaeontological features which may be found on site and the implementation of the chance finds procedure. Should any potential heritage or palaeontological features be identified the relevant specialist must be notified and shall advise on the way forward.	NHRA Development Facilitation Act	As required
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limited extent but have a very high significance due to the value of heritage resources which are protected by law.	All identified gravesites will be fenced off or relocated. Access to gravesites will be arranged for family members/friends of the deceased if requested. Grave sites that remain in situ shall be inspected on a regular basis to ensure no damage has occurred.	NHRA Development Facilitation Act	As soon as possible and implemented throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limited extent but have a very high significance due to the value of heritage resources which are protected by law.	In the event that graves, or cemeteries need to be relocated, a full grave relocation process must be undertaken that includes comprehensive social consultation.	NHRA Development Facilitation Act	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and	Impacts on heritage affect a limited extent but have a very high significance due to the value of heritage resources which are protected by law.	If construction activities expose any fossil deposits, a professional palaeontologist should be contacted to assess whether mitigation actions are necessary.	NHRA SAHRA Chance Find Procedure, Fossil Find Procedure and Fossil Monitoring Procedure	Throughout LoM
Land Capability					
General Surface Rehabilitation	Construction Operation Decommissioning	Impacts on land capability have long term effects and can be of a high significance	The mine will ensure that overburden stockpiles are in accordance with the rehabilitation plan to allow for minimal handling when returning soils during rehabilitation.	In accordance with Rehabilitation and closure plan	Throughout LoM
Maintenance and operation of site	Construction Operation Decommissioning		The mine shall preserve soil potential as far as possible to ensure enhanced land capability post mine closure.	In accordance with Rehabilitation and closure plan	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
infrastructure and facilities	Rehabilitation and Closure				
Mine area site preparation **Opencast mining**	Construction Operation Decommissioning Rehabilitation		While it is not anticipated that subsoil or overburden stockpiles will be able to be vegetated, topsoil stockpiles should be vegetated with indigenous seed mixtures to prevent soil erosion and to preserve the viability thereof.	In accordance with Rehabilitation and closure plan	Throughout LoM
Filling Opencast Voids	Rehabilitation		During rehabilitation care must be taken to return the correct soil types and depths to specific sections of rehabilitated land to enhance land capability potential post mining.	In accordance with Rehabilitation and closure plan	During Rehabilitation
Site establishment – Camp **Site establishment – Permanent site office Infrastructure** **Storm water management**	Construction Operation Decommissioning Rehabilitation and Closure		Re-vegetate rehabilitated areas as soon as possible to prevent soil erosion.	In accordance with Rehabilitation and closure plan	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Water management Infrastructure construction **Water Treatment**					
Surface Water					
Maintenance and operation of site infrastructure and facilities **Mine area site preparation** **Mineral Processing** **Opencast mining**	Construction Operation Decommissioning	Impacts on surface water can have a high significance and extent	The mine shall ensure that a detailed storm water management plan is approved by DWS and implemented for the mining area. Clean and dirty water system infrastructure must be installed as per the detailed storm water management plan which must take into consideration the design capacities and locations restrictions stipulated in GN 704 of the NWA (unless GN704 exemption is granted). Contaminated storm water run-off must be collected and routed to lined pollution control dams. Where clean water is diverted away from construction and/or mining areas, its point of re-entry into the natural environment should be well protected against erosion and/or sedimentation. No wastewater may run freely into any of the surrounding environment or neighbouring properties. The Mine shall implement the storm water design in accordance with the approved Storm Water Management Plan.	NWA GN704 DWS best Practice Guidelines Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	As soon as possible and implemented throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Opencast Voids **Post Closure Monitoring and Maintenance**	Construction Operation Decommissioning Rehabilitation and Closure		All areas susceptible to erosion shall be suitably protected. Berms/drains shall be constructed where necessary to direct all runoff into the stormwater system. Care must be taken to avoid scouring and erosion and suitable measures should be placed in areas where runoff concentrates, in order to reduce the sediment load and slow down the runoff. All erosion damage shall be repaired as soon as possible as directed by the EO.		
Re-vegetation **Site establishment – Camp**	Construction Operation Decommissioning Rehabilitation and Closure		All storm water and erosion control mechanisms must be inspected frequently and shall be maintained on a regular basis to ensure they remain effective. Appropriate remedial action, including the rehabilitation of eroded areas, shall be undertaken under direction from the EO.		
Site establishment – Permanent site office Infrastructure	Construction		Materials capable of resulting in poor quality leachate will not be used for the construction of haul roads. This will entail testing for acid generation potential.		
	Construction		Where possible, the disturbance of land during the construction phase will be confined to areas which are planned to be disturbed during the operation of the mine.		
Open Cast mining **Water management**	Construction Operation		Topsoil stockpiles must be stabilised with vegetation to reduce erosion and siltation into streams and dams. Other stockpiles that cannot be vegetated must have adequate control measures such as berms in place to prevent siltation of surrounding areas.		
	Construction		Hydrocarbon spills will require immediate attention and should be disposed of at a licensed facility. All used		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Infrastructure construction	Operation Decommissioning Rehabilitation and Closure		hydrocarbons will be suitably stored before being recycled or disposed of.		
	Construction Operation		Storm water drainage and pollution control facilities will be constructed to manage the flow of water and separate clean and dirty water on site.		
	Construction Operation Decommissioning Rehabilitation and Closure		All licenses and permits required as per the National Water Act will be applied for as per the relevant water uses.		
	Construction Operation Decommissioning Rehabilitation and Closure		The mine shall ensure soil erosion control measures are established in all high-risk areas to reduce silt-loading in storm water runoff. Construct a down-stream drain and silt traps at the outlet of water diversion areas.		
	Construction Operation Decommissioning Rehabilitation and Closure		Erosion control measures should be implemented on rehabilitated areas and vegetation established as soon as possible.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation Decommissioning Rehabilitation and Closure		Excess water will only be discharged if it meets statutory requirements.		
	Construction Operation		Pollution control dam water levels must be regularly monitored. Steps and procedures must be put in place to manage situations where excess water builds up in the pollution control dams.		
Wetlands					
Maintenance and operation of site infrastructure and facilities **Opencast mining** **Site establishment – Camp**	Construction	Impacts on wetlands are considered to be highly significant due to the sensitivity of these areas. Impacts can range from localized to impacts which are large in extent	The mine shall limit the extent of the development footprint to exclude aquatic resources as far as possible. Those pans or drainage lines that will be impacted by mining activities must be appropriately licenced by the DWS. A wetland offset strategy must be developed given the fact that the responsive hydropedological forms are the only sections of the hillslopes that will remain intact, with the rest of the hillslopes (recharge and interflow hydropedological forms) being removed during the proposed activities. This strategy has been considered as a last resort according to the mitigation hierarchy due to the irrelevance of "avoidance", "decreasing impacts" and "rehabilitation"	NWA GN704 Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
	Construction Operation Decommissioning		The mine shall implement an aquatic biomonitoring and water quality monitoring programme. Where target endpoints are not met, recommendations should translate directly into follow-up action that are recorded and auditable.		Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site establishment – Permanent site office Infrastructure **Mine Infrastructure** **Open Cast mining** **Water management Infrastructure construction** **Water Treatment**	Rehabilitation and Closure				
	Construction Operation Decommissioning Rehabilitation and Closure		No dirty water may be discharged into any wetland or water resource on site unless treated to the required standards.		Throughout LoM
Topography and Landform					
General Surface Rehabilitation	Construction Operation Decommissioning	Impacts on topography tend to be large in extent and can have a significant	Levelling out of the mine site area will be supervised by a qualified mine surveyor and the mine planning department. Where possible, the original topographic landscape and drainage/flow lines will be recreated so as to reduce loss of water in the natural catchments.	In accordance with Rehabilitation and closure plan	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Infrastructure removal **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing** **Opencast mining** **Filling Opencast Voids** **Post Closure Monitoring**	Rehabilitation and Closure	effect on the environment	Berms and diversion trenches will be constructed as part of the stormwater management infrastructure to help separate clean and dirty water on site. A post mining topographical plan should be developed during the start of the project in order to ensure compliance during and after mining. Regularly monitor, especially after first heavy rain falls of the season, to ensure adequate surface water drainage, surface water flow and erosion. Overburden, discard and wash plant filter cake/waste will be temporarily stockpiled and will be placed back into the pit during backfilling operations. This will assist in obtaining as close as possible the original natural topography. Any carbonaceous material that is returned to the pit must be placed below the natural groundwater level to prevent oxidation thereof. There will be survey checks included as part of the rehabilitation planning to ensure that the planned post mining topography is being followed. Topsoil depth should be related to the proposed post-mining land capability plans. Prevent compaction of rehabilitated areas as far as possible. Rehabilitated areas should be landscaped to prevent water logging and vegetated to prevent soil erosion.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
and Maintenance			Erosion control measures such as contour banks and cut off berms should be constructed, and soil vegetated in rehabilitated areas.		
Site establishment – Camp			Final profiling of the last cut / final void will take place to ensure safety of people and livestock as well as to blend as far as possible into the final land use profile.		
Site establishment – Permanent site office Infrastructure					
Storm water management					
Mine Infrastructure					
Open Cast mining					
Water management Infrastructure construction					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Transportation, Infrastructure and Traffic					
Mine area site preparation **Opencast mining** **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure** **Open Cast mining** **Water management Infrastructure construction**	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on transportation infrastructure and traffic can have a significant extent although typically low in significance	The mine shall ensure that the internal haul roads are adequately maintained, including monthly scraping and removal where required. Together with road maintenance, the storm water system to direct storm water that falls within the roads shall be kept maintained and settlement ponds shall be cleared of silt on a regular basis. Any/all spillage of mine product or by product will be cleared and added back onto the RoM stockpile. On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation on site, and to minimise disruption of traffic. In the case of dual or multiple use of access roads by other users, arrangements for multiple responsibility must be made with the other users. If not, the maintenance of access roads will be the responsibility of the mine. Road conditions must be assessed regularly for signs of damage and repaired where necessary. All intersections with main tarred roads will be clearly signposted. Road signs and safety features will be maintained to ensure that the haul road crossings are visible to motorists. All construction and mining vehicles using public roads shall be in a roadworthy condition and their loads secured. They must	Road Traffic Act OHSA MHSA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			adhere to the speed limits and all local, provincial and national regulations with regards to road safety and transport.		
Visual					
General Surface Rehabilitation	Rehabilitation and Closure	Visual impacts have an impact on the perception and sense of place in the area and although hard to quantify can have a significant impact over a large extent of the area.	Final shaping will be implemented, such that, the final profile of the rehabilitated mining areas is formed to emulate natural contours of the area as far as possible.	In accordance with Rehabilitation and closure plan	Throughout LoM
Mine area site preparation	Construction Operation Decommissioning		Directional lighting and soft lighting will be utilised as far as possible. Screens will be considered if I&AP complaints are received.	Closure and final land use objectives	
Mineral Processing	Construction Operation Decommissioning		Where possible, the mine may create suitable screening to reduce the visual impact of the mining operations and infrastructure.		
Opencast mining **Site establishment – Camp** **Site establishment – Permanent site office Infrastructure**	Construction Operation Decommissioning Rehabilitation and Closure		Dust suppression methods must be applied when necessary to restrict the visual impact of dust emissions.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Storm water management **Open Cast mining** **Water management Infrastructure construction**					
Blasting and Vibration					
Opencast / underground Mining	Operation	Blasting and Vibration can have a significant impact which increases in significance with proximity to the blast	Notification of blast schedules must be made available to relevant receptors. The time and date of blasts should be shared with all relevant parties. Where relevant, the structural integrity of surrounding buildings, boreholes, etc. must be assessed and recorded prior to blasting events. Should any complaints be received, a follow-up integrity assessment must be undertaken, and suitable compensation provided if it is determined that the blast resulted in damage. During blasting operations, vibration and noise readings must be recorded at sensitive receptors within 1km of a blast. These results must be kept in good order for future reference.	Explosives Act No. 26 of 1956 and amended No. 15 of 2003. Mine Health and Safety Act 29 Of 1996: Regulation 17. (7a;8a;9a and 10) And Regulation 4.16(2).	Throughout Operation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			Consult with Explosives suppliers and/or master blaster for guidance on using the correct product for the application.		
			All blast designs shall comply with current legislation and shall be designed to minimise ground vibrations and air blast.		
Groundwater					
General decommissioning activities **General Surface Rehabilitation** **Maintenance and operation of site infrastructure and facilities** **Mine area site preparation** **Mineral Processing**	Construction Operation Decommissioning Rehabilitation and Closure	The mining impact on groundwater potentially affected a very large area and has a potentially high significance impact	Water level measurements should be taken on a monthly basis in the monitoring boreholes, while the external users' boreholes within a 1km radius are to be monitored quarterly with some selected for monthly monitoring.	NEMA Duty of care NWA GN704	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		Rainfall runoff should be separated into clean and dirty water (rainfall falling on the site should be allowed to drain quickly/freely, and contaminated water should be captured in the mine dirty water system and re-used where possible	DWS best practice guidelines Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	
	Construction Operation Decommissioning Rehabilitation and Closure		In the event of pollution caused as a result of construction or mining activities, the responsible party, according to section 20 of the National Water Act (Act No. 36 of 1998) shall be responsible for all costs incurred by organisations called to assist in pollution control and/or to clean up polluted areas.		
	Construction		Dumps and overburden stockpiles should be managed to minimise infiltration of contaminants to the groundwater		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Opencast / underground mining	Operation Decommissioning Rehabilitation and Closure		zone. Mitigation that should be considered includes the management of the stockpile shape to control the ease with which water can run off from the stockpiles.		
Filling Opencast Voids	Construction Operation		Water accumulating within the mine workings will be pumped to a lined pollution control facility from where it will be re-used in the operation.		
Post Closure Monitoring and Maintenance	Operation		The mine shall ensure that the groundwater monitoring program is implemented. All boreholes shall be monitored throughout the LoM for ground water level and water quality.		
Re-vegetation	Construction Operation Decommissioning Rehabilitation and Closure		Boreholes identified during the impact assessment as potentially being dewatered need to be monitored and if required, replaced by newly drilled boreholes abstracting from below the mined workings or outside the area of influence of the mining activities.		
Site establishment – Camp **Site establishment – Permanent site office Infrastructure**	Construction Operation Decommissioning Rehabilitation and Closure		The mine shall utilize water on site responsibly. Ensure all pipelines and water containment facilities are adequately sealed to prevent leaks. Record water usage by attaching meters to relevant pumps.		
	Construction Operation Decommissioning		Discard should preferably be placed in mined-out areas (i.e. backfilled to pit) and should be placed sufficiently deep below the long-term decant elevation (e.g. 10m). Ongoing surface and groundwater monitoring must be undertaken up to 3		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Storm water management **Mine Infrastructure** **Water management Infrastructure construction**	Rehabilitation and Closure		years following post mining stabilisation of groundwater levels in the pits.		

7 CLOSURE AND REHABILITATION

7.1 CLOSURE AND REHABILIATION GOALS AND OBJECTIVES

The goals and objectives for closure were determined based on the baseline environment and the land uses that will be established post mining. The rehabilitation plan is based on good industry practise and is based on the described objectives for rehabilitation and closure which in turn are based on the end land use objectives defined during the original EIA studies in consultation with landowners and key stakeholders. Further to this, the ongoing stakeholder engagement as per the ESMS will allow for continued consultation landowners with regards to the reinstatement of preferred land uses post mining. A rehabilitation design including backfill elevations and backfill profile layouts should be prepared for the mine and updated when necessary. This should be utilized for final rehabilitation objectives and landform design.

A Rehabilitation Strategy and Implementation Plan (RSIP) is currently available for the mine however this should be updated for it to be applicable to the extension area. The rehabilitation is based on the following objectives and principles:

- Develop a mine completion criterion based on final landform design, erosion control, drainage patterns, soil processes, ecological components and ecosystem function;
- Develop a detailed rehabilitation plan which is in accordance with the progressive mine sequence;
- Identify limiting factors including topsoil availability, soil fertility, seed bank stock, water availability, soil water retention and surface preparations;
- Determine suitability of soil and overburden material for enabling successful establishment of natural vegetation;
- Clear and mulch non-habitat vegetation for collection with topsoil, or stockpiling for re-spreading on disturbed areas;
- Strip and retain topsoil for re-spreading on disturbed areas;
- Manage topsoil stockpiles and seed with an appropriate seed mix;
- Stockpiles must be seeded and revegetated as soon as possible;
- Design and reshape a final landform with the purpose to create a stable, well drained landscape that complies with rehabilitation and erosion control guidelines and post-mining land use objectives;
- Create a final landform that is visually compatible with the adjacent landforms and suitable for sustaining end land-use;
- Reinstate natural drainage in areas where they have been altered or impaired;
- Minimise erosion and include functional sedimentation control measures, designed to appropriate critical storm duration;
- Develop and implement a pest and weed control programme to prevent the introduction of pests and noxious weeds in rehabilitated areas, and to prevent spreading and re-establishment;
- Fence off rehabilitated areas to exclude stock and damage from unauthorised access;
- Use adaptive management approaches with continuous improvements; and
- Provide necessary access for the suppression of fires, control of invasive vegetation and monitoring of rehabilitated areas.

Closure objectives include physical, biological and chemical stability of the post-mining landform, as well as regulatory approval and stakeholder support for the actions associated with this objective and outcome. These objectives counter the principle post-mining risks of:

- Post-closure site safety for casual access;
- Restoration of native vegetation covers and ecology;
- Protection of water resources, including wetlands; and
- Post-mining environment in line with stakeholder needs.

The overall rehabilitation and closure objectives for Manungu Colliery are:

- Public health and safety must be protected;
- Prevention of erosion and sedimentation to ensure long-term structural integrity of the site;
- Socio-economic benefits post-closure must be maximised;
- Visual impacts of disturbed areas should be minimised by creating a natural landform that is visually suited to the surrounding landscape;
- Soil integrity should be restored, as it forms the base from which rehabilitation proceeds. Soils in rehabilitated areas should be correctly prepared and suitably conditioned and maintained for re-vegetation;
- Management of invasive alien vegetation (black wattle infestation in particular);
- Short and long-term impacts on surface and groundwater quality must be minimised and contained at acceptable levels;
- Restoration of pre-mining drainage patterns; and
- The need for long term monitoring and maintenance must be reduced or removed.

7.2 CONSULTATION WITH LANDOWNERS AND I&AP'S

Manungu Colliery is an existing mine and several authorisation processes have been undertaken for the mine to date. The EIA processes undertaken have included extensive PPP and stakeholders have been given an opportunity to provide input into the EIA process including comments on the final land use objectives. The Stakeholder Engagement process is ongoing throughout the LoM and landowners will continue to be engaged with regards to the reinstatement of preferred land-uses post mining.

7.3 MINE CLOSURE PROCESS

7.3.1 CONSTRUCTION PHASE

Preparation for closure of the mine require that certain actions be undertaken during the construction phase and therefore the closure plan for Manungu Colliery included the following actions during the construction phase:

- Removal of vegetation;
- Implementation of the Environmental Management Programme (EMPr); and
- The implementation of guidelines and conditions of the approved EMPr shall ensure that construction activities are limited to the approved construction footprint. Areas for the location of topsoil stockpiled and salvaged coal material were identified.

7.3.2 OPERATIONAL PHASE

During preparation for mine closure, certain aspects must be undertaken during the operational phase of Manungu Colliery. Required actions undertaken during the operational phase include:

- Implementation of the EMPr;
- Management of mine sections; and
- Implementation of progressive rehabilitation.

Infrastructure and mine sections on site include an open cast pit (with future underground sections), access/hauls roads, stockpiles, workshops, offices, change rooms and pollution control structures. All construction should take place within specified areas only to avoid impacts on streams or other sensitive areas. Rehabilitation will run concurrently with the mining programme. However, filling of the final void, removal of dams and ripping of roads will commence during the final stages of the mine operation and a total allowed period for completion of this exercise is three years. The offices and other facilities will be removed and sold for re-use or disposed of as scrap as far as possible. Electrical and water supplies to the mining area will be terminated and made safe. Surface haul roads will be ripped and revegetated.

The prevention of land degradation through the adoption of appropriate soil conservation practices will be an integral component of site management and landscape reconstruction. In order to achieve the final landform design, slopes and surfaces will be stabilised to prevent subsequent rehabilitation and revegetation from being reduced and maintenance being prolonged. Final landform design will take the following factors into consideration:

- Erosion potential of material on site;
- Recognition of pre-mining surface and groundwater flow;
- Alignment with existing topographical features;
- Preparing and implementing an erosion and sediment control plan in accordance with relevant government guidelines;
- Recognition that unconsolidated material from disturbed areas will require greater protective measures to minimise erosion;
- Immediate revegetation of all bare soil areas should be undertaken. The species utilised for revegetation should be determined by a suitably qualified specialist;
- Create storm water discharge stilling dams or artificial wetlands on drainage lines to absorb extreme runoff events, settle entrained solids, passively treat water and control discharge.
- Monitoring to detect occurrences of soil erosion and landform irregularities to ensure prevention and minimisation;
- Rehabilitation should consider recreating rocky areas, a habitat that harbours a large range of vertebrate as well as invertebrate animals. These would typically be the most effective at the top of contours or hills;
- The final backfilled opencast topography should be engineered such that runoff is directed away from the opencast areas.

7.3.3 DECOMISSIONING PHASE

Following conclusion of mining decommissioning, final strip backfilling will take place and the area will be cleaned up and the sections to be rehabilitated will be made safe. This involves the following:

- Removal and dismantlement of all infrastructure and equipment. No facilities will remain on site unless with the written approval of the post-mining landowner, post-mining land user or relevant authority. This includes the removal of temporary office and change room structures, and any

associated ablution facilities and pipelines. The remaining concrete foundations and buildings will be removed and inert material will be deposited into the final void, non-inert material will be dealt with in accordance with the Regulation 63 (c) of the MPRDA which states that, “where possible, dispose pollution, waste and mine residue in a responsible and sustainable manner”;

- Ripping of all haul/access roads and compacted areas to reduce compaction (followed by adding topsoil and revegetating);
- Removal of any waste/rubbish from waste collection and storage facilities for disposal at approved sites. Particular care will be required for residual toxic or hazardous material, although these volumes should be minimal;
- Removal of all concrete slabs, foundations and footings, unless these are required by the post-mining landowner or have been designated and approved for post-mining use by the relevant authority;
- Backfilling and levelling of all pits and excavations to achieve final landform design;
- Topsoil and subsoil application to encourage re-establishment of vegetation;
- Seeding with appropriate seed mix in areas where natural vegetation establishment does not yield sufficient cover;
- Restricting and preventing access by the removal of access roads;
- Cleaning and removal of all PCD’s and silt traps; and
- Cleaning and removal of all trenches.

Once the final landform has been established and stabilized, the mine will provide for a period of monitoring to verify the success of the rehabilitation programme. The length of the monitoring period will be determined in consultation with the appropriate regulators and would take the form of periodic inspections by the contractor and specialists but is generally assumed to last for at least 3 years for issues other than groundwater. Groundwater monitoring programmes could last for more than a decade and are largely dependent on the severity of mining impacts on groundwater quality.

The parameters that will be monitored after rehabilitation should subject to agreement with specialist and regulators, and include the following:

- Continued safety of the mine site;
- Alignment of final topography to the agreed final landform design;
- Restoration of soil fertility to a condition capable of sustaining end land-use;
- Re-establishment of adequate vegetation cover to create a self-sustaining system that suits the surrounding landscape;
- Preserve fauna and flora species identified in the EIA/EMPr as indicator species;
- Prevent and or reduce deterioration of surface and groundwater quality;
- Reinstate water drainage systems;
- Control of invasive alien species.

7.4 CLOSURE COSTING

In terms of the NEMA, MPRDA and the Income Tax Act, the financial provision for closure must be assessed annually in order for any additional infrastructure or negative impact to be incorporated into the financial provision costing during the annual assessment as the project progresses. This review must be informed by any adjustments of the Life of Mine plans, revisions of the EMPr and new legislative requirements and include the new mining areas that form part of this report as well. Depending upon the outcome of the review, annual

contributions to the mine closure provision/ mine closure trust fund will be adjusted to ensure that enough funds are available for rehabilitation, decommissioning and closure.

Table 10 provides procedures for the decommissioning, closure and rehabilitation of the affected site.

Table 10: Decommissioning, Rehabilitation and Closure Actions

Activities	Phase	Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Decommissioning					
General decommissioning activities **General Mine Management** **Decommissioning Mine Infrastructure** **Infrastructure removal** **Filling Opencast Voids**	Decommissioning	Decommissioning of infrastructure can result in negative impacts. The extent is localized to the extent of the infrastructure and mining footprint.	All infrastructure, equipment, plant and other items used during the mining period will be removed from the site (Section 44 of the MPRDA). Infrastructure should be removed down to foundations to prevent loss of soil productivity. All vehicles, equipment and other assets belonging to the mine must be removed from the property upon completion of the mining operation, including any excess aggregate, gravel, stone, concrete, temporary fencing and the like. Waste material, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognised and licensed landfill facility.	MPRDA In accordance with Rehabilitation and closure plan Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	During decommissioning activities
Rehabilitation					
	Rehabilitation and Closure	Rehabilitation has limited negative impacts. The scale	The current RSIP shall be updated to make it applicable to the new extension area. The Plan must be viewed as a dynamic document and shall be subjected to independent review on an	MPRDA	As soon as possible in operational phase and

Activities	Phase	Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Surface/ Rehabilitation **Re-vegetation** **Storm water management**		of the impact is limited to the disturbance footprint.	annual basis (together with the quantum for financial provision). As a minimum, the Integrated Rehabilitation and Closure Plan shall include the following; • Desired end land use objectives. • Methodology and proposed schedule for progressive rehabilitation to be undertaken concurrently with mining operations. • Details of soil preparation procedures including proposed measures to improve soil fertility (if so required) and the sustainability thereof. • A list of the plant species that will be used in the rehabilitation process. Only indigenous species may be utilised, and these species should be representative of the relevant vegetation unit/landscape type of the area. • Procedures for ensuring vegetation growth and survival (watering, fertilisation etc.). • Details of proposed storm water and erosion control measures to ensure re-vegetation is successful and not hampered by scouring and erosion. • Monitoring procedures that will be implemented to assess re-vegetation efforts (duration and frequency of monitoring, criteria for determining success of rehabilitation). • Procedures for preventing the establishment of alien invasive vegetation in rehabilitated areas. Upon completion of the mining operation and closure of the mine, the mine shall ensure that all cleared and/or disturbed areas (as a result of the mining activity) shall be rehabilitated	In accordance with Rehabilitation and closure plan Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	implemented throughout LoM Annually Updated

Activities	Phase	Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			in accordance with an Integrated Rehabilitation and Closure Plan.		
			Rehabilitation will include returning the slope to the minimum possible gradient (in line with surrounding landforms), the topsoil will be replaced for vegetation re-establishment and contour drains will be installed to prevent erosion where necessary.		
			The area must be rehabilitated using indigenous vegetation representative of the surrounding areas. Rehabilitation shall be overseen by a suitably qualified specialist who shall approve the indigenous seed mix to be used.		
			Any access road or portions thereof, constructed by the mine which will no longer be required by the landowner/tenant, shall be removed and/or rehabilitated to the satisfaction of the EM/EO and Regional Manager (DMR).		
			Erosion control measures shall be implemented where necessary (such as berms, brush packing, silt fences etc.). Erosion control and silt prevention measures shall be inspected regularly and shall be maintained whenever required to ensure they remain effective.		
			No alien or invader plant species should be introduced on site during rehabilitation. The weed management plan shall be implemented throughout the rehabilitation and closure phase. Regular monitoring of the rehabilitated area shall be undertaken, and all alien vegetation shall be eradicated and/or controlled prior to it setting seed. Weed management		

Activities	Phase	Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			shall be to the satisfaction of the EM/EO and Regional Manager (DMR).		
General Surface/ Rehabilitation	Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	If erosion occurs, corrective actions must be taken to minimize any further erosion from taking place and topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion.	In accordance with Rehabilitation and closure plan	During rehabilitation
			Only the designated access routes are to be used to reduce any unnecessary compaction. Compacted areas are to be ripped to loosen the soil structure and vegetation cover reinstated.		
			After the completion of the project the area is to be cleared of all infrastructure and topsoil to be replaced for rehabilitation purposes. The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate and stockpiles should only be used for their designated final purposes.		
			Compacted areas are to be ripped to loosen the soil structure and vegetation cover reinstated.		
			The rehabilitated area must be assessed once a year for post mining land capability, compaction, fertility, vegetation cover and to identify and rectify any erosion.		
General Surface/ Rehabilitation	Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential	Disturbed surfaces will be re-vegetated as soon as they become available, by seeding with an appropriate seed mix. The ongoing rehabilitation should occur soon after the area has been mined out so that alternative land use can commence.	Adherence to Rehabilitation and Closure Plan	During rehabilitation

Activities	Phase	Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		to be a relatively high significance			
Mine Closure					
Closure	Rehabilitation and Closure	Very limited potential for impacts during closure. The Mine remains responsible for the mining right area until such time as a closure certificate is obtained.	Should the activity ever cease or become redundant the applicant shall undertake the required closure process in accordance with the MPRDA and the NEMA.	MPRDA, NEMA and associated regulations	In accordance with legislated timeframes in force at the time of closure.
Closure	Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	Leasing options should be evaluated so that unmined land can be used for other uses such as grazing or cropping. Adequate fencing will be required to separate the land from miming areas for safety reasons.	MHSA	Closure
Acid Mine Drainage					
Opencast / underground Mining	Construction Operation Decommissioning Rehabilitation and Closure	Acid Mine drainage is a highly significant impact in terms of its severity as well	The mine shall appoint specialists to develop detailed, site specific AMD management plan which shall be updated regularly (at least every 3 years).	NWA NEMA duty of care	As soon as possible during operation. AMD mitigation plan to be implemented as soon as possible.

Activities	Phase	Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Opencast / underground Mining	Operation Decommissioning Rehabilitation and Closure	as potential extent.	Where acid mine drainage is anticipated or detected, an Acid-Base Accounting Technique and Evaluation (ABATE) should be initiated.	GN704 DWS best practice guidelines	As required and ongoing until closure certificate s received
	Operation		AMD can be reduced through the addition of calcitic lime to the backfill material (to buffer pH) or treating decant water. In terms of cost and volume, the required tonnage of calcitic lime to be added to the entire pit would be impracticable in terms of cost and volume. Target areas may include where discard is placed in the pits.	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Operation
	Operation		If necessary, a pump-and-treat system can be established to continuously pump the water from the rehabilitated workings, treat to a suitable water quality and discharge to the environment as long as it meets the relevant DWS water quality guidelines.		Operation
	Operation Decommissioning Rehabilitation and Closure		Acid drainage control and treatment techniques can be broadly classified into physical, chemical and biological, and those using combinations of these. The mine must investigate further the best options for site specific treatment of AMD. Treatment techniques are usually reactive rather than pro-active, and are generally designed to: 1. Raise pH. 2. Lower toxic metal concentrations (e.g. precipitation, adsorption). 3. Lower aqueous sulphate concentrations. 4. Lower the toxicity / bioavailability of metals in solution (e.g. oxidation, reduction).		As soon as possible during operation. AMD mitigation plan to be implemented as soon as possible.

Activities	Phase	Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			5. Oxidise the solution (e.g. Fe(II)-Fe(III), Mn(II)-Mn(IV), As(III)-As(V)). 6. Reduce the solution (e.g. SO_4^{2-}, H_2S). 7. Collect / dispose / isolate the metallic sludge generated.		
	Rehabilitation and Closure		Provision must be made for the long-term treatment and/or management of water collecting in mined out voids and/or in mined underground workings. Water that decants or is pumped from mined out areas will need to comply with target water quality variables and flow requirements of downstream watercourses (as stipulated by DWS).		As required and ongoing until closure certificate s received
	Rehabilitation and Closure		After closure, mine water and/or decant needs to be treated to the required level before discharge into natural watercourses. The extent of treatment required, as well as the duration of treatment needs to be determined by water quality assessments. All remaining carbonaceous material should be removed and placed into the bottom of a mining area below the final post-mining groundwater level.		As required and ongoing until closure certificate s received
Post-Closure Monitoring					
Post Closure Monitoring and Maintenance **Water Treatment**	Rehabilitation and Closure	Very limited potential for impacts during closure. The Mine remains responsible for the mining right area until such time as a closure	The post-closure monitoring and management period following cessation of mining activities will be implemented by a suitable qualified independent party for a minimum of ten (10) years unless otherwise specified by the competent authority. The monitoring activities during this period will include but not be limited to: • Regular ground and surface water monitoring; • Air quality monitoring;	MPRDA and regulations	Minimum of ten (10) years post closure or as agreed upon with DMR

Activities	Phase	Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		certificate is obtained.	• Biomonitoring; and • Re-vegetation of disturbed areas where required; Provision must be made to monitor any unforeseen impact that may arise as a result of the proposed mining activities and incorporated into post closure monitoring and management.		

8 ENVIRONMENTAL MONITORING

8.1 FUNCTIONAL REQUIREMENTS OF MONITORING PROGRAMMES

The purpose of monitoring is not merely to collect data, but to provide information necessary to make informed decisions on managing and mitigating potential impacts. Monitoring therefore serves the following functions:

- Serve as early warning system to detect any potential negative impacts;
- To provide information to feedback into management controls to avoid, prevent or minimise potential negative impacts;
- Provide quantitative data that can serve as evidence for the presence of negative impacts or the lack thereof;
- Allows for trending, modelling and prediction of future conditions or potential impacts;
- Based on the above, the mine must ensure that monitoring programmes comprise of the following (at a minimum) in order to obtain valuable environmental data;
    - Environmental aspect monitoring must be a formalised procedure;
    - All equipment used in monitoring must be correctly calibrated and serviced regularly;
    - Samples required for analysis will be sent to an independent and accredited laboratory;
    - Monitoring data must be stored;
    - Data must be checked and interpreted and tending undertaken on a quarterly basis;
    - Both the date and reports on environmental monitoring must be kept on record for the life of mine and where relevant provided to I&AP's; and
    - The general and site-specific parameters to be monitored must be identified by an independent specialist, the authorities and where relevant I&AP's.

8.2 LIST OF ASPECTS THAT REQUIRE MONITORING PLANS

The list of aspects that require on-going environmental monitoring includes the following:

- Air quality;
- Aquatic biomonitoring;
- Alien and invasive plant species;
- Blasting and vibration;
- Surface water;
- Groundwater; and
- Rehabilitation.

As mines and the environment are both dynamic it is likely that future scenarios may require the monitoring of additional or unforeseen impacts. As such, the list provided is by no means conclusive and must instead be used as a guideline for the impacts that require monitoring.

8.3 MONITORING PLANS FOR ENVIRONMENTAL ASPECTS

The monitoring of various environmental aspects and the impact on them as a result of the mining activities shall take place by means of both quantitative and qualitative techniques in order to determine whether the

requirements of the Environmental Management Programme are being complied with. The importance and value of detailed environmental monitoring networks cannot be overstated.

Environmental monitoring serves as a tool to track compliance, assist with potential liability identification, and mitigation throughout the life of the proposed project. This is achieved through the provision of actual evidence-based monitoring and reporting thereof. Monitoring is a continuous data-gathering, data interpreting, and control procedure that ranges from visual inspection to in-depth investigative monitoring and reporting. These monitoring plans need to be drawn into standalone plans that can be updated and amended as per authority requirements and additional data requirements identified during the mining activities. These plans need to include the site-specific roles and responsibilities for actions.

8.3.1 AIR QUALITY

Air quality monitoring in the form of dust sampling is undertaken at Manungu Colliery. The dust sampling is undertaken at 8 dust bucket sites. The results are compared to the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) (NEMA: AQA): National Dust Control Regulations 2013 (NDCR, 2013). The dust fall rates as specified in the NDCR (600 mg/m²/day for residential areas and 1200 mg/m²/day for non-residential areas) are applicable for dust fallout measured by the ASTM D1739 method.

Given the potential dust impacts from operations it is considered "good practice" that dust control measures be implemented throughout the life of the project and it is recommended that the project proponent commit itself to dust management planning.

8.3.1.1 PERFORMANCE INDICATORS

Key performance indicators against which progress may be assessed form the basis for all effective environmental management practices. In the definition of key performance indicators careful attention is usually paid to ensure that progress towards their achievement is measurable, and that the targets set are achievable given available technology and experience.

Performance indicators are usually selected to reflect both the source of the emission directly and the impact on the receiving environment. Ensuring that no visible evidence of wind erosion exists represents an example of a source-based indicator, whereas maintaining off-site dust fall levels to below 600 mg/m²/day represents an impact- or receptor-based performance indicator. The NAAQS for particulate matter and NDCR represents receptor-based objectives.

8.3.1.2 RECEPTOR BASED PERFORMANCE INDICATORS

Based on the impacts from the proposed project it is recommended that the current dust fallout sampling undertaken at the mine be continued during proposed operations to ensure management measures implemented are effective and ambient air quality levels are not significantly different to baseline levels.

Recommendations on a change in placement of the current dust fallout network is provided for proposed operating conditions and is provided in Table 11. Suggested locations for the directional dust buckets are also provided. It should be noted that directional buckets can be used to understand the source apportionment from the area but should not be used for comparison to NDCR. In addition, only boundary and off-site single dust bucket samples should be reported to the authorities, this excludes MAN03 and MAN06 as well as the directional dust bucket samples. The recommended performance assessment and reporting programme for ambient air sampling is given in Table 12.

Table 11: Recommended dust fallout and PM10 sampling.

Sample	Latitude	Longitude	Placement of Bucket
MAN01	-26.2330	28.6710	To the west of operations, co-located with the closest sensitive receptor (R1). The directional bucket MAN-OP can be co-located at this site.
MAN02	-26.2377	28.6609	Along access road, co-located with sensitive receptor R3.
MAN03	-26.2234	28.6982	At the product and crusher area.

MAN04	-26.2225	28.6925	At the northern boundary, co-located with the directional bucket MAN-MG.
MAN05	-26.2235	28.7113	At the eastern boundary (same location as current sampler but can be moved to co-locate site with closest sensitive receptor (R7).
MAN06	-26.2391	28.6947	Along the proposed haul road.
MAN07	-26.2542	28.6919	At the southern boundary (same location as current sampler). The directional bucket MAN-GR can be co-located at this site.
MAN08	-26.2358	28.7131	Co-located with the directional bucket MAN-MF.

Table 12: Ambient air monitoring, performance assessment and reporting programme

Monitoring Strategy Criteria	Dust fall Monitoring
Monitoring objectives	• Assessment of compliance with dust fall limits within the main impact zone of the operation. • Facilitate the measurement of progress against environmental targets within the main impact zone of the operation. • Temporal trend analysis to determine the potential for nuisance impacts within the main impact zone of the operation. • Tracking of progress due to pollution control measure implementation within the main impact zone of the operation. • Informing the public of the extent of localised dust nuisance impacts occurring in the vicinity of the mine operations.
Monitoring location(s)	It is recommended that the current dust fallout network comprising of 8 single dust buckets, be continued with some of the samplers moved to capture the dust fallout due to proposed activities (refer to Table 11).
Sampling techniques	Single Bucket Dust Fallout Monitors Dust fallout sampling measures the fallout of windblown settle able dust. Single bucket fallout monitors to be deployed following the American Society for Testing and Materials standard method for collection and analysis of dust fall (ASTM D1739). This method employs a simple device consisting of a cylindrical container exposed for one calendar month (30 days, ±2 days).
Accuracy of sampling technique	Margin of accuracy given as 200 mg/m2/day.
Sampling frequency and duration	On-going, continuous monitoring to be implemented facilitating data collection over 1-month averaging period.
Commitment to Quality Assessment/ Quality Control (QA/QC) protocol	Comprehensive QA/QC protocol implemented.
Interim environmental targets (i.e. receptor-based performance indicator)	Maximum total daily dust fall (calculated from total monthly dust fall) of not greater than 600 mg/m2/day for residential areas. Maximum total daily dust fall to be less than 1 200 mg/m2/day on-site (non-residential areas).
Frequency of reviewing environmental targets	Annually (or may be triggered by changes in air quality regulations).
Action to be taken if targets are not met	(i) Source contribution quantification. (ii) Review of current control measures for significant sources (implementation of contingency measures where applicable).
Procedure to be followed in reviewing environmental targets and other	Procedure to be drafted in liaison with I&APs through the proposed community liaison forum. Points to be taken into

Monitoring Strategy Criteria	Dust fall Monitoring
elements of the monitoring strategy (e.g. sampling technique, duration, procedure)	account will include, for example: (i) trends in local and international ambient particulate guidelines and standards and/or compliance monitoring requirements, (ii) best practice with regard to monitoring methods, (iii) current trends in local air quality, i.e. is there an improvement or deterioration, (iv) future development plans within the airshed (etc.)
Progress reporting	At least annually to the necessary authorities and community forum.

8.3.2 SURFACE WATER MONITORING

Surface monitoring is currently being undertaken at Manungu Colliery in accordance with the requirements of the Integrated Water Use Licence (IWUL). The stated objectives of the current monitoring programme have been developed in alignment with section 9 of the NWA and are in correlation with the catchment management strategy, are as follows:

- To establish a continuous database specific to this mine representative of the life of mine;
- Assessing the general temporal condition of water quality of resources in the vicinity likely to be impacted upon by the mine;
- Identifying any potential pollution sources and determining their extent, in order to circumvent relevant legal liabilities potentially resulting from recorded impacts on the receiving aquatic environment;
- Quantifying and assessing any impacts in obstruction of legislative stipulations in order to develop mitigation or remedial plans where necessary; and
- To set out strategies, objectives, plans, guidelines and procedures for protection, use, development, conservation, management and control of water resources within the water management area.
- The monitoring plan must be amended to take in account the new mining areas.

Surface water monitoring occurs at eight surface water monitoring points on a monthly basis. Surface water quality is assessed against the SANS- 241:2015 Drinking Standards and Background Water Quality Limits.

The baseline surface water variables that were recorded are: pH, EC, TDS, Alkalinity, Cl, SO_4, NO_3, NH_4, PO_4, F, Ca, Mg, Na, K, Al, Fe, Mn, Cr, Cu, Ni, Zn, SS, SOG, Oil & Grease, and PCB (PCD and Pit only).

Water samples are analysed at a South African National Accreditation System (SANAS) Accredited Testing Laboratory. The quarterly and annual surface water assessments must be evaluated by a registered Pri. Sci. Nat. Environmental Scientist. The quarterly reports must include basic representation of data, evaluated against appropriate water quality guidelines with related discussions. Surface water monitoring must continue in line with the current plan and any new requirements stipulated in the WUL.

8.3.3 AQUATIC BIOMONITORING

Aquatic biomonitoring is currently being undertaken for the Manungu Colliery as per conditions of the Water Use Licence (WUL, No. 04/B20A/ACGIJ/2621). It is recommended that this biomonitoring programme be continued and consider the proposed expansion project. In addition to this, it is recommended that wetland monitoring be conducted simultaneously with the biomonitoring programme.

The purpose of aquatic biomonitoring is aimed at assessing the ecological integrity of wetlands and rivers at the time of sampling in relation to the pre-mining condition. Biomonitoring for temporal and spatial comparison is undertaken at five locations on a bi-annual basis.

In situ measurements for pH, Electrical Conductivity (EC), Dissolved Oxygen Concentration (DO) and Temperature (Temp) are measured. The results obtained from the assessment of the water quality data were compared to benchmark criteria and Target Water Quality Ranges (TWQRs) for aquatic ecosystems.

The Present Ecological State (PES) of the river ecosystems are assessed and monitored by applying the South African Scoring System 5 (SASS5) with associated Invertebrate Habitat Assessment System (IHAS). The results of the SASS5 assessment are provided as Ecological Categories ranging from Natural (Category A) to Critically Modified (Category F) for each site assessed. The ecological state of the wetland systems should be further ascertained by applying the Diatom Assessment Protocol (DAP) as an indication of water quality as indicated by the biotic response of diatoms to the ambient environment.

Whilst water quality monitoring is currently undertaken, a detailed stand-alone monitoring procedure which is subject to internal review and update is required to align the mine with current best practice standards. This procedure must incorporate a mechanism for dealing with any exceedances identified.

The design and implementation of the water monitoring programme must be undertaken in accordance with the Best Practice Guidelines G3: Water Monitoring Systems. The aim of the surface water monitoring network is to assist with overall water management including but not limited to the following:

- Pollution prevention;
- Assess the performance of pollution prevention; and
- Develop a more holistic understanding of current, baseline water quality on site and the changes that result from mining activities.

An aquatic biomonitoring programme is an essential management tool. The monitoring programme should be designed to enable the detection of potential negative impacts brought about by the proposed project. Table 13 highlights some important aspects to monitor in reference to aquatic biota for the duration of the programme.

Table 13: Aquatic and Wetland Ecology Monitoring Plan

Location	Monitoring objectives	Frequency of monitoring	Parameters to be monitored
Current sites used in this study.	Overall Aquatic PES	Bi-annual	Standard aquatic ecology (Ecostatus) methods
Identify wetland monitoring sites.	Wetland PES, functioning and EIS		Wetland WET-series
Current sites used in this study.	Determine if water quality deterioration is occurring.	Bi-annual	SASS5 and ASPT scores should not decrease as and be related to mining activities.
Current sites used in this study.	Determine if water/habitat quality deterioration is occurring.	Bi-annual	Monitor for presence of fish.

8.3.4 GROUND WATER MONITORING

Manungu is currently monitoring the groundwater at 10 boreholes based on the current mining activities with an additional 24 borehole sampling locations to be added for the future mining areas. The following water quality parameters are analysed by an accredited water laboratory at least biannually: pH, EC, TDS, Ca, Mg, Na, K, Cl, SO_4, NO_3, Tot.Alk., P, F, Fe, Mn, Al, Si, N, SS, NTU.

It is recommended that groundwater levels in the regular boreholes be initially measured on a monthly basis. Water quality samples should be collected quarterly, except for drinking water supply to the mine and local village, which require monthly monitoring. Drinking water supply boreholes and external users' boreholes which

may be affected should also be monitored monthly. Elsewhere, external users' boreholes should be monitored annually.

Groundwater monitoring of the boreholes should be conducted as detailed in Table 14 (as minimum for a period of two years, when less frequent groundwater quality monitoring may be recommended by an expert)

Table 14: Monitoring parameters and frequency.

Groundwater Levels	Groundwater Quality
Quarterly	**Quarterly:** pH, EC, TDS, Ca, Mg, Na, K, Cl, SO4, NO3, Tot.Alk. [NOTE: all drinking water to be analysed monthly]
	Annually: Si, Fe, Mn, Al & ICP-Scan, additional recommendations by geochemist
	Annually: Hydrocarbon-type analyses (e.g. TPH, DRO and GRO) and bacteriological.

The groundwater monitoring boreholes are presented in Table 15 and cover the current and future project potential impacts.

Table 15: Groundwater monitoring boreholes.

Site Name	Latitude	Longitude	Elevation (mamsl)	End of hole (m)	Collar Height (m)	Water Level (m)	Sampling Horizon (m)
MAN-BH2D	-26.237200	28.679010	1592	175	0.50	34.40	88
MAN-BH2M	-26.237160	28.679010	1590	41	0.55	3.54	23
MAN-BH2S	-26.237130	28.679020	1590	10	0.57	3.03	5
MAN-BH3D	-26.236750	28.703780	1580	100	0.27	26.01	71
MAN-BH3M	-26.236730	28.703790	1580	30	0.32	4.18	15
MAN-BH3S	-26.236690	28.703820	1580	10	0.3	3.99	7
MAN-BH4D	-26.239650	28.694450	1595	90	0.32	28.1	67
MAN-BH4M	-26.239630	28.694490	1595	41	0.28	7.23	25
MAN-BH4S	-26.239600	28.694530	1596	10	0.24	6.4	8
MAN-BH5M	-26.234210	28.683400	1597	40	0.36	4.43	32
MAN-BH6D	-26.216920	28.683900	1572	91	0.3	32.6	75
MAN-BH6M	-26.216880	28.683880	1572	40	0.42	5.15	30
MAN-BH7M	-26.243110	28.682930	1597	36	0.27	6.53	25
MAN-BH8M	-26.222640	28.699540	1570	31	0.61	2.77	15

Site Name	Latitude	Longitude	Elevation (mamsl)	End of hole (m)	Collar Height (m)	Water Level (m)	Sampling Horizon (m)
MAN-BH9D	-26.248280	28.698050	1593	96	0.43	43.84	66
MAN-BH9M	-26.248340	28.698050	1593	46	0.58	8.23	30
MAN-BH9S	-26.248370	28.698050	1593	10	0.53	7.82	8.5
MAN-BH10M	-26.240870	28.706280	1577	26	0.47	5.23	17
MAN-BH11D	-26.247860	28.687810	1606	86	0.46	36	71
MAN-BH11S	-26.247850	28.687830	1606	7	0.52	4.18	5.5
MAN-BH12D	-26.256870	28.678330	1596	86	0.73	41.17	59
MAN-BH12M	-26.256880	28.678300	1596	40	0.75	4.11	28
MAN-BH12S	-26.256850	28.678270	1596	7	0.74	3.5	5
MAN-BH13D	-26.265620	28.674660	1602	86	0.70	52.22	78

8.3.5 BLAST AND VIBRATION MONITORING

Blast monitoring is recommended and a detailed stand-alone procedure which is subject to internal review and update is required to align the mine with current best practice standards. This procedure must include a list of identified sensitive receptors (e.g. buildings, boreholes, etc.) and allowable limits as well as incorporating a mechanism for identifying and dealing with exceedances and incorporate a mechanism for dealing with any exceedances identified.

Blast monitoring must be undertaken at Manungu Colliery during each blast by a suitably qualified blast manager employed by the Mine. Each blast should be monitored, and a report compiled by a qualified blasting expert employed by the Mine.

Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. This will bring about unbiased evaluation of levels and influence from an independent group. Audit functions may also be conducted to assist the mine in maintaining a high level of performance with regards to blast results and the effects related to blasting operations.

Video of each blast will also help to define if fly rock occurred and from where. Immediate mitigation measure can then be applied if necessary. The video will also be a record of blast conditions.

8.3.6 ALIEN AND INVASIVE CONTROL

Nine (9) category 1b invasive species were recorded within the current and future mining areas and must therefore be removed by implementing an alien invasive plant management programme in compliance of section 75 of the NEMBA. Alien and invasive species monitoring must be undertaken on the areas that have been disturbed by the mine, namely the operating area and the remaining extent of the future mining areas that are still considered to be greenfield. The priority is to remove alien vegetation from areas disturbed by mining activities, and then to manage the remaining undisturbed areas within the operations area. The Category 1b species ae shown Table 16. An alien and invasive plant management plan should be developed by a suitably qualified individual and implementation of the plan must be ongoing throughout the LoM.

Table 16: Alien and invasive plant species recorded within the mining areas.

Species	NEMBA Category
Campuloclinium macrocephalum	Category 1b
Cirsium vulgare	Category 1b
Cortaderia selloana	Category 1b
Datura ferox	Category 1b
Datura stramonium	Category 1b
***Eucalyptus* sp.**	Category 1b
Pennisetum clandestinum	Category 1b in protected areas and wetlands
Robinia pseudoacacia	Category 1b
Verbena bonariensis	Category 1b

The recommended control method for the species is the same. Mechanical clearing (removal of species by hand) is recommended as soon as possible, preferably before the end of the wet season. Broadleaf herbicides such as Mamba or Roundup can be used in the event that this specie's growth accelerates. These herbicides are easily bought in hardware stores.

Further to this it is recommended that a follow up survey is undertaken by a specialist on an annual basis, focussing on the operations area, during the wet season in order to assess the alien vegetation clearing and any further colonisation.

8.3.7 REHABILITATION MONITORING

In order to achieve successful closure and relinquishment of the mine, the following programmes will be included:

- Annual fertilisation of rehabilitated areas;
- Monitoring of surface and groundwater quality;
- Invasive vegetation control;
- General maintenance including rehabilitation of cracks and subsidence.

The purpose of a monitoring, maintenance and aftercare programme is to ensure that the rehabilitation and closure objectives are met, and that the rehabilitation process is followed. The frequency of monitoring must be adequate to identify potential gaps in the effectiveness of the mine closure strategy. A monitoring programme must be implemented during the operational and closure phases of the mine. The following identified aspects required continuous monitoring during the operation and closure phases:

- Alignment of the final landform design with that of the actual topography and landscape;
- Placing of the correct topsoil depth in order to encourage successful rehabilitation of vegetation communities;
- Erosion status of the mine site;
- Surface drainage and surface water quality;
- Groundwater quality;
- Pit water quality;
- Successful re-vegetation and basal cover proportions;

- Rehabilitation effectiveness;
- Fauna and flora re-colonisation; and
- Control of invasive vegetation species.

Existing and newly drilled boreholes must be monitored on a quarterly basis in order to assess the impact of ROM stockpiles and the PCD on the groundwater quality. Monitoring of these boreholes also serves to evaluate the dewatering status and potential groundwater contamination from the pit. As mining advances, some of the boreholes will be destroyed thus requiring additional boreholes to be drilled to replace those lost. In-pit boreholes will be necessary in order to maintain monitoring in the latter stage of mining.

The following measures should be taken into account in order to ensure that groundwater and surface water quality objectives are met:

- All identified springs must be monitored in order to assess the contribution of groundwater flow from the mine. Groundwater levels of all boreholes which supply drinking water to the mine must be monitored on a weekly basis;
- Natural drainage lines and catchments should be restored during the decommissioning phase;
- Rehabilitation of the PCD should be implemented during the winter-period as the majority of water should have evaporated at the time;
- Contaminated soils and impermeable layers of the PCD should be removed and disposed of at an appropriate facility;
- Groundwater and surface water should be continuously monitored after operation ceases until a definite trend is established and understood;
- Boreholes should remain on site to allow continuous monitoring to take place;
- The PCD and trenches should be the last infrastructure to be removed; and
- Post-closure monitoring should continue.

9 UNDERTAKING

The EAP herewith confirms:

a) The correctness of the information provided in the reports;

b) The inclusion of comments and inputs from stakeholders and I&AP's;

c) The inclusion of inputs and recommendations from the specialist reports where relevant; and

d) That the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein.

10 SUPPORTING INFORMATION

The following supporting information is included as Appendices to this report:

Appendix A: Declaration of Independence and CV of EAP

Appendix A: EAP Declaration of Independence and CV

DECLARATION OF THE EAP

I, Adri Joubert, declare that –

General declaration:

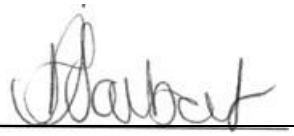
- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the Regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

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

- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~

N/A



Signature of the environmental assessment practitioner:

Geo Soil and Water (Pty) Ltd

Name of company:

9 January 2020

Date:

ADRI JOUBERT

ID: 7305010075089, Pretoria, Cellular 082 926 8460, adri@geosoilwater.co.za

DIRECTOR: GEO SOIL AND WATER cc

PERSONAL DATA

Surname:	Joubert
First names:	Adri
Identity number:	730501 0075 089
Date of birth:	1 May 1973
Sex:	Female
Marital status:	Married
Driver's license:	Yes, code 8
Nationality:	South African
Home language:	Afrikaans
Other language:	English
Fully bilingual:	Yes
Criminal offences:	None
Health:	Excellent

Employment History

Geo Soil and Water, Pretoria — 2008 - Present
Director

Bureau Veritas, South Africa — 2011 - 2014
ISO 14001:2004, ISO 9001:2008 and OHSAS 18001 Auditor

Price Waterhouse and Coopers (PWC), South Africa — 2011 - Present
ISO 14001:2004, ISO 9001:2008 and OHSAS 18001 Auditor

DQS, South Africa — 2008 - 2013
ISO 14001:2004, ISO 9001:2008 and OHSAS 18001 Auditor

Khutala Colliery, Ogies
BHP Billiton Energy Coal South Africa — 2002-2007
Environmental Manager/Head of Department

Optimum Colliery, Ogies
BHP Billiton Energy Coal South Africa — 2001-2002
Environmental Officer

Council for Geoscience, Pretoria — 1998-2001
Scientific Officer/Geologist

Education

Baccalaureus Scientiae Honores, Geographical Information Systems University of Pretoria, Pretoria	2001
Magister Science, Geology University of Port Elizabeth, Port Elizabeth	1999
Baccalaureus Scientiae Honores, Geology University of Port Elizabeth, Port Elizabeth	1995
Baccalaureus Scientiae University of Port Elizabeth, Port Elizabeth	1994

Other Training

SABS-Understanding SABS ISO14001 (EMS)	9/11/2001
SABS-Environmental Management System Auditing	14/12/2001
DQS-OHSAS 18001: 2007 Auditor Training	22/1/2010
DQS-ISO 9000: Auditor Training	29/1/2010
Technikon Pretoria-Introduction to Life Cycle Assessments	8/12/2002
University of Cpe Town- Environmental Management Theory and Practical Application	1/12/2002
Abê Bosman- Attorneys Line Management Legal Responsibility	7/12/2001
PUCHO- Environmental Law	16/3/2002
DQS-Exchange of Experience	18/5/2008
DQS-Occupational Health and Safety Act 85 of 1993	15/1/2010
E.I. du Pont Nemours-Safety Management Audit Training	12/12/2003
DQS – EMS Legal Compliance Training	4/1/2012
DQS – Legal Compliance Updates	4/1/2012

DQS – IMS Generic Processes	7/1/2012
DQS – IMS Problem Areas	13/1/2012
DQS – Multi Site Sampling	7/1/2012
DQS – EMS	6/2/2012
DQS – ENA PAL	24/1/2012
DQS – Occupational Health Training	1/1/2012
DQS – Globally harmonised system for classification and labelling of chemicals	1/1/2012
DQS – IMS Generic Processes	7/1/2012
DQS – IMS Problem Areas	13/1/2012
DQS – Multi Site Sampling	7/1/2012
DQS – EMS	6/2/2012
DQS – ENA PAL	24/1/2012

Skills and Competencies

Financial Management

- Prepare and plan for budgets
- Assist with cost forecasting
- Approve budget and manage costs
- Supply information for contractor Scope of Work
- Provide detailed information for Capital Investment Project's (NPV, IRR, etc.)
- Deliver savings
- Ensure Corporate Governance
- Ensure adherence to Financial Policies and Procedures

Customer Relations

- Manage relationships with key stakeholders
- Interact with customers

Environmental

- Manage Environmental Performance Reviews
- Review and authorise changes in accordance with the Management of Change process
- Manage the Continuous Improvement and promote the understanding, use and application of Environmental Management System
- Identify applicable legislative requirements that have an impact on the function
- Comply with Environmental, legislative and functional requirements
- Assist in the effective management of contractors
- Develop and assist in the reporting and investigation of Environmental Incidents
- Assist and develop Environmental Emergency Preparedness and Response within a function

Strategy

- Provide Strategic and Change Leadership to the Environmental Team
- Align Strategy to customer and business requirements
- Align Strategy to regional and global Environmental strategies

Environmental Legislation (Policies, Act and Regulations)

- Ensure compliance to Environmental Legislation
- Monitor and keep up to date with changes in Legislation
- Participate and influence development of Legislation

Policies, Procedures

- Develop Environmental Management Policies, Procedure, Standards, Protocols, Work Instructions, Codes of Practice, etc.

Audits

- Conduct and Manage Environmental Audits
- ISO 14001: 2004 (internal and external)
- Regulatory audits

Communication

- Liaise with internal and external stakeholders regarding Environmental issues

Reports

- Reports and Assessments: Scoping Reports, Environmental Impact Assessments, Environmental Management Programs/Plans, Basic Assessments, Mining Right Applications, Prospecting Right Applications, Water Use Licence Applications, Waste Licence Applications, Land use assessments, Infrastructure mapping, Specialist Report Review, Public Participation

Projects

- Manage the execution of Environmental projects

External Forums

- Participate in external Forums

New Business Development

- Manage the Environmental inputs related to new Business Development from inception, pre-feasibility, feasibility and implementation
- Manage the Environmental Risk of new Business Developments from inception, pre-feasibility, feasibility and implementation

Business Improvement

- Participate in Environmental Improvement Projects

People Management

- Lead and manage Geo Soil & Water
- Plan, organise and allocate work
- Conduct Performance and Talent Management Reviews
- Reward excellence and manage substandard performers
- Identify talent and manage individual careers

Affiliations/Registrations

South African Council for Natural Scientific Professions (SACNASP)

- Pr. Sci. Nat. GIS Science 400058/01
- Pr. Sci. Nat.Geological Science 400058/01
- Pr. Sci. Nat. Environmental Science 400058/01

Awards

Highly Commended Award for Technical Excellence from ESKOM 2003