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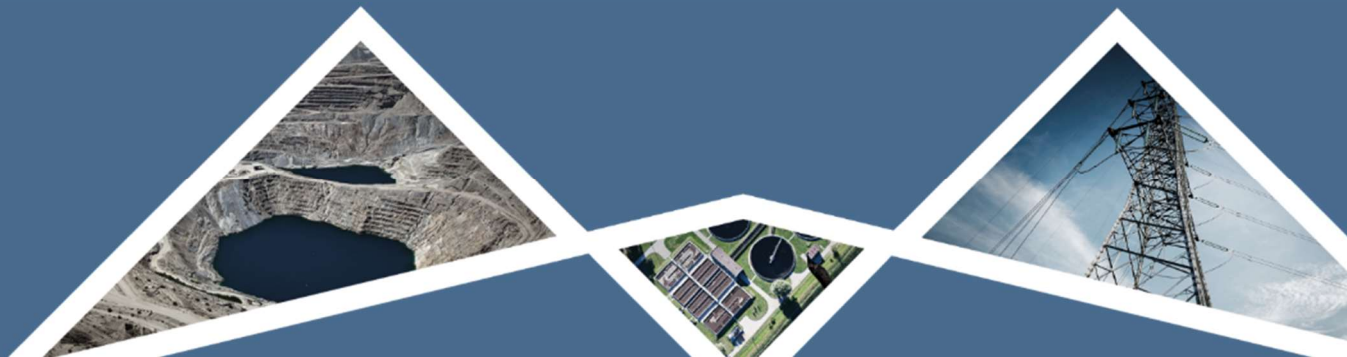
ENVIRONMENTAL MANAGEMENT PROGRAMME

KALGOLD MINE (NW30/5/1/2/2/77MR)



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REVISION AND AMENDMENTS

REVISION DATE:	REV # 0	DESCRIPTION
July 2008	Previous EMPR	Kalgold Mine Environmental Management Programme
December 2014	Previous EMPR	Shangoni Management Services: Environmental Management Programme amendment in terms of Section 102 of MPRDA, 2002
February 2021	Previous EMPR	Environmental Impact Management Services: Environmental Management Programme amendment
2022/01/31	ORIGINAL DOCUMENT	Current EMPr

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1 INTRODUCTION

1.1 REPORT STRUCTURE

This report is an updated Environmental Management Programme (EMPr) for Kalgold Mine and is compliant with the requirements of the National Environmental Management Act (Act 107 of 1998) (NEMA) Regulations. Table 1 below provides a summary of the NEMA requirements in terms of Appendix 4 of the Environmental Impact Assessment (EIA) Regulations (GNR 982)(EIA Regulations), and an indication in which section the supporting information and documentation can be found.

Following a feasibility study, Harmony wishes to expand its current Kalgold Mine production from the current production rate of 130 000 tons per month to 300 000 tons per month. This EMPr includes the activities and infrastructure required for this expansion.

This EMPr represents an update of the Environmental Impact Management Services (Pty) Ltd (EIMS) EMPr submitted to the Department of Minerals Resources (DMR) in February 2021, Departmental Ref No: NW30/5/1/2/2/77MR (00289); Approved on 13 December 2021, hereafter referred to as the EIMS 2021 EMPR. The EIMS 2021 EMPr is being updated to reflect the activities associated with the proposed production expansion activities. The changes and updates are reflected in this current EMPr (EIMS, 2022). Once approved, this EMPR will be the version to be implemented on the mine from date of approval and will supersede the previous versions. The EMPr complies with the requirements of NEMA Appendix 4 however all content was sourced from the latest 2014 EMPr.

Table 1: Report Structure

Environmental Regulation	Description	Section in Report
NEMA Regulation 982 (2014) Appendix 4		
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;	Sections 1.2 and 1.3 and Appendix 1
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 5
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 1 and Figure 3
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 6

Environmental Regulation	Description	Section in Report
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 7
Appendix 4(1)(1)(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5.1
Appendix 4(1)(1)(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5
Appendix 4(1)(1)(i):	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 5.1 and 5.3
Appendix 4(1)(1)(j):	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 7
Appendix 4(1)(1)(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 5.3
Appendix 4(1)(1)(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 4.4
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 4.7
Appendix 4(1)(1)(n):	Any specific information that may be required by the competent authority.	N/A

1.2 DETAILS OF THE EAP

Shangoni Management Services compiled the original 2014 EMPr, upon which the EIMS 2021 EMPr update is based. EIMS has been appointed by Kalahari Goldridge Mining Company (Pty) Ltd (Kalgold) as the Independent EAP and to assist in preparing the updated Kalgold EMPr with respect to activities associated with the proposed expansion project. The contact details of the EIMS consultant who compiled this EMPr are as follows:

EAP Name: Bongani Darryl Khupe

SACNASP Registration Number: 400375/11

EAPASA Registration Number: 2020/1192

Contact no: +27 11 789 7170

Email address: bongani@eims.co.za

1.3 EXPERTISE OF THE EAP

1.3.1 QUALIFICATIONS OF THE EAP

In terms of Regulation 13 of the EIA Regulations (GN R. 982) as amended, an independent EAP, must be appointed by the applicant to manage the application. EIMS has been appointed by the Applicant as the EAP to assist with compiling the necessary reports and undertaking the statutory consultation processes, in support of the proposed Phase 3 Project. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- Objective and Independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the Regulations and all other applicable legislation;
- Takes into account all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

Furthermore, EIMS has appointed a team of specialists to undertake additional studies required for the expansion project. EIMS is responsible for project management and the compilation of the EIA and EMPr with the guidance and input from the independent specialists.

1.3.2 SUMMARY OF EAP'S PAST EXPERIENCE

Mr Khupe is an environmental project manager and environmental auditor. He is a registered Professional Natural Scientist (SACNASP) and Environmental Assessment Practitioner (EAPASA) who holds a Bachelor of Science Honours degree in Applied Environmental Science from the University of Zimbabwe and is a trained Environmental Auditor (Crystal Clear, 2012). His training included all aspects of Environmental Auditing as well as EMS auditing in terms of ISO14001. In addition, he is a trained on the ISO14001:2015 environmental standard and has completed the EMS lead auditor training in terms of ISO14001:2015. Mr Khupe is registered with the Institute of Environmental Management and Assessment (IEMA) as an Environmental Auditor and with the South African Auditor and Training Certification Authority (SAATCA) as a Provisional Auditor. He has 15 years' experience in the environmental field. His key focus is on environmental compliance advice and monitoring, environmental impact assessments, environmental permitting, public participation, environmental management plans and programmes, strategic environmental advice, rehabilitation advice and monitoring as well as providing technical input for projects in the environmental management field. He is conversant with the South African environmental legislation as well as sustainability auditing, including Equator Principles, IFC Performance Standards and World Bank EHS guidelines.

The Curriculum Vitae of the EAP that is responsible for the compilation of this Report is included in Appendix 1.

1.3.3 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 expansion 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 report are summarised in Table 2 below.

Table 2: List of specialists appointed to the Kalgold Expansion project

Study	**Specialist**
Geohydrological Impact Assessment	MvB Consulting.
Hydrological Impact Assessment	Hydrologic Consulting (Pty) Ltd.
Freshwater Ecology Impact Assessment (Wetlands)	The Biodiversity Company (Pty) Ltd.
Terrestrial Ecology Impact Assessment	The Biodiversity Company (Pty) Ltd.
Hydropedology Impact Assessment	The Biodiversity Company (Pty) Ltd.
Agriculture Potential	The Biodiversity Company (Pty) Ltd.
Heritage and Cultural Resources Impact Assessment	PGS Heritage (Pty) Ltd.
Air Quality Impact Assessment	Airshed Planning Professionals (Pty) Ltd.
Social Impact Assessment	NLN Consulting.
Closure Costing	Environmental Impact Management Services (Pty) Ltd.
Traffic Impact Assessment	SMEC South Africa

2 INTRODUCTION TO THE MINE

Kalgold Mine is a gold mine that is managed by Harmony Gold Mining Company Limited, located approximately 55km southwest of the town Mafikeng and 60km northeast of the town Stella in the Ratlou Local Municipality (RLM) within the North West Province of South Africa. Nearby villages include Kraaipan (15km to the south), Setlagole (18km to the southwest) and Mareetsane (20km to the east).

2.1 DESCRIPTION OF THE PROPERTY

The tables below provide the details of the owners of land and associated title deed descriptions as well as other relevant regional information for the Kalgold Mine.

Table 3: Property details

Farm Name	Title deed	Owner
Spanover 549 IO Portion 4	T1234/1996	Kalahari Goldridge Mining Company Ltd.
Spanover 549 IO Portion 5	T2226/1998	Kalahari Goldridge Mining Company Ltd.
Spanover 552 IO Portion 0	T1236/1996	Kalahari Goldridge Mining Company Ltd.
Ferndale 554 IO	T3024/1997	Kalahari Goldridge Mining Company Ltd.
Goldridge 632 IO	T1604/1998	Kalahari Goldridge Mining Company Ltd.
Ferndale 551 IO Portion 11	T1234/1996	Kalahari Goldridge Mining Company Ltd.
Ferndale 554 IO	T4009/1998	Kalahari Goldridge Mining Company Ltd.
Koedoerand 569 RE	T1998/2000	Kalahari Goldridge Mining Company Ltd.

Table 4: Administrative and water management boundaries

Province	North West
District Municipality	Ngaka Modiri Molema District Municipality
Local Municipality	Ratlou Local Municipality
Ward	11
Catchment Zone	Orange River Catchment
Water Management Area	Lower Vaal Water Management Area

Table 5: Administrative and water management boundaries

Direction	Distance from site	Closest town
Kraaipan	15km	South
Setlagole	18km	South-west
Mareetsane	20km	East
Mafikeng	55km	North-east

2.2 LOCALITY AND SENSITIVITY MAP

Figure 1 and Figure 2 indicate the locality of the existing Kalgold Mine, and the existing Kalgold operations. The latest sensitivity map generated during the EIA for the expansion project is provided in Figure 3.

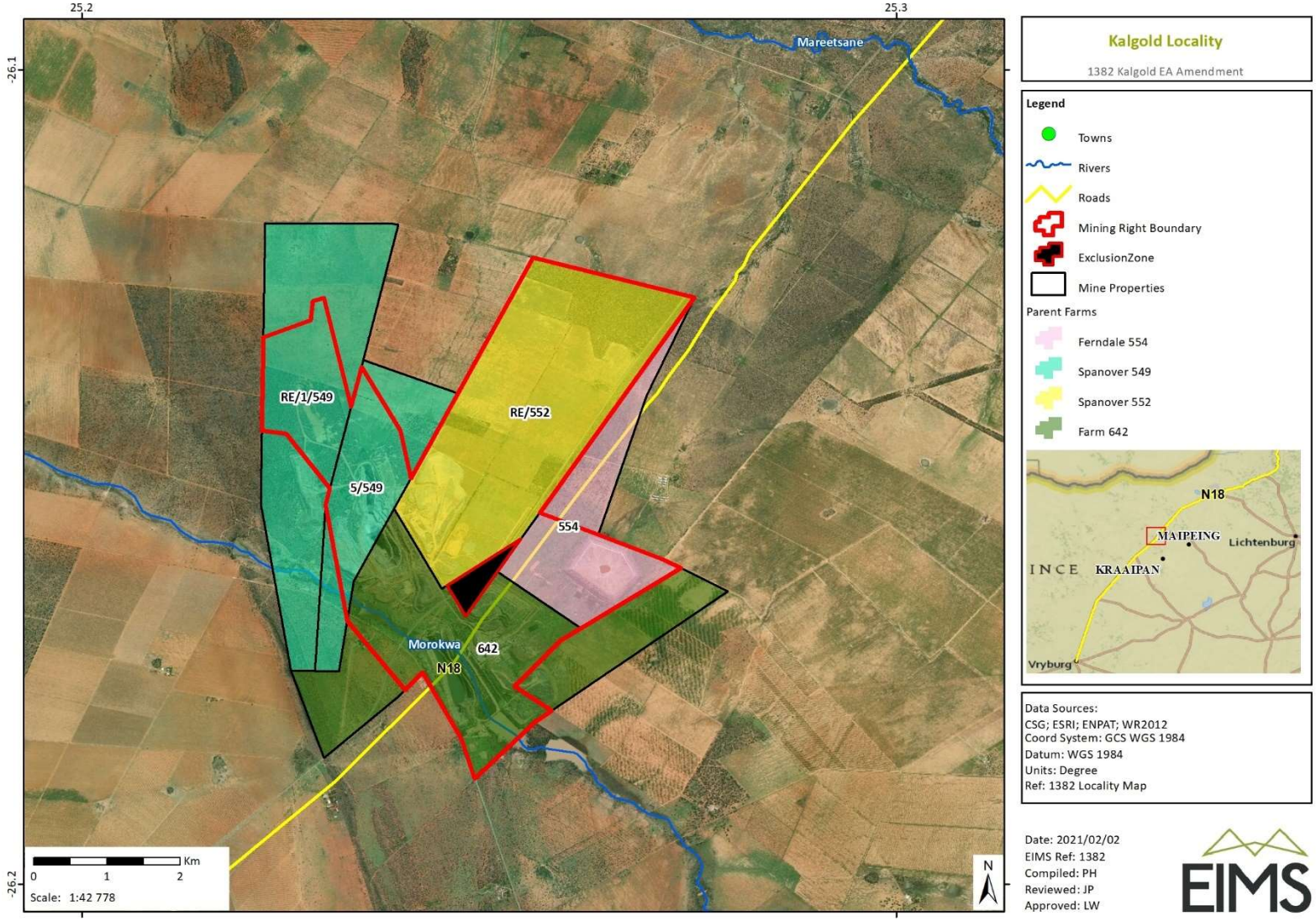

Figure 1: Locality Map

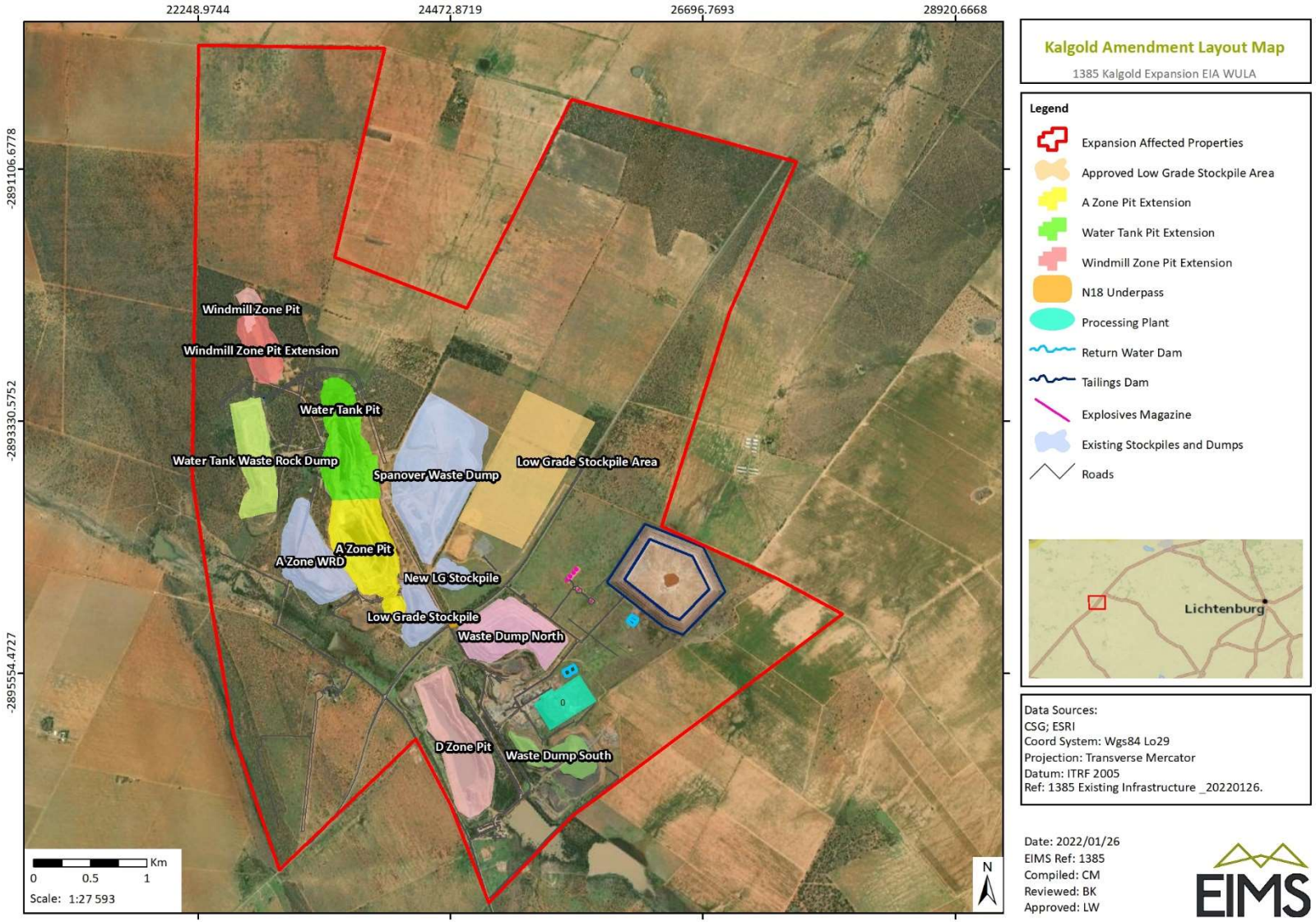

Figure 2: Existing Kalgold operation and areas

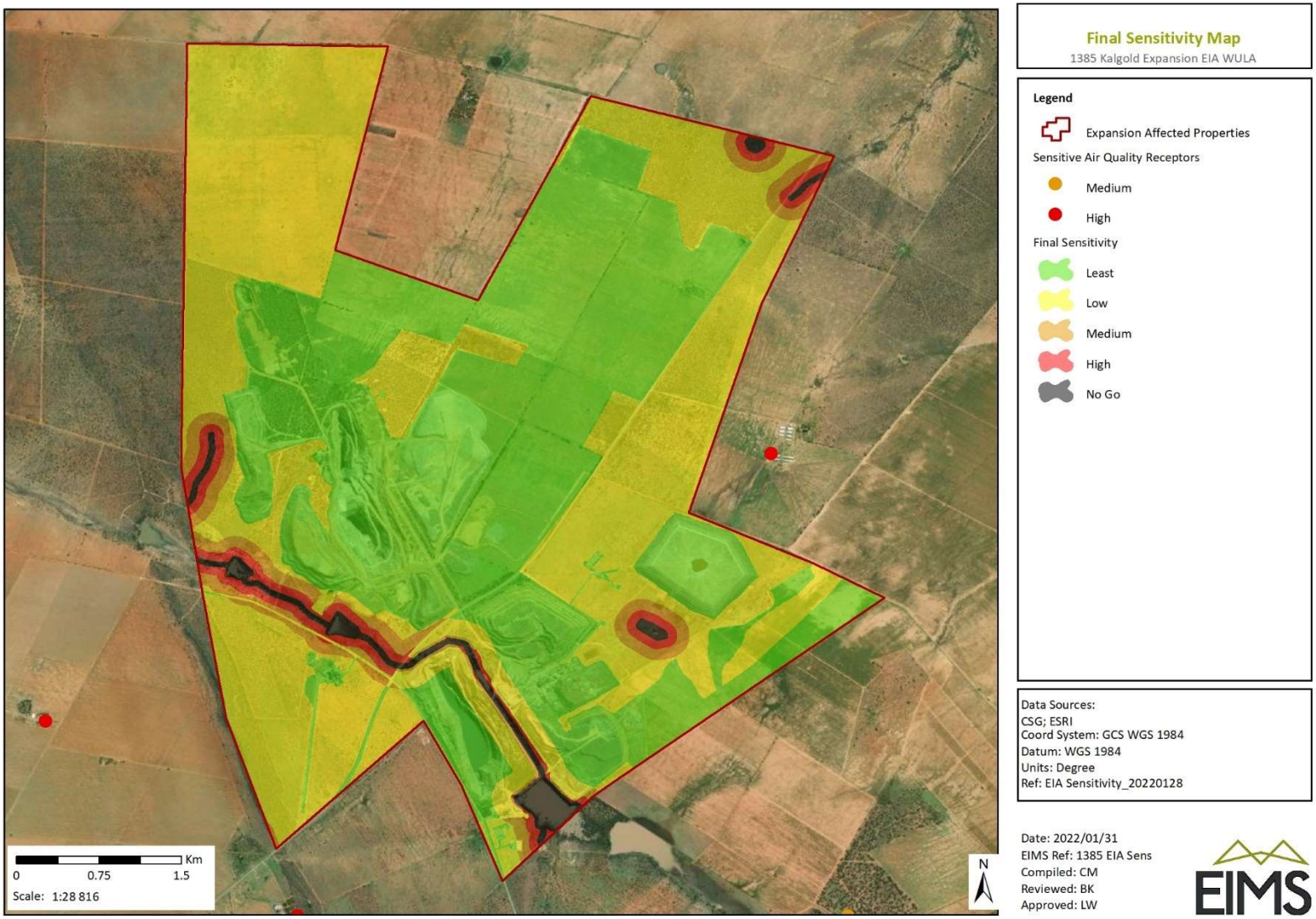

Figure 3: Sensitivity Map

2.3 RESOURCE DETAILS

The Kalgold operation is located within the Kraaipan Greenstone Belt, which forms part of the larger Amalia-Kraaipan Greenstone terrain. The Kraaipan Greenstone Belt consists of north trending linear belts of Archaean metavolcanic and metasedimentary rocks, separated by granitoid units. Mineralisation occurs in shallow dipping quartz veins, which occur in clusters or swarms, within the steeply dipping magnetite-chert banded iron formation. Disseminated sulphide mineralisation, dominated mostly by pyrite, occurs around and between the shallow dipping quartz vein swarms. The following rocks are associated with the ore body:

- The footwall consists of mafic schist and the hanging wall of greywacke, shale, sandstone, conglomerate and siltstone.
- The host rock is Banded Iron Formation (BIF) intercalated with shale. The greenstone formations are exposed in discontinuous outcrops of steeply dipping rocks which define three narrow, sub-parallel belts that strike approximately north-south (GCS, 2008).

The ore body mined at Kalgold occurs within the central belt which comprises banded iron formation (BIF), magnetite quartzite, chert, greywacke, shale and schist. The gold mineralization is hosted by steeply dipping BIF that are interbedded with schist, shale and greywacke. The greenstones are hosted within intrusive granite and gneiss. The Kraaipan greenstone is intruded by numerous east-west trending dykes. One such dyke cuts across the southern boundary of the mining lease area. The area is further characterised by abundant faults with displacement from a few metres to hundreds of metres.

2.4 MAIN MINING ACTIONS, ACTIVITIES AND PROCESSES OCCURRING ON SITE

Kalgold Mine first started operation during the mid-1990s where it focussed on mining of the D-Zone ore body. The economic ore body was mined out by a single open pit operation, along a strike length of 1300m and to a depth of approximately 290m below surface. The mining operation at D-Zone open Pit ceased in March 2009. Mining at Kalgold Mine has continued despite the operation cessation at D-Zone Open Pit. The A-Zone Open Pit, Windmill Open Pit and Watertank Open Pit are ongoing opencast operations.

The current opencast pits at Kalgold are therefore:

- The D-Zone pit – the largest ore body, which was mined as a single opencast operation along a strike length of 1300m to a depth of approximately 290m, from 1996 to 2009. Kalgold is currently depositing tailings into the D-Zone pit[1].
- The A-Zone open pit – commissioned in 2005 and is located immediately south of the Watertank North pit and is approximately 27ha in size.
- The Watertank and Windmill Zone – commissioned in 2008.

The open pit workings are accessed by ramps.

Extensive metallurgical test work conducted by The Council for Mineral Technology (Mintek) and detailed feasibility studies completed in 1995 have shown that the ores at Goldridge are non-refractory and that gold is economically extractable by conventional carbon-in-leach (CIL) technology, yielding high (+91%) recoveries. In addition, the ores in the oxidized portions of the deposits are amenable to gold extraction by the low-cost heap leach method, which recovers between 60 and 70% of the gold. The metallurgical extraction strategy designed for the Goldridge ores, involved the construction of a twin-process plant which incorporates a common batch crushing facility from which the product is fed either to the CIL process (for high grade and sulphidic ores) or the heap leach process (primarily for lower grade oxidised ores). The plant construction programme was designed so that the heap leach plant and pads were constructed first. The heap leach process started producing gold

[1] On 16 February 2009 as part of conditions of an EMPr approval, Kalgold was required to backfill all excavations with waste generated from the mine. In the EMPr appendment approval dated 4 May 2019, it was further indicated that no dump structures should be left on the surface (topsoil, overburden, waste rock, tailings and slime dams).

during the third quarter of 1996. Construction of the CIL portion of the plant commenced during May 1997 and the CIL plant came on stream during the first quarter of 1998. At full capacity, the current metallurgical complex can process up to 150 000 tons (90 000 tons CIL, 60 000 tons heap leach) of ore per month yielding approximately 2 500kg (80 000 ounces) of gold per year.

Heap leach and CIL are industrial mining processes to extract metals and other compounds form ore. Ore from the open pit is trucked to the run of mine (ROM) stockpile area. From here it is transferred via conveyor through pre-primary, primary, secondary, tertiary and quaternary crushing circuits that reduce the ore size from 1000mm to 6mm. This product is stockpiled before lime is added and the material is transported and stacked on the heap leach pads. The cyanide solutions are pumped onto the heaps via a network of drip pipes. These solutions percolate through the ore particles within the heaps. Exposed grains of gold are dissolved and carried in solution via a system of drainage channels at the base of the heap to the pregnant pond. The pregnant pond overflows to an emergency pond in the event of excess solution volumes flowing from the heaps e.g. after a high rainfall event. The pregnant liquor is then pumped through carbon solution columns in which the gold is loaded by absorption onto carbon granules. After gold extraction, the cyanide solutions are pumped to the barren pond, where the cyanide is replenished, and the solutions prepared for the next leaching cycle. The loaded carbon is diluted and gold recovered by electro-winning and smelting. The current heap leach facility is no longer operational. Occasionally the heap is loaded into the mills for processing. The historical heap leach and associated dams and ponds are lined with PVC.

The CIL circuit came on stream during March 1998 and shares a batch ore crushing facility with the heap leach operation. This process is used to treat higher-grade oxide and sulphide ores. Ore is taken to the tertiary crusher stage after which 12mm crush will be transferred to the mills where it is reduced to 80% minus 75µm. This pulp is then passed via a gravity concentrator in which the coarse gold is removed for smelting. The gravity tails are transferred to the CIL tanks where cyanide and carbon are added. A series of 6 tanks is in use, the first 2 for gold dissolution only and the following 4 for carbon-in-leach extraction. Loaded carbon from the CIL tanks is transferred to elution columns for gold extraction and electro-winning. Barren ore pulps from the CIL tanks are pumped to the slimes dam for disposal. Storage tanks for the heap leach are: Cyanide: 2 tanks at 29t each; Caustic soda: 1 tank at 29t; and Lime: 120t.

On 16 February 2009 as part of conditions of an EMPr approval, Kalgold was required to backfill all excavations with waste generated from the mine. In the EMPr appendment approval dated 4 May 2017, it was further indicated that no dump structures should be left on the surface (topsoil, overburden, waste rock, tailings and slime dams). The decision was made by Kalgold to utilise tailings for backfilling the pit in line with DMRE conditions, in this regard deposition to the existing TSF was suspended in July 2015.

2.5 KALGOLD EXPANSION PROJECT

The existing Harmony Kalgold operation wishes to expand its current production from the current production rate of 130 000 tons per month to 300 000 tons per month. A pre-feasibility study has been undertaken. The findings of the pre-feasibility study have concluded that the following new activities and expansions are proposed:

- The pit footprint will increase.
    - A-Zone. Total footprint will be 127 ha
    - Windmill south: 13 ha
- Larger dewatering pipelines (Internal diameter of approximately 350mm and peak throughput of approximately 150L/s).
- Extension to Spanover waste rock dump (expand the waste rock dump with another 140 ha)
- New ROM pad.
- New processing plant.
- Recommission old TSF at low deposition rate.

- Increase deposition rate at D-Zone pit.
- Install pipeline from Central dam to the new plant (Internal diameter of approximately 450mm and peak throughput of approximately 230L/s).
- Install a tailings pipeline from the new plant to old TSF and D-zone pit. (Pipelines for both deposition and also another for return water). (Internal diameter of approximately 350mm and peak throughput of approximately 150L/s).
- Install pipeline from old plant raw water pond to the new plant (D-Zone return water, Internal diameter of approximately 450mm and peak throughput of approximately 230L/s).
- Install two power lines from Ferndale substation to the new plant.
- Install a water treatment plant at the new plant.
- Relocate and expand the explosives magazine.
- Additional new road from the plant to the N18 (approximately 13m wide).
- New road from pit to ROM pad (approximately 28m wide).
- New road to Spanover waste rock dump extension
- Increase the size of the water pipe from A-Zone to Central dam. (Internal diameter of approximately 350mm and peak throughput of approximately 150L/s).
- Increase the size of the water pipe from Watertank pit to Central dam. (Internal diameter of approximately 350mm and peak throughput of approximately 150L/s).

The layout of the proposed infrastructure for the expansion project is presented in Figure 4. Following the findings of the EIA process undertaken, the mitigation measures associated with the proposed project are included in this EMPr.

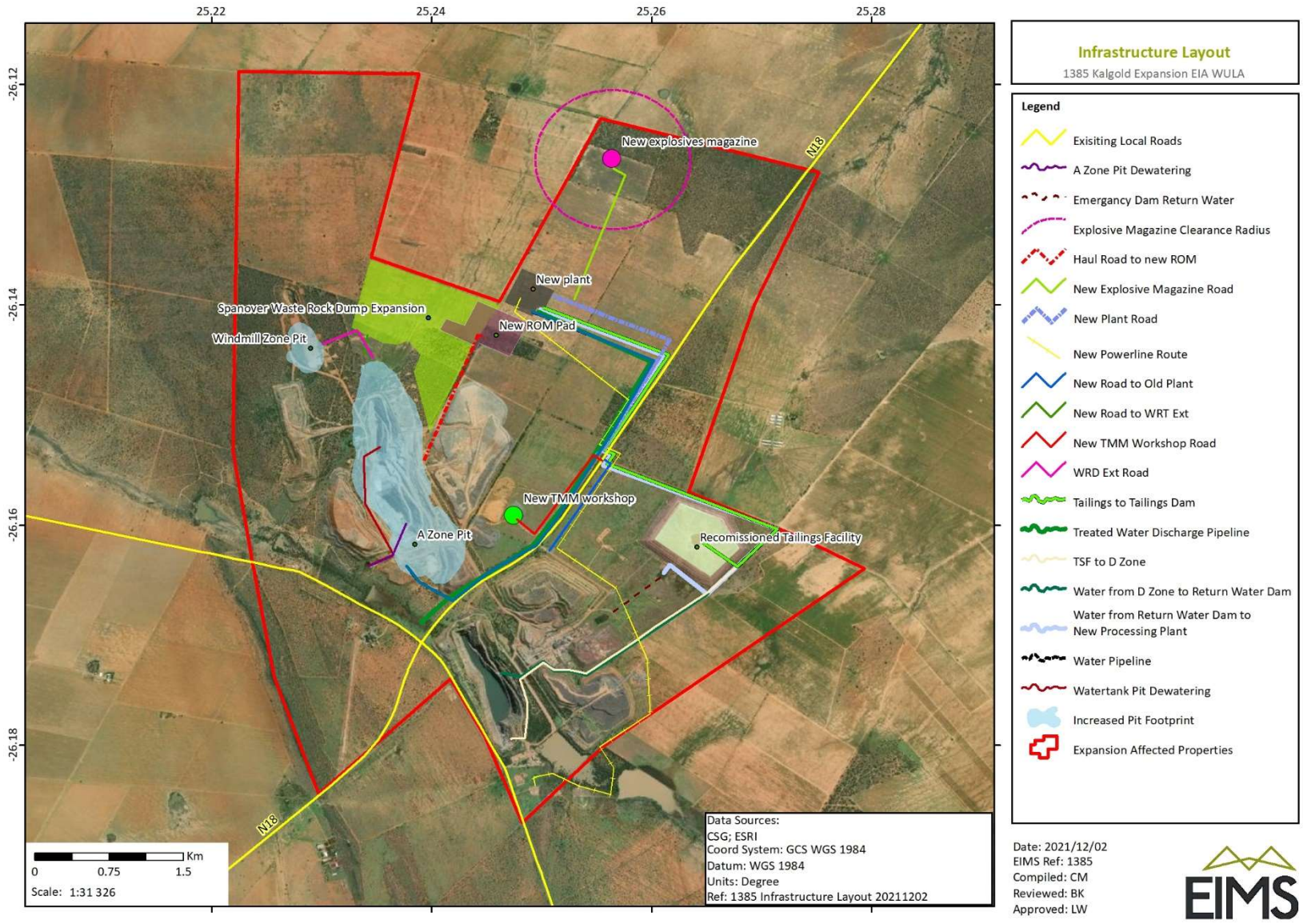

Figure 4: Kalgold Expansion Project

3 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 mine's 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.

3.1 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.

3.2 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.

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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."*

3.8 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.

4 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.

4.1 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 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. 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 mine;
- 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.

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 regular basis to ensure that it stays relevant and to capture new information.

The principles of engagement include:

- Transparency: open agenda and information exchange;
- Accountability: emphasis on governance;
- Legitimacy: recognise that stakeholders have valid needs and expectations; and
- Mutual respect: engage with dignity.

The Stakeholder Engagement, Philosophy, Policy, Process and Communication Plan (Pol007), clearly defines various stakeholders and provides the procedure for engagement, including:

- Plan:
    - Profile and map stakeholders'
    - Scope out the purpose of engagement;
    - Establish authority matrix; and
    - Determine appropriate engagement levels and methods.
- Prepare:
    - Identify who is to be engaged /mode and format/date;
    - Identify issues to be discussed;
    - Invite stakeholder to proposed engagement session;
    - Establish clear objectives and projected outcomes for the engagement session;

- Develop an agenda; and
- Present the proposed engagement objectives and tactics to the person taking responsibility for any/ all stakeholder engagement to obtain approval to conduct the engagement activity;

- Engage:
  - Meet with the identified Stakeholders at the planned location, date or issue appropriate communique;
  - Ensure that all matters are discussed and identified as "future matters;"
  - Identify and confirm any/all commitments made by either the engagement champion managing the engagement activity, or one of the engaged Stakeholders;
  - Ensure that timeline and expected outcomes are duly agreed upon by all parties;
- Document:
  - During any/all engagement with Stakeholders, comprehensive attendance registers ought to be recorded by the engaged facilitator; and
  - During any/all engagements with Stakeholders, comprehensive meeting notes ought to be recorded either by the engagement facilitator or colleague tasked with taking notes/minutes.

4.1.1 GRIEVANCE MECHANISM

Kalgold Mine shall establish a specific mechanism for dealing with grievances prior to construction commencing. 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 grievance mechanism is 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.

4.1.2 INTERNAL GRIEVANCE PROCEDURE

Kalgold Mine 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.

4.2 DOCUMENT CONTROL

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;
- Prevent unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

4.3 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. Kalgold Mine is therefore required to develop and maintain a procedure for the identification, storage, protection, retrieval, retention, and disposal of records. Records must be legible, identifiable, and traceable.

4.4 AUDITING AND REPORTING PROCEDURES

Kalgold Mine shall develop an 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 list below presents 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/levels/number 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 EM/EO/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.

4.5 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;

An environmental non-conformance and incident register must be prepared and maintained by the EM/EO/ECO throughout the lifespan of the mine 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 EM/EO/ECO in the non-conformance register. This register shall be maintained by the EM/EO/ECO and will be sent to the Holder/EM on a regular basis (at least quarterly), and the Holder/EM shall ensure that the responsible party takes the necessary corrective actions. Non-conformances may only be closed out in the register by the EM/EO/ECO upon confirmation that adequate corrective action has been taken. The register should be utilised to measure overall environmental performance.

4.6 ENVIRONMENTAL INCIDENTS

Harmony has historically been reporting environmental incidents by using a risk matrix to evaluate the severity regarding incidents recorded within the group. The risk matrix will continue to be used as the tool to assess the severity and risk of an incident. The risk matrix is provided in Table 6 below.

Table 6 Description of incidents and non-conformances for the purpose of the project

Severity Level	Mitigation Costs	Environmental Impact	Reputation Impact	Legal Impact
5	>R10 000 000	Irreversible damage on habitat or ecosystem	International condemnation	Potential director liability
4	>R10 000 000	Significant impact on habitat or ecosystem	National and international concern – NGO involvement	Very significant fines or prosecutions
3	<R 5 000 000	Longer-term impacts & ecosystem compromised	Adverse media attention – locally/nationally	Breach of legislation & likely consequences from regulator
2	<R 1 000 000	Moderate short-term effects but not affecting the eco-system function	Unresolved local complaints & possible local media attention	Minor breach of legislation
1	<R 500 000	localised affected area of low impact	Local complaints	No major breaches of legislation

The following incident reporting procedures shall apply:

- All environmental incidents shall be reported to the mine EM/EO who shall ensure that the appropriate rectification is undertaken;
- The mine EM/EO shall record all level 3 to 5 incidents and non-conformances in the incident register and advise on the appropriate measures and timeframes for corrective action;

- An incident report shall be completed by the party responsible for the incident for all medium and major incidents and the report shall be submitted to the Mine Manager and mine EM/EO within 5 calendar days of the incident; and
- The mine EM/EO shall investigate all major, 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 Harmony Regional Environmental manager (or similar) to advise on the potential reporting requirements in terms of the above.

4.7 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.

Kalgold Mine 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.

Kalgold Mine 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.

4.7.1 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 EM/EO and presented where possible by the Mine EM/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;

- Monthly Environmental Toolbox Talks: Environmental toolbox talks will be prepared by the Mine EM/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 EM/EO; and

- The Mine EM/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.

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

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 managed through the emergency response procedure.

5 COMPLIANCE MONITORING

5.1 RESPONSIBLE PERSONS

This section includes details as to the roles and responsibilities of responsible persons.

Table 7: Roles and responsibilities for environmental resources on site

Monitoring	Functional Requirement	Roles and Responsibilities	Monitoring Timeframes
Fall out dust	Dust sampling will be conducted as stipulated in Kalgold's Procedure for Fall-out Dust Monitoring, EPR No. 017, dated 17 July 2013.	Environmental Dept.	Monthly
Ambient Air quality monitoring	PM_{10} and $PM_{2.5}$ monitoring will be done as stipulated in the latest Air quality specialist assessment study attached. The ambient air quality monitoring procedure will be submitted to the DMR prior to commencing with construction activities.	Environmental Dept.	Continuously
Monitoring of Meteorological conditions	PM_{10} monitoring station should also record basic hourly average meteorological measurements of the following parameters: The following meteorological conditions will be monitored: • Wind direction. • Wind speed. • Temperature. • Rainfall. • Solar radiation/Surface heat flux.	Environmental Dept.	Continuously
Surface and groundwater quality	Surface water and groundwater quality monitoring will be conducted, with the objective to quantify the impact on surface water and groundwater quality associated with the operation. Surface and ground water quality monitoring will be conducted in accordance with the WUL requirements at the locations stipulated in the IWWMP. The water quality tests for Kalgold will be analysed by a SANAS certified laboratory. The results of the chemical and biological analysis will be captured in a database that will	Environmental Dept.	In accordance with the WUL and the requirements of this

Monitoring	Functional Requirement	Roles and Responsibilities	Monitoring Timeframes
	be made available to management. The water monitoring programme will be reviewed and revised on an annual basis so as to be in accordance with the Best Practice Guidelines G3: Water Monitoring System, dated July 2007 and submitted to DWS.		EMPr
Surface water quantity / use	Surface water use will be monitored and recorded on a monthly basis at the following locations (or as need arise from the water balance): • Water used at Plant (from Raw Water Dam), • Water abstracted from the open pits, • The quantity of water used for dust suppression, • The quantity of water pumped from the Crafford Dam to the Raw Water Dam, and • The quantity of water pumped from the CIL Return Dam to the Raw Water Dam. The water balance will be kept up to date using the water use data.	Environmental Dept.	Monthly
Groundwater use	Groundwater use will be monitored and recorded on a monthly basis at the following location (or as need arise from the water balance): • The quantity of water abstracted from the dewatering boreholes.	Environmental Dept.	Monthly
Biomonitoring	Biomonitoring needs to be undertaken upstream and downstream in the Morokwa Spruit.	Specialist.	As per the WUL requirements
GN 704	Undertake GN 704 compliance audits to verify the effectiveness of clean/affected water management.	Specialist	Once every 3 years or as per the WUL requirements
Mine Residue Deposits	Implement monitoring requirements as per Code of Practice for Mine Residue Deposits.	Specialist	As per COP defined frequencies
Rehabilitation	Rehabilitation will continuously be monitored to determine whether the practices are effective. A rehabilitation plan will be compiled and submitted to the DMR.	Rehabilitation specialist	As per rehabilitation plan
Alien invasive species	Alien invader plant species control program will be compiled and submitted to the DMR.	Environmental	Continuously

Monitoring	Functional Requirement	Roles and Responsibilities	Monitoring Timeframes
monitoring	The effectiveness of the alien invasive species eradication will continue to be monitored.	Department	
Post rehabilitation	Post rehabilitation monitoring to assess the effectiveness of rehabilitation measures, and the need for further intervention. • During and after rehabilitation, colonisation of the disturbed areas by plants species from the surrounding natural vegetation will be monitored. • Evidence of erosion or instability and identify any latent risks that may arise.	Rehabilitation specialist	For at least 3 years (12-month frequency) after rehabilitation has been completed.
Environmental noise	Environmental Noise Surveys will be conducted in three instances: • When a complaint is received on Noise generated by the Mine; • With any significant changes to the operation that is anticipated to influence the ambient noise level.	Environmental Department	Once every 3 years or as per the WUL requirements
Soil erosion monitoring	As per the Procedure for Monitoring and Control of Soil Erosion (EPR No. 023), the monitoring programme the following will be conducted: • Sheet erosion • Rill erosion (width and depth) • Gully erosion (width and depth) • Stream bank erosion Wind erosion (will be monitored with fall-out dust).	Environmental Department	Bi-annually
Topsoil monitoring	As per the Procedure for Concurrent Topsoil Management (EPR No. 015), the monitoring programme the following will be conducted: 1. Topsoil balance (removed vs. stockpiled / placed) 2. Depth of topsoil removed 3. Chemical and physical status of replaced soils 4. Chemical, physical and biological status of replaced soils, fertility sampling.	1. Mining contractor / surveyor/ environmental officer 2. Mining contractor / surveyor/ environmental officer	1. Quarterly 2. Quarterly

Monitoring	Functional Requirement	Roles and Responsibilities	Monitoring Timeframes
		3. Soil auger specialist 4. Specialist	3. Once every 2 years 4. Once every 2 years
Waste Management	As part of the monitoring programme the following will be conducted: • Volumes of all waste generated and disposed of will be monitored and measured on a monthly basis and records kept, and • All contractors and disposal agents, premises and disposal sites will be inspected annually to ensure that all environmental and legal requirements are adhered to.	Environmental Department	Monthly
Resource consumption	Monitor quantities of raw water, electricity and fuel usage. Monitoring program to reflect target consumption, develop trends on actual usage and identify areas of excessive usage.	Environmental Department	Monthly
Vibration and blasting	Develop a ground vibration and air blast monitoring program and submit to the DMR for approval. This program will be reviewed every two years. The blast monitoring program will also reflect the blasting schedule.	Blasting specialist/	During blasting. As per blasting schedule.
Pit stability monitoring	Monitoring of the pit walls, rate of displacements and documentation of failures should be performed by the Kalgold Geotechnical Officer.	Geotechnical Officer	Continuously
Environmental Audits	Environmental audits to be undertaken to assess compliance with the conditions of the EMP commitments, and to furthermore identify any environmental incidents or potential risk that may arise.	Environmental Department	Internal – Annually & External – Once every 2 years
Environmental Legal Compliance Audits	Undertake environmental legal compliance audits to verify compliance to all applicable authorisations and all other legislation as applicable to the mining operation.	Legal Technical Specialist	Annually

5.2 METHOD OF MONITORING IMPACT MANAGEMENT ACTIONS

Kalgold Mine is required to develop an auditing and reporting procedure. 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. 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. Kalgold Mine 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 8: 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 Department	EMP/EMPr's	Kalgold	As Required	Environmental Dept.	Report Review	As Required	Mine Management	Report	As Required
	IWULA	Kalgold	As Required	Environmental Dept.	Report Review	As Required	Mine Management	Board Report	As Required
	NEMA EA	Kalgold	As Required	Environmental Dept.	Report Review	As Required	Mine Management	Report	As Required
	Other Licences, Permits or Approvals	Kalgold	As Required	Environmental Dept.	Report Review	As Required	Mine Management	Report	As Required
Environmental Control Officer / Environmental Manager	EMP/EMPr's	External ECO / EM	-	Environmental Dept.	Sample Audit	Quarterly	Environmental Manager	Audit Report	Quarterly
	IWULA	External ECO/ EM	-	Environmental Dept.	Sample Audit	Quarterly	Environmental Manager	Audit Report	Quarterly
	NEMA EA	External ECO / EM	-	Environmental Dept.	Sample Audit	Quarterly	Environmental Manager	Audit Report	As Required
	Other Licences, Permits or Approvals	External ECO / EM	-	Environmental Dept.	Sample Audit	Quarterly	Environmental Manager	Audit Report	As Required
	IWULA	Auditor	-	Environmental Dept.	Audit	As per license	Environmental Manager	Audit Report	Annual

Resource	Document	Implementation		Checking/Monitoring/Audit			Reporting		
		Responsible Party	Frequency	Responsible Party	Type	Frequency	To	Type	Frequency
Independent Environmental Auditor						requirements			
	NEMA EA	Auditor	-	Environmental Dept.	Audit	As per ROD/EA requirements	Environmental Manager	Audit Report	Annual
	Other Licences, Permits or Approvals	Auditor	-	Environmental Dept.	Audit	As Per Licence		Audit Report	As Per Licence

5.3 MECHANISMS FOR MONITORING COMPLIANCE

Table 9 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 9: 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	Weekly inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Environmental Specialist	As Required
		Site Inspections and Audits	Environmental Practitioner	Weekly inspections
				Monthly Reports
			Independent Environmental Auditor	As per regulated requirements
Mining Operations	All Impacts Identified during the EIA	Site Inspections and checklists	Environmental Practitioner	Regular inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Environmental Specialist	As Required
		Site Inspections and Audits	Environmental Practitioner	Weekly inspections
				Monthly 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	As per regulated requirements
Decommissioning Activities	All Impacts Identified during the EIA	Site Inspections and checklists	Environmental Practitioner	Regular 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	As per regulated requirements
Rehabilitation	All Impacts Identified during the EIA	Report Review and Development of Action Plans for Corrective Action	Environmental Specialist	As Required
		Site Inspections and Audits	Environmental Practitioner	Weekly inspections
				Monthly Reports
			Independent Environmental Auditor	As per regulated requirements
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 Practitioner	Bi-Monthly inspections

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementation
				Bi-Monthly Reports
			Independent Environmental Auditor	As per regulated requirements

5.4 THE EMPR AUDITING

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 Environmental Practitioner 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.

5.5 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. 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 Kalgold Mine 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 affected with written approval from the competent authority and in accordance with the then-in-effect relevant legal processes.

6 IMPACT MANAGEMENT OUTCOMES

This section of the EMPr provides the impact management outcomes identified for Kalgold Mine and the proposed Kalgold expansion project. The impact management objectives, including the standard to be achieved, are summarised in Table 10 below.

Table 10: Impact Management Outcomes

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
1.	• **General Surface Rehabilitation** • **Mine area site preparation** • **Permanent site office Infrastructure** • **Water management Infrastructure construction** • **Stockpiles**	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
2.	• **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation**	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
	• **Permanent site office Infrastructure** • **Storm water management** • **Water management Infrastructure construction** • **Stockpiles**					
3.	• **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Powerline** • **Pipelines** • **Permanent site office Infrastructure**	Erosion	Soils	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures) Limiting areas to be cleared.	Principles of the Conservations of Agricultural Resources Act (CARA)

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Storm water management** • **Water management Infrastructure construction** • **Stockpiles**					
4.	• **Infrastructure removal** • **Mine area site preparation** • **Powerline** • **Post Closure Monitoring and Maintenance** • **Permanent site office Infrastructure** • **Storm water management** • **Pipelines** • **Processing Plant** • **Stockpiles** • **Water management Infrastructure construction**	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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
5.	• **General decommissioning activities** • **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Powerline construction** • **Pipelines** • **Processing Plant** • **Re-vegetation** • **Permanent site office Infrastructure** • **Storm water management** • **Water management**	Soil Pollution/Contamination	Soils	• Construction • Operation • Decommissioning • Rehabilitation and Closure	• Avoid through preventative measures (e.g. bunding, spill kits) • Remedy through clean-up and waste disposal • Modify through soil treatment if required	• Hazardous Substances Act • NWA • NEMA Duty of Care • NEMWA • Incident reporting procedures • DWS minimum standards for waste disposal

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	Infrastructure construction • **Stockpiles**					
6.	• **General Surface Rehabilitation** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Permanent site office Infrastructure** • **Storm water management** • **Stockpiles** • **Water management Infrastructure construction**	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
7.	• **General Surface Rehabilitation** • **Maintenance and operation of site infrastructure and facilities**	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.	• CARA • Rehabilitation and Closure Plan

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Mine area site preparation** • **Permanent site office Infrastructure** • **Storm water management** • **Stockpiles** • **Tailings storage facility** • **Water management Infrastructure construction**				fertilizer and Organic Matter applications)	
8.	• **Infrastructure removal** • **Mine area site preparation** • **Permanent site office Infrastructure** • **Water management Infrastructure construction** • **Stockpiles** • **Pipelines**	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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Tailings Storage facilities**					
9.	• **General Surface Rehabilitation** • **Infrastructure removal** • **Mine area site preparation** • **Permanent site office Infrastructure** • **Powerlines** • **Pipelines** • **Tailings Storage facilities** • **Storm water management** • **Processing plant**	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
	• **Water management Infrastructure construction** • **Stockpiles.**					
10.	• **General Surface Rehabilitation** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Powerline** • **Permanent site office Infrastructure** • **Site visits** • **Storm water management** • **Water management Infrastructure construction**	Disturbance of wildlife	Biodiversity	• 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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
11.	• **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Permanent site office Infrastructure** • **Storm water management** • **Water management Infrastructure construction**	Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, rock chips, vibration and poaching).	Biodiversity	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Avoid and control through implementation of EMPr mitigation measures (e.g. bird flappers)	NEMBA
12.	• **Permanent site office Infrastructure** • **Powerline**	Powerline collisions and electrocutions	Biodiversity	• Operation	• Control through implementation of EMPr mitigation measures	• NEMBA
13.	• **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Permanent site office Infrastructure**	Destruction, further loss and fragmentation of the vegetation community	Biodiversity	• Planning and Design • Construction • Operation • Decommissioning • Rehabilitation and Closure	• Control through implementation of EMPr mitigation measures	• NEMBA

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Storm water management**					
14.	• **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation and new infrastructure** • **Post Closure Monitoring and Maintenance** • **Permanent site office Infrastructure** • **Powerline** • **Site visits** • **Storm water management** • **Water management Infrastructure construction**	Introduction/ invasion by alien (non-native) species	Biodiversity	• 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
15.	• **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Re-vegetation** • **Permanent site office Infrastructure** • **Processing plant** • **Water management Infrastructure construction** • **Tailing's storage facilities** • **Stockpiles** • **Processing Plant**	Pollution of surface water resources/decreased water quality (Impacts on the watercourses associated Continuation of TSF, construction of pipelines and powerlines)	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
16.	• **Mine area site preparation Tailing's storage facilities** • **Stockpiles.**	Changes in Hillslope Hydrology	Surface Water	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Avoid through implementation of preventative measures (e.g. stripping and stockpiling guideline, storm water management plans)	• NWA • GN704 • NEMA Duty of Care • NEMA Polluter Pays Principle

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
						• DWS best practice guidelines
17.	• **Maintenance and operation of site infrastructure and facilities** • **Water management Infrastructure construction** • **Stockpiles.**	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.
18.	• **Mine area site preparation Tailing's storage facilities** • **Stockpiles** • **Tailing Storage facilities**	Flood Risk (River)	Surface Water	•	Avoid and control through implementation of preventative measures (e.g. define floodlines)	• NWA • GN704 • NEMA Duty of Care • NEMA Polluter Pays Principle • DWS best practice guidelines.
19.	• **General Surface Rehabilitation** • **Storm water management**	Dewatering of groundwater aquifers and decrease in groundwater quantity/ availability.	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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
20.	• **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 progressive rehabilitation) • Remedy through water treatment when required	• NWA • GN704 • NEMA Duty of Care • NEMA Polluter Pays Principle • DWS best practice guidelines • Rehabilitation and closure plan • AMD mitigation Strategy
21.	• **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Re-vegetation** • **Permanent site office Infrastructure**	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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
22.	• **Maintenance and operation of site infrastructure and facilities** • **Water management Infrastructure construction** • **Tailings Storage facilities** • **Stockpiles**	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 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
23.	• **Maintenance and operation of site infrastructure and facilities** • **Permanent site office Infrastructure** • **Water management Infrastructure construction** • **Tailings Storage facilities** • **Stockpiles**	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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
24.	• **Post Closure Monitoring and Maintenance**	Decant from workings	Environmental Pollution	Rehabilitation and Closure	• Avoid through implementation of suitable progressive rehabilitation and soil management • Control/Remedy through interception of decant and treatment of polluted water where required	• MPRDA • NWA • NEMA Duty of Care • NEMA Polluter Pays Principle • NEMWA • GN704 • DWS best practice guidelines • Rehabilitation and closure plan
25.	• **General decommissioning activities** • **Infrastructure removal** • **Mining activities**	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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
						• WS minimum standards for waste disposal
26.	• **General decommissioning activities** • **General Surface Rehabilitation** • **Infrastructure removal** • **Mining activities** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Powerline** • **Pipelines** • **Re-vegetation** • **Permanent site office Infrastructure**	Hydrocarbon spills/ contamination	Environmental Pollution	• Planning and Design • Construction • Operation • Decommissioning • Rehabilitation and Closure	• Avoid through preventative measures (e.g. bunding, spill kits) • Remedy through clean-up and waste disposal • Modify through soil treatment if required	• Hazardous Substances Act • NWA • MSDS • OHSA • MHSA • NEMA Duty of Care • NEMWA • Incident reporting procedures • DWS minimum standards for waste disposal

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Storm water management** • **Water management Infrastructure construction**					
27.	• **General decommissioning activities** • **Maintenance and operation of site infrastructure and facilities** • **Mining activities** • **Permanent site office Infrastructure**	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
28.	• **Mining activities**	Potential impact on heritage resources	Heritage	Operation	• Avoid and control through implementation of preventative measures (e.g. chance find procedure)	• NEMA • MPRDA • NHRA • SAHRA permitting requirements
29.	• **Mine area site preparation** • **Permanent site office Infrastructure**	Destruction/ damage of palaeontological resources	Heritage	• Construction • Operation • Rehabilitation and Closure	• Avoid and control through implementation of preventative measures (e.g.	• NEMA • MPRDA • NHRA

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Construction of expansion infrastructure** • **Water management Infrastructure construction** • **Mining Operations**				chance find procedure)	• SAHRA permitting requirements
30.	• **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
31.	• **General Construction Management** • **General Mine Management** • **Mine area site preparation**	Project induced in-migration	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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
32.	• **General Construction Management** • **General Mine Management**	Nuisance factors	Social	• Construction • Operation • Decommissioning • Rehabilitation and Closure	• Modify and control through mitigation measures (e.g. grievance mechanism)	• Constitution of South Africa
33.	• **General Construction Management** • **General Mine Management** • **Maintenance and operation of site infrastructure and facilities**	Termination of employment	Social	• Construction • Operation • Decommissioning • Rehabilitation and Closure	• Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct)	• Labour Act • Basic Conditions of Employment Act • SLP Commitments • Code of Conduct • Livelihood restoration plan
34.	• **General Construction Management** • **General Mine Management**	Economic growth	Socio-Economic	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Maximise through optimisation of economic growth opportunities	SLP Commitments
35.	• **General Construction Management** • **General Mine Management**	Education, Skills Development and Training	Socio-Economic	• Planning and Design • Construction • Operation • Decommissioning	Maximise skills development and training through implementation of SLP	SLP Commitments

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
				• Rehabilitation and Closure		
36.	• **General Construction Management** • **General decommissioning activities** • **General Mine Management** • **Maintenance and operation of site infrastructure and facilities** • **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
37.	• **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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
38.	• **General Construction Management** • **General decommissioning activities** • **General Mine Management** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Re-vegetation** • **Permanent site office Infrastructure** • **Water management Infrastructure construction**	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
39.	• **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation**	Fire and explosion hazard	Health and Safety	• Construction • Operation • Rehabilitation and Closure	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)

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Permanent site office Infrastructure** • **Mining operations**					criteria for safe blasting for ground vibration and recommendations on air blast
40.	• **Mine area site preparation** • **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
41.	• **Mine area site preparation** • **Permanent site office Infrastructure** • **Water management Infrastructure construction**	Increased traffic	Transportation, Infrastructure and Traffic	• Construction • Operation	Avoid and control through implementation of EMPr mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	• National Road Traffic Act • OHSA • MHSA
42.	• **Mine area site preparation**	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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
43.	• **General Surface Rehabilitation** • **Mine area site preparation** • **Permanent site office Infrastructure** • **Powerline** • **Storm water management** • **Processing plant** • **Water management Infrastructure construction**	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
44.	• **General decommissioning activities** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Re-vegetation**	Human health from increased pollutant concentrations	Air Quality	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Avoid and control through implementation of EMPr mitigation measures (e.g. Dust suppression, air quality management plan)	NEMAQA

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Permanent site office Infrastructure** • **Water management Infrastructure construction** • **General Surface Rehabilitation** • **Storm water management**					
45.	• **Drilling monitoring boreholes** • **General decommissioning activities** • **General Surface Rehabilitation** • **Infrastructure removal** • **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Re-vegetation**	Increased nuisance dust fall rates (Dust)	Air Quality	• Planning and Design • Construction • Operation • Decommissioning • Rehabilitation and Closure	• Avoid through preventative measures (e.g. speed limit enforcement) • Control through implementation of EMPr mitigation measures (e.g. dust suppression)	• Road Traffic Act • NEMAQA • Dust regulations

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Permanent site office Infrastructure** • **Storm water management** • **Water management Infrastructure construction**					
46.	• **Drilling monitoring boreholes** • **General decommissioning activities** • **General Surface Rehabilitation** • **Infrastructure removal** • **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Re-vegetation** • **Permanent site office Infrastructure**	Vegetation health from increased dust fall rates and pollutant concentrations	Air Quality	• Planning and Design • Construction • Operation • Decommissioning • Rehabilitation and Closure	• Avoid through preventative measures (e.g. speed limit enforcement) • Control through implementation of EMPr mitigation measures (e.g. dust suppression)	• Road Traffic Act • NEMAQA • Dust regulations

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
	• **Storm water management** • **Water management Infrastructure construction**					
47.	• **Drilling monitoring boreholes** • **General decommissioning activities** • **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Re-vegetation** • **Permanent site office Infrastructure** • **Storm water management** • **Processing Plant**	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
	• **Water management Infrastructure construction**					
48.	• **Mining Operations**	Ground Vibration and human perception	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
49.	• **Mining Operations**	Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes)	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

#	Activity	Potential Impact	Aspects	Phase	Objective / Outcome	Standard to be Achieved
						recommendations on air blast • Blast Procedures • Emergency response procedure

7 IMPACT MANAGEMENT ACTIONS: MANAGEMENT PROGRAMME

Table 11 below provides measures for management of the environmental aspects that are impacted on during the different phases of the project.

Table 11: 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	• Continue implementation of operational procedures covering the relevant commitments as per the EMP report, and as a minimum the risks and mitigation measures as identified within the EMPr risk table as well as covering the requirements as per relevant Environmental, Health and Safety legislation. • Ensure that relevant staff and contractors are trained on the relevant procedures. • Develop and implement an Environmental Training Program that covers both site-specific requirements and general awareness training. • Maintain all records relevant to this EMPr. • Keep all environmental monitoring reports within a central location, easily retrievable and protected against damage. • Undertake regular internal compliance environmental audits (biannual) to verify compliance against the commitments of the EMP report as well as all environmental operational procedures. • Implement an incident reporting and corrective action procedure that must be used by all staff and onsite contractors.	Shall adhere to the EMPr 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
			The mine must have a copy of this EMPr at the point of use and should be briefed by the Mine Environmental Representative with regards to the use and implementation of the EMPr.		
			The EMPr must be made binding on all sub-contractors (if utilised) operating on behalf of the Mining Right Holder.		
			The mine shall ensure that all sub-contractors (if utilised) abide by the requirements of the EMPr.		
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 maintain 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/ awareness to ensure effective response; and • Periodic review and revision, as necessary, to reflect changing conditions. • Conduct regular emergency drills	Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
	• Construction • Operation	No direct physical disturbance	The necessary provisions (financial, resources, materials) shall be made available to ensure compliance with the Emergency Preparedness and Response Plan.	Shall adhere to the ESMS developed to ensure compliance	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	• Decommissioning Rehabilitation and Closure			with the regulatory framework	
Health and Safety					
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.	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
			Speed limits on the road to the mine must be enforced.		
			The mine shall provide appropriate Personal Protective Equipment (PPE) to employees wherever required and in accordance with the risks associated with their activities.		
			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.		
			The mine shall continue implementing the safety reporting procedure to ensure that all accidents and incidents (safety and environmental) are recorded and reported to the Mine manager and Mine Environmental Practitioner.		
			The mine shall maintain 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.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			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).		
Site Access and Security					
General Mine Management	• Construction • Operation • Decommissioning • Rehabilitation and Closure	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 so as to minimise excessive environmental disturbance to the soil and vegetation off site, and to minimise disruption of traffic.	Applicable Legislation	Throughout LoM
	• Construction • Operation	The creation of roads can have a significant and relatively widespread impact, especially as roads create corridors	Any new access (if required and withing the confines of relevant environmental legislation) shall first be approved by the Environmental Manager and Environmental Officer (method statement may be required) and should be provided with erosion and silt pollution prevention measures where required.	Applicable Legislation	Throughout LoM
	• 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

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
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).	NEMA, Harmony site access procedures	Throughout LoM
Social and Socio-Economic					
General Mine Management	• Planning • Construction • Operation • Decommissioning • Rehabilitation and Closure	No direct physical disturbance	To mitigate against potential social impacts due to water quality and quantity: • Conduct yearly water meetings where an independent water specialist addresses the farmers and answers their questions. • Make water results available upon request to the neighbouring farmers/landowners. • Adhere to mitigation measures by the relevant specialists.	Adherence to corporate policies (e.g.: SLP) and compliance with legislation including Labour Act and Employment Act SLP commitments	Throughout LoM
			To mitigate against potential social impacts due to vibrations caused by blasting: • Create an asset and infrastructure baseline of dams and buildings within a 10km radius from the mine. Provide one copy to owner of infrastructure and one copy to the mine. • Create a blasting schedule to share with CLF to allow people to prepare for the impact. Can be shared electronically. • Monitor grievances voiced by adjacent farmers. • Compensate affected parties in case of proof of damage from blasting		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			To mitigate against potential social impacts due to Dust: • Adhere to recommendations made by Air Quality specialist. • Minimise dust creating activities on exceptionally windy days. • Educate work force on precautionary measures such as wearing masks.		
			To mitigate against potential social impacts on relationship between mine and communities • Mine to create community liaison forum involving all stakeholders within a 10km radius. • Continue involvement with existing forums such as LED forum and Agri Mareetsane and expand involvement to other key stakeholders. • Establish and communicate a grievance mechanism.		
			To mitigate against potential Economic impacts: • Align procurement with company strategy • Employ local labour from closest communities for low skilled opportunities. • Utilise Community skills and SMME Development Centre near Kraaipan. • Involve community in updates of the SLP • Ensure that the updated SLP (2023- 2028) takes the increased profits into account due to the extension and adjusts the social funds in line with the targets of the Mining Charter of 2018. • Prioritise immediate adjacent communities of RLM for additional funds allocated to the SLP • Monitor and manage the social contribution of multinational suppliers (in-house as well as suppliers to contractor and direct service providers).		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• As per the SLP (section 6) develop mechanisms to assist employees, prior to retrenchment date in the transition phase after closure of the operations, including portable skilled development programmes during the operational phase of the mine, providing assistance in accessing available and suitable jobs with other local mines or companies etc. • Focus on non-core related local supply links during the operational phases of the mine to facilitate easier transitioning of local suppliers to other industries		
			To mitigate against project induced migration: • Comply with company HR and recruitment policies.		
			To mitigate against crime and security concerns from construction activities: • Increase security in terms of entry into mining area. • Liaise with and support local community policing groups / forums to aid proactive policing.		
			The mine shall continue implementing the detailed grievance mechanism for communities to lodge concerns, suggestions and grievances which can be dealt with by the Project in a timely manner. The grievance mechanism aims 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;		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• 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 community must be informed that they can complain about unsafe behaviour through the grievance mechanism.		
	• Planning • Construction • Operation • Decommissioning • Rehabilitation and Closure	No direct physical disturbance	A complaints register must be maintained by the mine to log grievances from landowners, communities, occupants and other Interested and Affected Parties, and response to such grievances. 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), • Agreed corrective action, • Responsible party for corrective action, • 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	Throughout LoM
			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.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Operation	No direct physical disturbance	Where retrenchments are unavoidable, they should be managed humanely according to legislative requirements.		When retrenchments are required
Site Establishment					
• **Construction camp sewage management** • **Dust suppression** • **Earthworks** • **Fencing** • **Fuel Storage and refuelling** • **Hazardous substances management** • **Site security** • **Soil Management** • **Truck and heavy machinery operation** • **Utilization of portable toilets and**	Construction	Construction impacts are temporary in nature and have a limited extent but may include significant impacts	The physical footprint of any construction or site camp shall be minimised and vegetation clearance should be kept to the minimum required area. Topsoil shall be handled in accordance with the soil management principles presented in this EMPr and the soil management guide developed for the Mine.	• Shall adhere to the ESMS developed to ensure compliance with the regulatory framework • OHSA • MHSA • NEMA • MPRDA	Throughout construction
			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 Kalgold Mine.		
			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.		
			The waste storage area must continue to provide for appropriate and adequate waste storage and waste		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
generation of sewage • **Vegetation clearance**			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 filters, soil from spills etc.) and the waste shall be contained within closed containers or roofed lined areas to prevent the possibility of spillages.		
			All fuel storage areas shall be bunded to contain at least 110 % of the combined volume or largest vessel stored and will comply with the relevant safety regulations. Fuel storage areas may not be located within 100m of the 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 result 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 etc.) and that provide for spill prevention and containment. It is recommended that a dedicated, bunded		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			and fenced Hazardous Storage Area is provided within the construction camp for this purpose.		
			Site camps/construction camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and this equipment must be readily accessible.		
			No open fires shall be permitted within the site camp/construction camp, except where approved by the responsible Mine Environmental Practitioner and Mine Environmental Specialist 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 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**	• 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	• Undertake a survey of Camel Thorn trees within areas of future development and obtain a permit for the removal/destruction of Camel Thorn Trees prior to undertaking such activities. • Removal of exotic/invasive species during the wet season; • Source seedlings from an off-site nursery that will serve to propagate indigenous and rare/protected species to restore disturbed area immediately after activity has ceased. • Avoid construction/development in sensitive areas as far as possible. • Conduct an ecological audit;	• 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

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
infrastructure and facilities • **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Permanent site office Infrastructure** • **Powerline** • **Site visits** • **Storm water management** • **Water management** • **Infrastructure construction**			• Establish an appropriate offset area with formal conservation status that could be used for eco-tourism; and • Rehabilitation with indigenous species.		
			• A pre-construction survey of mining footprint for the extension areas should be carried out to identify endangered floral species that will be directly disturbed and to relocate flora if required. • It is recommended that the extension areas to be mined be specifically demarcated so that during the construction phase and operational phase, only the demarcated areas be impacted upon. All working areas inside the new pit must be clearly demarcated from surrounding natural areas and no persons should be allowed to enter these areas under any circumstance. • A pre-construction survey of all extension areas (pits, WRD, haul road) footprints should be carried out to identify endangered floral species that will be directly disturbed and to relocate flora if required. • It is recommended that the extension areas to be mined be specifically demarcated so that during the construction phase and operational phase, only the demarcated areas be impacted upon. All working areas inside the new pit must be clearly demarcated from surrounding natural areas and no persons should be allowed to enter these areas under any circumstance. • Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. • All construction/operational and access must make use of the existing roads. Access (footpaths and roads) within	• 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
			and around the area need to be strictly controlled in order to prevent the degradation of the surrounding habitats. Footpaths and roads need to be monitored for litter and erosion depending on the amount of traffic. The creation of new footpaths must be limited. • Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded • All individual of the nationally protected trees that were observed needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Preferably, the trees/plants can be relocated within the property without a permit or otherwise left unharmed. High visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. Tree tags can be put up to assist with the identification and education. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species. • Compacted areas must be tilled, to ensure the surface ground gets loosened to assist with rehabilitation		
			• Kalgold will establish and implement an alien and invasive eradication programme to eradicate existing invader plants and to prevent new invasions during ongoing opencast mining operation and decommissioning.	• NEMBA • TOPS regulations • National Forests Act	Prior to commencement of activities or disturbance

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Waste rock dumps and soil stockpiles should, as far as practically possible, be maintained weed free. No broad-leafed plants considered as weeds in terms of the Conservation of Agricultural Resources Act (Act 43 of 1998), or those plants regarded as a nuisance should not be allowed in the area. Special mention is made of Melia Azedarach and Opuntia spp.	• DAFF permitting requirements	
			• It should be made an offence for any staff to take/bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	NEMA	Throughout LoM
			• Set rehabilitation objectives develop an effective and detailed rehabilitation plan, • Kalgold is negotiating with contractors and the local community for the crushing of waste rock for aggregate, a process that will remove the waste rock and leave only the footprint for rehabilitation.	• NEMA • CARA	
			• Development within the high sensitivity areas need to be limited. Clearing of the low sensitivity areas is permitted. The areas to be developed/mined must be specifically demarcated to prevent movement into highly sensitive surrounding environments. • Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. • Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited	• NEMBA • TOPS regulations • National Forests Act • DAFF permitting requirements	

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. Buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species. • All structure footprints to be rehabilitated and landscaped after construction is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type. • Progressive rehabilitation and mining will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank Any indigenous woody material removed during construction can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion. • A spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. • Keep the surface and sub-surface water as well as storm water away that may run off from the dumps from the low laying areas, such as wetlands as well as the surrounding areas, from leaving the project area in an uncontrolled manner. • Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair. • Monitor Storm Water run-off and Discharge Water Quality. • It should be made an offence for any staff to /take bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants. Signs must be put up to enforce this. • Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines. This includes on-going maintenance of such topsoil piles so that they can be utilised during decommissioning phases and re-vegetation. All removed soil and material must not be stockpiled within the medium/high sensitivity areas. Stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Appropriate speed reduction measures (i.e. humps), enforcing of speed limits via signs and mitre drains must be constructed along the access roads (every three metres of elevation) in order to slow the flow of water run-off from the road surface, if this does not already exist. Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds. • A fire management plan needs to be complied and implemented to restrict the impact fire might have on the rehabilitated areas. • Aquatic monitoring must be done, this includes ground water and surface water to ensure that that acid mine drainage is detected and managed. A management plan must be compiled for acid mine drainage. • Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual that may be removed, damaged, or destroyed due to the development. Hi visibility flags must be placed near any threatened/protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. • A fire management plan needs to be complied and implemented to restrict the impact fire might have on the rehabilitated areas.		
			All alien vegetation occurring on the site must be controlled in accordance with NEMBA. The following mitigation measures should be adhered to;	• NEMA • NEMBA	

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Compilation of and implementation of an alien vegetation management plan. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. • Temporary storage of domestic waste shall be in covered waste skips; and • A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of Species of Conservation Concern (SCCs).	• CARA • Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	
			Erosion will lead to the loss of vegetation, the removal/ relocation of the topsoil and the destruction of habitat. The following mitigation measures should therefore be considered: • Appropriate speed reduction measures (i.e. humps), enforcing of speed limits and mitre drains must be constructed along the access roads (every three metres of elevation) in order to slow the flow of water run-off from the road surface, if this does not already exist; • Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface (with “dirty water”) and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds;	• NEMA • NEMBA • CARA • 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
			• Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. • A storm water management plan must be compiled and implemented. • A row of indigenous trees may be planted to act as a wind breaker and to reduce the overall levels of dust and erosion. The location of the trees must be determined after dust monitoring has been done.		
Fauna					
• **Drilling monitoring boreholes** • **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation**	• 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	• Establish a fauna relocation program. • Monitoring of protected mammal, bird and herpetofauna species.	• NEMBA • TOPS Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
			• A search and rescue plan needs to be implemented. The project area should be walked prior to the activity taking place, disturbing fauna so they will move off. Should any Species of Conservation Concern not move out of the area, a suitably qualified specialist must be consulted to advise on the correct actions to be taken. The ECO should evaluate and determine the need for an appropriate specialist to advise on the rescue, if required. • No trapping, killing, or poisoning of any wildlife is to be allowed. This must be included in a contractor toolbox talk.		
		Impacts on fauna has the potential to be a relatively high significance	• The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into highly sensitive areas and the surrounding environments. Signs must be put up to enforce this.	• NEMA • NEMBA • CARA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
• **Post Closure Monitoring and Maintenance** • **Permanent site office Infrastructure** • **Powerline** • **Site visits** • **Storm water management** • **Water management** • **Infrastructure construction** • **Pipelines**		especially where threatened or protected species are impacted upon.	• Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals. • Signs must be put up to enforce no trapping, killing, or poisoning of any wildlife. • The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (yellow) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. Signs must be put up to enforce this. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons. Driving on access roads close to highly sensitive areas at night should be prevented in order to reduce or prevent wildlife road mortalities which occur more frequently during this period; • Surface and ground water monitoring/analysis must be done in accordance with the conditions/ requirements of the approved Water Use Licence. • Based on the observed avifaunal species, bird strikes, and electrocutions will be a highly likely, bird flappers must be placed where the transmission line crosses a river or a	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
			wetland. Powerline towers must be insulated to prevent electrocutions, especially on any transmission lines close to the river and wetland areas. • The design of the proposed powerline must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins et al., 2015). • Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. • Where feasible, all the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution. • All areas to be extended must be walked through prior to any activity to ensure no nests or birds area found in the area. Should any species of conservation concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken (refer to the Terrestrial Biodiversity study, TBC, 2021) • Develop post-mining environments in conjunction with regional development plans as well as the recreation of habitats where possible or structure altered landscapes to be compatible with regional habitats		
Geology, Soils and Agriculture					
• **Decommissioning Mine Infrastructure**	• Construction • Operation • Decommissioning	Impacts on soils can have significant impact both in terms of severity and scale.	• Mining operations will remain within the footprint of the proposed opencast operations thereby reducing any potential impact on the surrounding geology. • Tailings will be deposited into the D-Zone Open Pit as per the existing approvals. The pit should fill only up to original groundwater level of 1 210 mamsl.	• CARA • NEMA	As required

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
• **Drilling monitoring boreholes** • **General decommissioning activities** • **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Powerline** • **Post Closure Monitoring and Maintenance** • **Re-vegetation** • **Permanent site office Infrastructure**	• Rehabilitation and Closure	Impacts on soil can in turn affect land use and land capability.		• In accordance with Rehabilitation and closure plan	
			Where topsoil stripping is required the following mitigation measures should be considered: • Ensure that mine planning has considered the smallest footprint necessary for infrastructure; • Ensure that construction crews stay within allocated footprint for construction; • Locate all soil and overburden stockpiles in areas where they will not have to be moved or relocated prior to final placement; • Ensure that all stockpiles especially topsoil are clearly and permanently demarcated and located in defined no-go areas; • All infrastructure should be designed with closure in mind, either with alternative uses or with ease of deconstruction; and • All soil stripping should be done in strict compliance with the soil stripping guidelines soil management is the key process in determining rehabilitation effectiveness. • Soil stripping, stockpiling and replacement will be done as per the Topsoil management procedure, Soil conservation guide and Detailed Rehabilitation plan.	• CARA • NEMA • In accordance with Rehabilitation and closure plan	Throughout LoM
			To prevention of soil compaction and erosion: • Limit access to one route; • Only stockpile to 3m and don't drive on topsoil stockpiles; • Deep rip compacted areas after construction to allow for natural vegetation regrowth; • Ensure proper storm water management designs are in place;	• CARA • NEMA • 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
• **Storm water management** • **Processing plant** • **Stockpiles** • **Water management Infrastructure construction**			• If erosion occurs, corrective actions must be taken to minimize any further erosion from taking place; • Stockpiles to be re-vegetated and designed according to Chamber of Mines Rehabilitation Guidelines and the approved rehabilitation plan; and • When topsoil stripping and replacement occurs, it is recommended that a truck and shovel method is used and not a bowl scraper. • Vegetation establishment in disturbed areas, where natural vegetation fails to establish, will be undertaken as soon as is practical, with growing season being the primary constraints.		
			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 Mine Environmental Specialist.	• NEMBA • NEMA	Throughout LoM
			• Proper planning of mining sequences. • Acquire stripping and stockpiling guideline. • Manage, maintain and care for soil stockpiles. • Stockpile the stripped soils in designated stockpile. Vegetate these stockpiles according to the rehabilitation plan. • Continuously monitor erosion on site. • Monitor compaction on site. • Implement proper storm water management plans. • All rehabilitated areas should be assessed for signs of compaction, fertility loss and erosion.	• NEMA • NWA • Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Ongoing throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Post closure, the soils fertility must be assessed by a soil specialist yearly (during the dry season so that recommendations can be implemented before the start of the wet season) as to correct any nutrient deficiencies. • If erosion occurs, corrective actions (erosion berms) must be taken to minimize any further erosion from taking place		
Land use					
• **General Mine activities**	• Operation • Decommissioning • Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	A post-mining land capability assessment needs to be done before decommissioning phase by a soil specialist in order to evaluate the rehabilitation procedures and to verify the topsoil thickness in order to obtain a final post-mining land capability classification	In accordance with Rehabilitation and closure plan	Established early during operations and implemented during rehabilitation
Pollution Prevention					
• **General Mine activities**	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Small scale and localised	• All fuels, flammable substances and hazardous chemicals must be stored at demarcated areas, within bunded areas, covered and with access restriction provided. • Drip trays must be used during equipment maintenance. These should be emptied regularly into waste oil containers. • Implement spill handling procedure if spillage of hazardous materials occurs. Further ensure that such contaminated material arising from spill clean-up is disposed of as a hazardous waste. • Implement the waste management procedure, detailing requirements for general and hazardous waste	• NEMA Polluter Pays Principle • NEMA Duty of Care • NEMA • NWA • OHSA • MHSA	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation

			segregation, waste skip requirements and temporary storage requirements.
			• The design of waste skips for temporary storage should include:
			  ○ Containment to prevent seepage,
			  ○ Covered to prevent water ingress, and
			  ○ On hard surface and within a bunded area.
			• Frequent collection of waste to prevent large accumulation on site.
				Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	

			Implement cyanide storage and handling procedures. The International Cyanide Management Code (ICMI) could be used as a guideline.		
			Any equipment that may leak, and does not have to be transported regularly, shall be placed on watertight drip trays to catch any potential spillages of pollutants. The 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 hazardous substances must be collected and adequately disposed of at a suitably licensed facility.		
			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 alternatively plastic under gravel. If emergency repairs are required elsewhere on site, this shall be undertaken with the necessary spill prevention measures in place.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			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,		
			• All hazardous substances (e.g. fuel, grease, oil, brake fluid, hydraulic fluid) must be handled, stored and disposed of in a safe and responsible manner so as 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.		
		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.		
		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	• NEMA Polluter Pays Principle • NEMA Duty of Care • NEMA • NWA	Throughout operations Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			activity that may results in sparks in the vicinity of fuels and other flammable substances to prevent ignition.	• OHSA • MHSA • Shall adhere to the ESMS developed to ensure compliance with the regulatory framework • NEMWA • DWS minimum requirement for waste disposal	
		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 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.		
		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.		
		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
		Potential health risks are	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	• MSDS specifications • OHSA	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		considered high significance	with regard to the safe handling and storage of hazardous materials.	• MHSA	
		Small scale and localised	The Mine Environmental Officer shall maintain a list of all hazardous materials that would be present on site and where they are kept. Material Safety Data Sheets (MSDS) must be available on site at the point of use and readily accessible for all hazardous substances stored.	• OHSA • MHSA	Throughout operations
Waste Management					
• **Maintenance and operation of site infrastructure and facilities** • **Permanent site office Infrastructure** • **Powerline** • **Processing Plant** • **Water management Infrastructure construction** • **General Construction**	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	• Reduce the possible impact of waste generation by establishing effective control of all types of waste and the removal or disposal thereof in accordance with the applicable legislative requirements. • Determine the composition and concentration of all waste disposed of on-site to determine hazard rating and classification, including mining waste, and • Reduce the quantity of hazardous materials by maintaining the chemical consumption to a minimum.	• NEMWA • NEMA cradle to grave • DWS minimum requirement for waste disposal	Throughout operations
			Hazardous waste storage: • Waste material will only be temporarily stored at areas demarcated for such storage, • All sites used for the temporary storage of hazardous waste will be clearly demarcated for this purpose, • Hazardous waste will be stored in such a manner as to prevent the contamination of rainwater with the hazardous substance, • The migration of leachate or spillage into the ground and groundwater regime around all temporary storage areas will be prevented, by placing such containers into a concrete bunded area, and		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
• **Mine area site preparation** • **General Mine Management** • **Mining Operations** • **Maintenance and operation of site infrastructure and facilities** • **General decommissioning activities** • **Infrastructure removal** • **Decommissioning**			• Waste materials will always be stored separately from other chemicals and products. • Temporary storage of hazardous waste should comply with the relevant regulations in terms of the National Environmental Management Waste Act (Act 59 of 2008).		
			Disposal of hazardous waste includes: • Waste material will only be disposed of at a licensed landfill site, appropriately classified to receive such waste material, and • Safe disposal certificates will be obtained for all hazardous waste material disposed. These certificates will be obtained from the contractor responsible for the disposal of the hazardous waste or from the facility utilised for disposal.		
			The waste management system shall provide for adequate waste storage, waste separation, 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.		
			Waste generated on site should be recycled as far as possible and sold/given to interested contractors. Recyclable waste should not be stored on site for excessive periods to reduce risk of environmental contamination		
			The Mine shall implement a waste removal regime that ensures waste skips do not exceed their capacity before being removed from site for disposal.		
			Littering shall be strictly prohibited. The site shall remain in a neat and tidy condition at all times.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			The mine will implement the cradle-to-grave approach to ensure that the waste is removed and disposed of in the prescribed and correct manner.		
			The mine will implement the cradle-to-grave approach to ensure that the waste is removed and disposed of in the prescribed and correct manner.		
Sewage and Sanitation					
Permanent site office Infrastructure • **Powerline** • **Processing Plant** • **Water management Infrastructure construction** • **General Construction** • **Mine area site preparation** • **General Mine Management**	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Sewage has the potential to result in localized impacts of low to medium significance	• All sewerage connections and applicable infrastructures will be serviced and maintained on a regular basis. • The contractor responsible for servicing the septic tanks must ensure that no spillage occurs and that the contents are removed from site according to approved methods. • Clean storm water must be kept away from areas where it could be contaminated and must be directed to the storm water drainage system. • Obtain records of safe disposal of sewage.	• NEMWA • NWA • NEMA cradle to grave	Throughout operations
			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.		
			Toilets must be easily accessible. Toilets 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.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
• **Mining Operations** • **Maintenance and operation of site infrastructure and facilities** • **General decommissioning activities** • **Infrastructure removal**			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					
• **General decommissioning activities** • **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities**	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Noise has the potential to result in significant impacts to sensitive receptors at a small to medium scale	• Ensure employees have access to and wear noise reduction personal protective equipment appropriate to their working conditions. • Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; • Switching off equipment when not in use. • Establish and implement a procedure to warn neighbours of blasting well in advance, preferably during Community Liaison Forum meetings; • Blasting is generally intermittent and should be limited to daylight hours when ambient noise levels are highest; • Noise monitoring should be undertaken throughout the life of the mining activities to ensure that noise levels comply with Safety and Health Standards. • A complaints register will be kept by the mine to record any external noise related complaints (or other) received,	• 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
• **Mine area site preparation** • **Mining Operations** • **Processing Plant** • **Permanent site office Infrastructure** • **Storm water management** • **Mine Infrastructure** • **Mining** • **Water management and treatment**			and appropriately investigated, including environmental noise monitoring if required. A complaints register will be kept by the mine to record any external noise related complaints (or other) received, and appropriately investigated, including environmental noise monitoring if required. 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. As a general rule, operations should meet the noise standard requirements 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	The following mitigation measures shall be implemented: • Reduction of fugitive PM emissions through the watering of roads, stockpiles and inactive open areas and the use of screens. • Reductions of vehicle exhaust emissions through the use of better-quality diesel; and inspection and maintenance programs. • Combine chemical suppressants with the use of water sprays on unpaved roads.	• NEMAQA • Dust regulations	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** • **Mining Operations** • **Post Closure Monitoring and Maintenance** • **Re-vegetation** • **hauling of material** • **Permanent site office Infrastructure** • **Powerline** • **Storm water management** • **Mine Infrastructure**			• Implement the air quality management plan as detailed in section 9.1. This includes the following: o The management of the operations; resulting in the mitigation of associated air quality impacts o The dustfall sampling, ambient fine particulate monitoring and operating of the on-site weather station. Should the dustfall sampling show higher rates than those estimated in this study it is suggested that Kalgold investigate and consider adopting additional mitigation and management measures. Fallout dust tends to settle relatively close to sources of emissions and thus if the dustfall sampling show significantly higher rates there is likely to be significantly higher finer particulate matter concentrations as well o Record keeping and community liaison procedures.		
		Wide scale of disturbance and low to medium significance. Some localized high significant impacts.	Haul roads • Proper road construction is required to manage the fugitive dust from roads. Proper road construction has high initial costs, but there will be less road maintenance roads incurred in the long run. • Effective dust management measures reduce fugitive dust from haul roads. Dust suppressants on roads work by forming a layer over the top of the roads, these can be petroleum emulsions, polymers and adhesives. • Speed limited to 40km/h.	• NEMAQA • Dust regulations	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
• **Water management Infrastructure construction** • **Processing Plant** • **Stockpiling.** • **Tailings Storage facilities**					
Heritage and Paleontological					
• **General decommissioning activities** • **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation**	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	• Implement the chance find procedure as detailed in the Heritage Impact Assessment report. • Implement a grave management plan as detailed in Section 9.7 should any of the identified graves be affected by construction activities. If any other heritage resources are uncovered SAHRA should be contacted and a qualified archaeologist appointed to evaluate the finds and make appropriate recommendation on. If construction activities expose any fossil deposits, a professional palaeontologist should be contacted to assess whether mitigation actions are necessary. If construction activities expose any fossil deposits, a professional palaeontologist should be contacted to assess whether mitigation actions are necessary.	• 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
• **Mining Operations** • **Post Closure Monitoring and Maintenance** • **Powerline** • **Re-vegetation** • **Permanent site office Infrastructure** • **Storm water management** • **Mine Infrastructure** • **Processing Plant** • **Water management Infrastructure construction**					
Land Capability					
• **General Surface Rehabilitation**	• Construction • Operation • Decommissioning	Impacts on land capability have long term effects	Topsoil and subsoil stockpiles should be vegetated with prescribed seed mixtures to prevent soil erosion. During rehabilitation care must be taken to return the correct soil types and depths to specific sections of rehabilitated land	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
• **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Permanent site office Infrastructure** • **Powerline** • **Storm water management** • **Processing Plant** • **Water management Infrastructure construction**	• Rehabilitation and Closure	and can be of a high significance.	to ensure land capability potential is restored to as close as possible the original land capability rating for the area.		
			Re-vegetate rehabilitated areas as soon as possible to prevent soil erosion.	In accordance with Rehabilitation and closure plan	Throughout LoM
Surface Water					
• **Maintenance and operation of site infrastructure and facilities**	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Impacts on surface water can have a high significance and extent Impacts on surface water can	• Where disturbed areas cannot be re-vegetated during the life of operations, appropriate measure will be taken to control erosion. These may include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters. • Erosion control measures are required on all slopes exceeding 2° and engineered erosion control measures are required on all slopes exceeding 15°. Slope angles of	• NWA • GN704 • DWS best Practice Guidelines	As soon as possible and implemented throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
• **Mine area site preparation** • **Post Closure Monitoring and Maintenance** • **Powerline** • **Re-vegetation** • **Site establishment – Permanent site office Infrastructure** • **Mining Operations** • **Processing Plant** • **Water management Infrastructure construction**		have a high significance and extent	topsoil stockpiles should, as far as practically possible, not exceed 1:3. • The mine will ensure that erosion controls are included in the river diversion • Soil pollution prevention. • Prevent any spills from occurring; • If a spill occurs it is to be cleaned up immediately and, depending on the risk, reported to the appropriate authorities; • Use of spill kits in areas where vehicles are serviced; • All vehicles are to be serviced regularly; and • Leaking vehicles will have drip trays place under them where the leak is occurring. • The pipeline should be maintained according to manufacturers' specifications so as to prevent leaks and spills. • All fuels, flammable substances and hazardous chemicals must be stored at demarcated areas, within bunded areas, covered and with access restriction provided. • Material Safety Data Sheets should be provided for all above substances, all substances clearly marked and staff trained on the risks associated with storage, use and disposal. • Drip trays must be used during equipment maintenance. These should be emptied regularly into secondary containers. • If refuelling on site or from drums, the ground must be protected and proper dispensing equipment is to be used i.e. hand pumps and funnels. Drums may not be tipped to dispense fuel. • All personnel handling fuels and hazardous materials are to be issued with the appropriate Personal Protective Equipment (PPE).	• 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
			• Implement spill handling procedure if spillage of hazardous materials occurs. Further ensure that such contaminated material arising from spill clean-up is disposed of as a hazardous waste.		
			For storm water run-off affected by the Waste Rock Dumps, ore stockpiles and Heap Leach pad, Implement the following measures as identified in the Storm Water Management Plan: • Sufficient sub-soil volumes will be available to construct berms around the perimeter of the optimisation project. The berms will prevent clean water from flowing into the workings. The proposed berms should be constructed in such a way that that it will not cause erosion along concentrated runoff areas. • Cut-off trenches and storm water attenuation dams will intercept affected runoff from the low-grade ore stockpile area and the waste rock dump area. Attenuated water will be left to evaporate or will be re-used for dust suppression purposes. The dams should be lined with suitable lining and operated at empty levels to accommodate flood events. • Pregnant liquor collection trenches around the heap leach will convey runoff towards the pregnant pond. It is essential that these collection trenches and process water dams are maintained to guarantee the original design capacity. Groundwater contamination should be prevented by lining the trenches, heap leach pad and the process dams with suitable lining. • It is proposed to construct a clean water diversion berm around the heap leach to prevent clean runoff from flowing into the pregnant liquor collection trenches.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• The heap leach cut-off trench will serve as an emergency measure in case of overflow from the process dams. Pregnant liquor or other process/affected water will be conveyed to a sump from where it can be pumped back into the process dams (pregnant pond). • Process dams at the heap leach should be operated with a 0.8 metre freeboard to comply with GN 704 specifications and to prevent product loss. • The waste rock dump will expand over time and it is recommended to take into account storm water management measures as the dump develops. This will be achieved by planning gradual runoff slopes, the placement of rocks along safety berms on the benches to decrease runoff velocity and to encourage natural vegetation growth to keep soil in place. • Slope design for storm water management will be as per Kalgold's COP and SOP. • Regular maintenance on the storm water infrastructure once operational to ensure optimal functioning of the affected storm water system.		
			Surface- and groundwater management regarding the D-Zone tailings deposition, as identified in the D-Zone tailings deposition IWWMP: • To apply the BPG: G1 Storm water Management to assess the tailings backfilling project and to offer options for consideration in line with the BPG; • To develop a plan that will minimise the negative quality impacts to the downstream rivers, dams and streams in the event of any tailings or return water spillage or pipe bursts. A monitoring programme is essential as a management tool and early detection tool to detect		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			negative impacts as they arise and to ensure that the necessary mitigation measures are implemented; • Monitoring should be implemented throughout the project. • To maintain the downstream water quantity by ensuring pipeline stream crossings do not impede stream flow. This will be achieved by planning the pipeline to follow a route that has previously been disturbed and using existing culverts; • A preventative maintenance programme to prevent breakdowns and leakages should be scheduled for pipelines; and • An emergency and contingency plan should be developed for the leakages of the pipelines.		
			Management of the D-Zone river diversion • Maintenance of the river diversion infrastructure for the sufficient flow of water. • Surface water monitoring to assess the impact of water course disturbance • Dirty water arising from any dirty area will be collected in the containment dams; • The dirty water systems will be constructed to allow for a 1:50 year storm event; • The clean water systems, as well as the mine dirty water dams will have a minimum freeboard of 0.8 m above full supply, to ensure that no spillages occur; • Erosion control measures will be implemented where required.		
			Overflow of process water dams • Ensure all dams and pollution control facilities in the new mining area – Portion 0 of the Farm Spanover 552 IO - are designed to accommodate a 1:50-year flood event.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Ensure that a 0.8 free board level is maintained at the process dams as specified in the GN 704 regulations of the NWA, 1998 (Act No. 36 of 1998). • Ensure maintenance of the process water dams (e.g. desilting) to ensure adequate capacity to effectively contain affected water stored in these facilities.		
			Pollution prevention • Minimisation of dirty water management areas and the separation of clean and dirty water management areas, • Minimising the intake of raw water for process application at Kalgold, • Minimise losses of water by careful design, operation and monitoring of the water management system, • The generation of waste materials will be kept, as far as possible, to a minimum, • Pollution prevention methods will be designed and implemented to minimise risk of accidental polluting releases to surface or groundwater, • Exposed surfaces within dirty water management areas (such as affected water storage facilities) will be kept to a minimum to minimise the volume of dirty runoff generated, and the potential loss of 'clean' runoff to the catchment, and • Mine infrastructure will have clean water diversions to direct runoff towards natural watercourses and which are designed to comply with Regulation GN 704 under the NWA, 1998 (Act 36 of 1998).		
			• The floodlines associated with the Morokwa Spruit must be determined by a suitable specialist and the WRD extension footprint must avoid these areas. • It is recommended that the stream in close to the Watertank WRD extension area be buffered by 100m		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			from the edge of the watercourse in order to avoid any potential impacts associated with the WRD extension on this stream (Figure 6). • A WRD Engineering design report that complies with the requirements of the MPRDA and the NEMWA must be completed for the Watertank WRD extension prior to construction.		
			Water re-use and reclamation • Affected water from dirty water management areas will be contained in the mine's dirty water management system (and treated if / when required) and re-used optimally to limit the risk of spillage to the environment to comply with legislative requirements, • The latest policy of the DWA, as contained in the relevant Best Practice Guideline, dated 2007, will be reflected in the annual review of the water re-use and reclamation strategies, • All process water and return water will be collected, contained and re-used, • Potentially polluting water from the mining area will be contained in pollution control facilities in accordance with the requirements of Regulation GN 704 under the NWA, 1998 (Act 36 of 1998). This water will be re-used in the mine process water circuit, as far as practicable, and • Opportunities for the recycling of waste materials will be investigated and utilised • wherever economically viable.		
			Storm water management • The capacity of all storm water infrastructures should accommodate at least a 1:50 year flood event. • All berms, attenuation dams and trenches should be inspected and serviced regularly to ensure the design		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			capacity and integrity is maintained. Storm water control measures should be kept clear of obstructions by objects as well as siltation especially where the velocity of the runoff is induced. • Affected runoff water should be controlled and not contaminate the natural clean habitat within the mining vicinity. • No affected water is allowed to spill into the clean water environment. This should be ensured through design as well as operational control measures. • Erosion prevention measures (e.g. grass, cement or rock) should be in place at all concentration points. These areas include trenches, berms and other infrastructure that may increase surface runoff. • Continual investigation into the geochemical characterisation of the waste rock should be done to determine the risk to surface or groundwater contamination when using waste rock for construction purposes. • Erosion of access roads should be addressed by implementing energy dissipaters to drain surface runoff away from the roads into the adjacent veldt areas.		
			Special considerations for stockpiles and the WRD • The size of un-rehabilitated areas that produce contaminated runoff should be minimised. • Development of stockpiles should be planned to promote maximum diversion of clean water. The runoff diversion measures may therefore need to be moved as the mine develops. • Rehabilitation should be planned to promote free drainage and to minimise or eliminate ponding of storm water on the waste rock dumps. On-going rehabilitation as the dump develops is required.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			Special considerations for the open cast pits • The size of un-rehabilitated areas that produce contaminated runoff should be minimised. Where disturbed areas cannot be re-vegetated during the life of the operations, appropriate measures should be taken to control erosion. These may include grading of surfaces to prevent rapid run-off of storm water and the use of energy dissipaters. • Development of open cast pits should be planned to promote maximum diversion of clean water. The runoff diversion measures may therefore need to be moved as the mine develops. • Rehabilitation should be planned to promote free drainage and to minimise or eliminate ponding of storm water. On-going rehabilitation as mining operations progress is required. • The capacity to rapidly pump water out of the pits into storage dams should be maintained. This will assist in minimising water quality deterioration due to long term retention of storm water in contact with materials that may cause a decrease in quality. • Regular monitoring and maintenance of all stockpiles (i.e. WRD's and Topsoil stockpiles) should be done to detect erosion gullies and other eroded areas. Investigations should determine if re-profiling is necessary to limit further erosion and encourage future vegetation growth. • Erosion control measures are required on all slopes exceeding 2° and engineered erosion control measures are required on all slopes exceeding 15°. Slope angles of topsoil stockpiles should, as far as practically possible, not exceed 1:3.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• The SWMP and Water Balance must be updated to reflect the new extension areas for the pits and Watertank WRD.		
			Optimisation of water usage • Regular maintenance and inspection of equipment to prevent leaks; • Regular site inspections by supervisors to prevent wastage of water; • Environmental training and awareness of staff; and • Monitoring of resource consumption (e.g. water meters installed to measure abstraction from Crafford Dam).		
			Excess water will only be discharged to the environment if it meets statutory requirements.		
			• Pollution control dam water levels must be constantly monitored. Steps and procedures must be put in place to manage situations where excess water builds up in the pollution control dams. • Pollution control dams must be operated empty as far as practicable and cannot fulfil the same role as water storage dams, unless specifically designed to fulfil both purposes. Water reuse from the pollution control dams should be maximised. • Dirty water dams will be lined by a suitable liner to limit the potential for leakage. Liner systems will be regularly inspected and repaired/replaced as required ensuring continued functionality.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			Implement a storm water management plan inclusive of containment of dirty water areas. • Ensure the tailings facility and return water dam have adequate capacity to contain both operational water and the relevant design. • storm (e.g. probable maximum precipitation) and that all are adequately engineered to prevent failure (e.g. of embankments or side slopes). • Keep tailings pipelines (and any other pipelines with possible contaminants) within the managed dirty water footprint where possible. • Keep tailings pipelines (and any other pipelines with possible contaminants) well maintained to prevent leakage. • Store hydrocarbons off site where possible, or otherwise implement hydrocarbon storage. • Handle hydrocarbons carefully to limit spillage. • Ensure vehicles are regularly serviced so that hydrocarbon leaks are limited. • Designate a single location for refuelling and maintenance where possible. • Keep a spill kit on site to deal with any hydrocarbon leaks. • Remove soil from the site which has been contaminated by hydrocarbon spillage. • Undertake surface water monitoring to enable change detection related to contaminants originating from the site.		
	• Construction • Operation		• Mining will adhere to regulations / requirements stipulated in the water license.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	• Construction • Operation • Decommissioning • Rehabilitation and Closure		• Keeping the contained dirty area to a minimum thereby limiting this impact. • Discharge excess water of an acceptable quality back into the surface water environment (river).		
RoM and Product Stockpiles	• Construction • Operation	Impacts on surface water can have a high significance and extent	To prevent risks associated with flooding the following mitigation measures should be considered: • Works should ideally not take place, nor infrastructure placed within 100m of the river or within the 1:100-year flood-line so as to limit the applicability of Section 21 water uses and GN 704 Condition 4. • The defined 1:100-year flood-line should be defined for infrastructure or works near a watercourse, while the expansion of excavated areas (i.e. pits) should be assessed with regards to the potential that flood waters could enter them. • Flood protection in the form of berms or increased flood conveyance (through river engineering) may be necessary where a flood risk exists. • Flood modelling should be undertaken to define the flood risk and consequently the expected impact on the D-Zone and site infrastructure (previous flood modelling has been undertaken although the accuracy of this flood modelling is not known). • D-Zone Pit is adjacent to a river diversion and flood protection and adequate conveyance of flood waters should be confirmed before deposition is increased as part of the expansion project (given the potential for a breach of flood waters into D-Zone Pit).		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Wetlands and Aquatics					
• **Maintenance and operation of site infrastructure and facilities** • **Mining Operations** • **Permanent site office Infrastructure** • **Powerline** • **Mine Infrastructure** • **Processing Plant** • **Water management Infrastructure construction**	• Construction • Operation • Decommissioning • Rehabilitation and Closure	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	• Effective stormwater management which includes and controls seepage and runoff control from the expanded operational TSF area. • Implementation of clean and dirty water separation as effective pollution control using a diversion trench and berm systems which diverts clean stormwater around pollution sources and convey and contain dirty water to central pollution control impoundments effectively controlling runoff. The use of barrier systems, including synthetic, clay and geological liners to minimize contaminated seepage and runoff is encouraged. • Erosion and sedimentation controls such as energy dissipation and silt screens where feasible. The focus must be placed on locations where stormwater enters the watercourse from disturbed areas. • The crossing points should be stabilized to reduce the resulting erosion and downstream sedimentation. Access crossing points must be prioritized and upgraded. • Structures must not be damaged by floods smaller than those which may occur on average once in every 50 years. • The indiscriminate use of heavy vehicles and machinery within the water resource areas will result in the compaction of soils and vegetation and must be controlled. • Erosion prevention mechanisms such as gabions must be employed to ensure the sustainability of all structures to prevent instream sedimentation where feasible.	• NWA • GN704 • 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
			• The planting of indigenous vegetation around pollution control impoundments and structures should be completed as this has been shown to be effective in erosion and nutrient control. • The continued removal of alien invasive flora species. • The continued implementation of the derived buffer zones and avoidances. Prioritize the use of existing routes and servitudes. • The feasibility of passive or active water treatment and containment for seepage and runoff emanating from the TSF and decant areas must be investigated.		
			• Proper planning of mining sequences. • Acquire stripping and stockpiling guideline. • Stockpile the stripped soils in designated stockpile areas. • Vegetate stockpiles according to the rehabilitation plan. • Continuously monitor erosion on site. • Monitor compaction on site. • All rehabilitated areas should be assessed for signs of compaction, fertility and erosion. • Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated. • If erosion occurs, corrective actions (erosion berms) must be taken to minimize any further erosion from taking place.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			No dirty water may be discharged into any wetland or water resource on site unless treated to the required standards.		
Topography and Landform					
• **General Surface Rehabilitation** • **Infrastructure removal** • **Maintenance and operation of site infrastructure and facilities** • **Mine area site preparation** • **Mining Operations** • **Post Closure Monitoring and Maintenance** • **Permanent site office Infrastructure** • **Storm water management**	• Construction • Operation • Decommissioning • Rehabilitation and Closure	Impacts on topography tend to be large in extent and can have a significant effect on the environment	• Rehabilitation should be conducted in accordance with Rehabilitation and closure plan • Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	• In accordance with Rehabilitation and closure plan • Shall adhere to the ESMS developed to ensure compliance with the regulatory framework	Throughout LoM
			Berms and diversion trenches will be constructed as part of the stormwater management facility 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. This plan must be adhered to at all stages of the project.		
			There will be survey checks included as part of the rehabilitation planning to ensure that the planned post mining topography is being followed.		
			All 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.		
			Topsoil and subsoil should be stockpiled separately.		
			Soil horizons should be replaced in the same order as they occur in nature to prevent mixing of soil horizons.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
• **Mine Infrastructure** • **Water management Infrastructure construction**			Topsoil depth should be related to the proposed post-mining land capability plans.		
			Rehabilitated areas should not be compacted more than is necessary, and activity, particularly that of heavy machinery and vehicles, on these areas should be limited.		
			Rehabilitated areas should be landscaped to prevent water logging and vegetated to prevent soil erosion.		
			Erosion control measures such as contour banks and cut off berms should be constructed, and soil vegetated in rehabilitated areas.		
			Accidental hydrocarbon spillages should have a suitable absorbent applied immediately and rehabilitated or if this is not possible then the affected soil should be removed to a licensed waste disposal site and the area rehabilitated.		
			Final profiling of the last cut will take place to ensure the area is rehabilitated to as close as possible its natural state as possible.		
			Former Digital Terrain Models' will be used to establish what contours were present prior to mining taking place and these will be used to help shape the area to the final topographic landform.		
Transportation, Infrastructure and Traffic					
• **Mine area site preparation**	• Construction	Impacts on transportation infrastructure and	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	• Road Traffic Act	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
• **Mining Operations** • **Permanent site office Infrastructure** • **Powerline** • **Processing Plant** • **Water management Infrastructure construction**	• Operation • Decommissioning • Rehabilitation and Closure	traffic can have a significant extent although typically low in significance	soil and vegetation on site, and to minimise disruption of traffic. • Limit heavy vehicle speed to 40km/h along site access road • Water down access road on a regular basis (as required) to reduce dust. • Limit construction heavy vehicle trips to off-peak hours when possible. • Ensure SARTSM Vol 2 Guidelines are followed in case number of heavy vehicles exceeds 10 per 12-hour daytime period or 5 per 12-hour night-time period or ensure special approval from the road authority. All construction and mining vehicles using public roads shall be in a roadworthy condition and their loads secured. They must adhere to the speed limits and all local, provincial and national regulations with regards to road safety and transport.	• OHSA • MHSA	
Visual					
• **General Surface Rehabilitation** • **Mine area site preparation** • **Mining Operations**	• 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	• Topsoil and vegetation should only be removed where absolutely necessary; • Stockpiles should be positioned in areas where the least visual disturbance is likely to occur; • If possible, the height of topsoil stockpiles should be kept to a minimum height of 3m to ensure that soil does not become compacted; • The height of dumps and other infrastructure should be limited where possible; • Dust suppression techniques such as the use of a water bowser should be implemented;	• In accordance with Rehabilitation and closure plan • Closure and final land use objectives	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
• **Permanent site office Infrastructure** • **Storm water management** • **Powerline** • **Processing Plant** • **Water management Infrastructure construction**		large extent of the area.	• A mixture of short and tall indigenous vegetation should be left intact around the infrastructure and on the perimeter of the project boundary from the outset of the project in order to conceal the development as much as possible; and • Lighting at night during the construction phase should only be directed to necessary areas if at all possible and construction activities at night should be avoided.		

			• Haul roads
			  ○ Numerous haul roads should not be created alongside each other;
			  ○ Vehicles must be roadworthy and obey the recommended speed limits in order to reduce dust;
			  ○ A water bowser should be frequently used to moisten the haul road and to suppress dust; and
			  ○ Indigenous vegetation should be maintained or established along roads to conceal the movement of vehicles.		

	• Construction
	• Operation
	• Decommissioning
			Decommissioning phase:
			• Demolition of infrastructure:
			  ○ Ensure that all unnecessary infrastructure is removed;
			  ○ Building rubble will be placed into the pits;
			  ○ Vehicles must be roadworthy and obey the recommended speed limits in order to reduce dust; and		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			○ A water bowser should be frequently used to moisten the haul road to suppress dust. • Rehabilitation: ○ Spread sub-soil and topsoil over the area to be rehabilitated; ○ Ensure that surface water drainage lines are rehabilitated to their pre-mining condition; ○ Use indigenous plant species to rehabilitate disturbed areas; ○ Waste rock dumps will be re-crushed for aggregate and the footprint rehabilitated; and ○ Rehabilitated areas should as far as possible blend into the surrounding landscape. • Post closure monitoring: ○ All disturbed areas from the mining activities should be rehabilitated to a pre- determined state as agreed upon with the Regulator.		
Groundwater					
• **General decommissioning activities** • **General Surface Rehabilitation** • **Maintenance and operation**	• Construction • Operation • Decommissioning • Rehabilitation and Closure	The mining impact on groundwater potentially affected a very large area and has a potentially high significance impact	• Drilling of additional monitoring boreholes as proposed by the geo-hydrological study conducted by Jones & Wagener (2013) to monitor the impact on the groundwater. • Monitoring groundwater levels; and • Monitoring groundwater quality. • Plume management and dewatering from the pollution prevention boreholes at the southeast corner of the FRD	• NEMA Duty of care • NWA • GN704 • DWS best practice guidelines • Shall adhere to the ESMS developed to	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
of site infrastructure and facilities • **Mine area site preparation** • **Mining Operations** • **Post Closure Monitoring and Maintenance** • **Re-vegetation** • **Permanent site office Infrastructure** • **Storm water management** • **Mine Infrastructure** • **Water management Infrastructure construction**			to prevent significant pollution to the groundwater resource. • Ensure regular maintenance on the solution trenches around the FRD for the sufficient collection of water from the FRD. • The tailings will be reprocessed through the plant and deposited into the D-Zone open pit. • The Spanover Heap Leach must be constructed using a suitable lining to prevent seepage from the facility. • Associated infrastructure (process dams) designs must incorporate suitable engineered liners. • Regular maintenance on the trenches and process dams is required to ensure the integrity of the system and to prevent spillages to the environment that can lead to groundwater pollution. • Ensure the efficient functioning of the system at the plant process dams to prevent the malfunction of the system and the subsequent spillages into the environment. • Rehabilitate the heap leach, through processing (reworking) of material through plant. • Repair damaged linings at the process water dams to prevent seepage.	ensure compliance with the regulatory framework	
			• Rainfall should be measured daily to distinguish between rainfall and groundwater inflow into the opencast pits. • The quality of the in-pit water should be monitored regularly. If it is necessary to discharge surplus water into the surface streams this activity will have to be licenced.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• The licence will specify monitoring requirements in terms of frequency and parameters to be analysed. • It is recommended that the private boreholes are also sampled and analysed annually. The previous sampling was conducted in 2011 as part of the hydro census.		
			Deposition of tailings into the D-Zone open pit • The pit should fill only up to original groundwater level of 1 210 mamsl. • It is recommended that additional monitoring boreholes are drilled. The aim of these boreholes is firstly to assess the groundwater level drop and potential impact on private groundwater users due to mine dewatering. Secondly the boreholes can be used to assess groundwater deterioration (if any) due to the deposition of tailings into D-Zone pit. • Accurate monitoring is required to confirm the estimates derived from the numerical model and to allow for timeous intervention should adverse impacts be detected. • Once backfilling commences, the pipeline should be inspected for any potential leaks. • An electronic monitoring system to continuously monitor the flow between the pump station and the tailings filling is required		
			Groundwater quantity: • It is recommended that dedicated monitoring boreholes are drilled to accurately measure the impact on the groundwater drawdown. Currently the groundwater		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			levels are measured in boreholes that are often pumped and are therefore not a true reflection of the static groundwater level. Accurate monitoring is required to confirm the estimates derived from the numerical model and to allow for timeous intervention should private boreholes be affected. • In the unlikely event that the groundwater availability to neighbouring water users are severely impacted upon, an alternative water supply must be provided to the affected user. • Leaking taps and pipes are to be repaired immediately. • Proper environmental training and awareness to conserve resources. • Monitoring of resource consumption and identify water reuse opportunities and water saving initiatives. • The private boreholes listed as "Medium and High Risk" in the October 2020 M van Biljon groundwater report should be included in this sampling (14 boreholes). The location of these boreholes is included in section 7.4.4 of this EMPR. The borehole and pump installation depths of these private boreholes should also be measured if possible, to allow for a more accurate risk assessment in terms of the available drawdown and risk of drying up. • Groundwater levels in the mine monitoring boreholes, as well as the "High Risk" private boreholes should be monitored quarterly. • In the event that the groundwater availability to neighbouring water users are severely impacted upon, an		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			alternative water supply must be provided to the affected user.		

8 CLOSURE AND REHABILITATION

8.1 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 with landowners with regards to the reinstatement of preferred land uses post mining.

8.2 CONSULTATION WITH LANDOWNERS AND I&AP'S

The Kalgold mine 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.

8.3 MINE CLOSURE

In order to align with the defined closure plan and final land use objective, the mine will need to implement a series of actions which addresses the mines infrastructure, facilities and rights area, as well as ongoing maintenance and management thereof. These actions and obligations apply to all infrastructure, activities and aspects both within the mine lease area and off the mine lease area which were associated with the mining activities and over which the mine has responsibility.

Mine Closure incorporates a process which starts at the commencement of mining and continue throughout the LoM. It is executed within the framework of sustainable development. Risk to elements of the environment is quantified and managed pro-actively. This includes the gathering of relevant information throughout the LoM. Scientifically designed monitoring systems will be implemented as an integral part of rehabilitation to ensure that preventive measures are adequate and efficient. The mining activities that impact on the environment over the life of the mine will be determined and financial provision for future mine site rehabilitation will be made.

Closure objectives are the following:

- After closure, the safety and health of humans and fauna will be safeguarded from hazards associated with the previous mining operations;
- Residual impacts will be identified and management strategies put in place to ensure that these impacts will be adequately dealt with. Environmental damage or residual impacts will be minimised through a public involvement programme, which is aimed at early identification of problems.
- As far as practicable, the land will be rehabilitated to a predetermined and agreed state of land use, which conforms to the concept of sustainable development. The most probable final land use will be for low density stock grazing, with the A-Zone, Watertank and Windmill Opencast Pits as strategic water resources that may be used for recreational activities;
- The physical and chemical stability of any remaining structures, such as the open pits, will be such that the risks to the environment will not be increased by naturally occurring forces;

- The environmental management programme will predict long-term impacts and will focus on pollution prevention, minimisation and control. Monitoring programmes will be used to confirm the accuracy of the predictions;
- The mine will be closed efficiently and cost effectively; and
- The mine will not be abandoned and financial provision for post-closure management and for the maintenance of pollution control measures will be made.

Table 12: Physical closure objectives

Structure	Area	Best objective	Probable objective
Processing plant and associated infrastructure	Crushing and Screening Plant	Sell as unit	Demolish, reclamation of equipment and scrap metal
	Low grade ore stockpiles	Rehabilitate footprint	Rehabilitate footprint
	Heap leach and CIL	Treatment of heap leach material through the Kalgold plant as an asset and using this as backfill material for the D- Zone pit. Rehabilitation of footprint.	Treatment of heap leach material through the Kalgold plant as an asset and using this as backfill material for the D- Zone pit. Rehabilitation of footprint.
	Stockpiling Equipment	Sell as unit	Demolish, reclamation of equipment and scrap metal
	Conveyor Equipment	Sell as unit	Demolish, reclamation of equipment and scrap metal
	Pollution Control Dams	To be used as water storage facilities	Demolish, reclamation of equipment and scrap metal.
Buildings with concrete areas and infrastructure	Offices, guardhouses, change houses, workshops, clean water tanks, pipelines, boardrooms and laboratory	• Demolish all infrastructure and rehabilitate footprint • Recyclable or reusable components of buildings and structures will be salvaged. • Foundations will be removed to an acceptable depth. • Inert building rubble may be placed in the pits, used as landfill or buried such that there is adequate soil material over the buried rubble. • The soils and land capability will be rehabilitated to pre-determined state as agreed with regulator.	Demolish and rehabilitate footprint
Mine Residue Deposits	Waste rock dumps	Removing of waste rock material to be used as an asset by a Harmony appointed contractor. Rehabilitate footprint.	Removing of waste rock material to be used as an asset by a Harmony appointed contractor. Rehabilitate footprint.

Structure	Area	Best objective	Probable objective
	Tailings dam	The tailings will be reworked through the plant and deposited into the D-Zone pit and the footprint rehabilitated.	The tailings will be reworked through the plant and deposited into the D-Zone pit and the footprint rehabilitated.
Electrical supply	Power lines	Power lines will be removed if it proves to inhibit land use at decommissioning.	Rehabilitate
Hazardous chemical storage	Diesel and chemical storage areas	Demolish and rehabilitate	Demolish
Explosives storage	Explosives storage area	Demolish and rehabilitate	Demolish
Fences	Fences	All fences to remain as part of the end land use utilisation.	All fences to remain as part of the end land use utilisation.
Roads	Haul roads	Remain as access road	Roads and parking areas will be removed if it proves to inhibit land use at decommissioning.
	Mine access and plant roads	Remain as access road	
	Parking areas	Rehabilitation of parking areas	
Open Pits	A-Zone, Windmill and Watertank Zones	It is envisaged that the rehabilitated open pit workings, once filled with water, will be able to sustain aquatic life and will be an attraction to aquatic birds. These areas may also be suitable for leisure activities.	It is envisaged that the rehabilitated open pit workings, once filled with water, will be able to sustain aquatic life and will be an attraction to aquatic birds. These areas may also be suitable for leisure activities.
	D-Zone	Tailings from the proposed operations will be deposited into the D-Zone Open Pit, as the closure objective for this pit changed from strategic water resource to backfilled pit. The pit should filled only up to original groundwater level of 1 210 mamsl.	Tailings from the proposed operations will be deposited into the D-Zone Open Pit, as the closure objective for this pit changed from strategic water resource to backfilled pit. The pit should filled only up to original groundwater level of 1 210 mamsl.

8.4 POST-CLOSURE OBJECTIVES

The objective for the post-closure land use is to rehabilitate the land to a stable condition. The final land use will be low density stock grazing with the A-Zone, Watertank and Windmill Opencast Pits as strategic water resources that may be used for recreational activities. The following is recommended:

- Prior to mine closure; a detailed risk assessment will be conducted to determine the potential residual and latent impacts associated with the closure of the mine, so as to ensure the identification, investigation and implementation of suitable mitigation prior to closure.
- A closure plan will be developed in accordance with the requirements of the Minerals Petroleum Resources Development Act (Act 28 of 2002), Regulation 57(a) as well as the NEMA Financial Provision regulations of 2019. Furthermore, closure objectives will be set in accordance with Regulation 61 and 62(a).
- In order to ensure that rehabilitation was effective; aftercare maintenance of the site will take place after closure operations have ceased for a period as proposed within the closure plan.
- The rehabilitation will continuously be monitored to determine whether the practices are effective. If erosion and limited re-vegetation takes place a detailed assessment of the rehabilitation strategies will be done, and where required alternative strategies will be implemented. Once the rehabilitation activities have ceased annual monitoring will take place by the rehabilitation specialist (with assistance from other required specialists) to ensure that rehabilitation was effective (for a period of 3 years or as proposed within the closure plan)
- Monitoring programmes will continue post closure for a period of 3 years or as per period proposed within the closure plan.

9 MONITORING PLANS FOR ENVIRONMENTAL ASPECTS

The monitoring of various environmental aspects and the impact on them as a result of the proposed project and existing mining operations shall take place by means of both quantitative and qualitative techniques in order to determine whether or not the requirements of the EMPr 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. In essence, monitoring is a continuous data-gathering, data interpreting, and control procedure that ranges from visual inspection to in-depth investigative monitoring and reporting.

9.1 AIR QUALITY

Air quality monitoring in the form of dust sampling is undertaken at Kalgold mine. Based on the findings of the EIA for the expansion project and proposed and current activities the following mitigation, management and monitoring plan is to be implemented.

9.1.1 AIR QUALITY MANAGEMENT OBJECTIVES

The main objective of the proposed air quality management measures for the project is to ensure that operations at the facility cumulatively result in ambient air concentrations that are within the relevant ambient air quality criteria off-site. To define site specific management objectives, the main sources of pollution needed to be identified. Based on the emissions estimation and dispersion modelling results the two main sources groups associated with the future operations were determined to be crushing and screening operations and vehicles travelling on unpaved roads.

9.1.1.1 SOURCE SPECIFIC MANAGEMENT AND MITIGATION MEASURES

Currently Kalgold uses water bowsers applying water to roads (with an efficiency of dust mitigation estimated at 50% (previous studies for Kalgold) and water mist system at the pre-primary and primary crushers and water mist system with scrubber at the secondary and tertiary crushers. Kalgold will continue making use of these mitigation measures for the current and expansion operations. It is recommended that Kalgold combines chemical suppressants with the water sprays. Section 9.1.3 includes details on the potential additional mitigation measures that could be implemented.

9.1.1.2 SOURCE MONITORING

It should be noted that Kalgold should be reporting the annual emissions on the NAEIS system and should continue to do so. Under Section 21 of the NEM:AQA it is compulsory to measure and report annually, PM, NOx expressed as NO_2, SO_2, HF, HCl, Cl_2 and NH_3 emissions from the smelter stacks; PM, NOx expressed as NO_2, SO_2.from the carbon-regeneration kiln stacks and requires the holder of an AEL to submit an emission report in the format specified by the National Air Quality Officer (AQO) or Licencing Authority. NEM:AQA does state that the Licencing Authority should establish the final sampling/monitoring and reporting requirements based on knowledge of the sensitivity of the area and the potential significance of the impact of the operations that would have a detrimental effect on the environment (all biophysical and socio-economic aspects). As per the current Atmospheric Emission Licence (AEL), the Licensing Authority requires Harmony to conduct quarterly emissions sampling and reporting in the format specified by the AQO. It is therefore recommended that Harmony continue emissions sampling and reporting as currently conducted; and make the necessary changes to the sampling and reporting if there are any associated with the expansion operations Provisional Atmospheric Emission Licence (PAEL).

9.1.1.3 AMBIENT AIR QUALITY MONITORING

Ambient air quality monitoring can serve to meet various objectives, such as:

- Compliance monitoring;

- Validate dispersion model results;
- Use as input for health risk assessment;
- Assist in source apportionment;
- Temporal trend analysis;
- Spatial trend analysis;
- Source quantification; and,
- Tracking progress made by control measures.

It is recommended that the Kalgold current dustfall sampling continue to be conducted and that the PM_{10} monitoring is continued, and the weather station remains operational as part of the project's air quality management plan. The equipment must be maintained and kept in good working order to reduce downtime and the quantity of missing data.

The dustfall sampling and reporting must be conducted according to the NDCR. The weather station operators need to check regularly (at least once a week) that the station is operational and ensure that a weather station is recording at least hourly meteorological data and that the units of measurements (metric or imperial/US customary system) remains constant or note changes in the unit of measurements. The inclusion of meteorological data (wind speed, wind direction, and rainfall) in the dustfall reports is a requirement of the National Dust Control Regulations (NDCR). The on-site personnel should also ensure that there are no nearby structures or trees that could interfere with the wind flow from certain directions as this would produce incorrect readings for the wind field. The cause for the poor data availability from the PM10 sampler should be investigated, and the instrument should be calibrated bi-annually to ensure credible data used for management purposes.

9.1.2 RECORD-KEEPING, ENVIRONMENTAL REPORTING AND COMMUNITY LIAISON

9.1.2.1 PERIODIC INSPECTIONS AND AUDITS

Periodic inspections and external audits are essential for progress measurement, evaluation and reporting purposes. It is recommended that site inspections and progress reporting be undertaken at regular intervals (at least bi-annually), with annual environmental audits being conducted. Annual environmental audits should be continued at least until closure. Results from site inspections and monitoring efforts should be combined to determine progress against source- and receptor-based performance indicators. Progress should be reported to all interested and affected parties, including authorities and persons affected by pollution.

The criteria to be taken into account in the inspections and audits must be made transparent by way of minimum requirement checklists included in the management plan. Corrective action or the implementation of contingency measures must be proposed to the stakeholder forum in the event that progress towards targets is indicated by the quarterly/annual reviews to be unsatisfactory.

Should any environmental emergency incidents occur, the incident will need to be documented in detail and reported to the AQO. The summary of each emergency incident must include

- Nature and cause of incident.
- Actions taken immediately following the incident to minimise impact.
- Actions taken after to reduce the likelihood of reoccurrence.

9.1.2.2 LIAISON STRATEGY FOR COMMUNICATION WITH I&APS

Stakeholder forums provide possibly the most effective mechanisms for information dissemination and consultation. Management plans should stipulate specific intervals at which forums will be held and provide information on how people will be notified of such meetings. For operations in which un-rehabilitated or partly rehabilitated impoundments are located in close proximity (within 3 km) from community areas, it is recommended that such meetings be scheduled and held at least on a bi-annual basis. A complaints register must be kept at all times.

9.1.2.3 BUDGETING

The budget should provide a clear indication of the capital and annual maintenance costs associated with dust monitoring plans. It may be necessary to make assumptions about the duration of aftercare prior to obtaining closure. This assumption must be made explicit so that the financial plan can be assessed within this framework. Costs related to inspections, audits, environmental reporting and I&AP liaison should also be indicated where applicable. Provision should also be made for capital and running costs associated with dust control contingency measures and for security measures. The financial plan should be audited by an independent consultant, with reviews conducted on an annual basis.

9.1.3 ADDITIONAL MITIGATION MEASURES FOR DUST CONTROL ON UNPAVED ROADS

There are three types of measures that can be taken to reduce emissions from unpaved roads: (a) measures aimed at reducing the extent of unpaved roads, e.g. paving, (b) traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes and reducing vehicle speeds, and (c) measures aimed at binding the surface material or enhancing moisture retention, such as wet suppression and chemical stabilization (Cowherd, Muleski, & Kinsey, 1988); (APCD, 1995).

The main dust generating factors on unpaved road surfaces include:

- Vehicle speeds
- Number of wheels per vehicle
- Traffic volumes
- Particle size distribution of the aggregate
- Compaction of the surface material
- Surface moisture
- Climate.

When quantifying emissions from unpaved road surfaces, most of these factors are accounted for. Vehicle speed is one of the significant factors influencing the amount of fugitive dust generated from unpaved roads surfaces. The control efficiency obtained by speed reduction can be calculated by varying the vehicle speed input parameter in the predictive emission factor equation given for unpaved roads. An evaluation of control efficiencies resulting from reductions in traffic volumes can be calculated due to the linear relationship between traffic volume, given in terms of vehicle kilometres travelled, and fugitive dust emitted. Similar effects will be achieved by reducing the truck volumes on the roads. Thus, by increasing the payload of the truck, fewer trips will be required to transport the same amount of material.

Thompson and Visser (2000) developed a model to determine the cost and management implications of dust suppression on mine haul roads using water or other chemical palliatives. The study was undertaken at 10 mine sites in southern Africa. The model was first developed looking at the re-application frequency of water required for maintaining a specific degree of dust palliation. From this the cost effectiveness of water spray suppression could be determined and compared to other strategies. Factors accounted for in the model included climate, traffic, vehicle speed and the road aggregate material. A number of chemical palliative products, including hygroscopic salts, lignosulponates, petroleum resins, polymer emulsions and tar and bitumen products were assessed to benchmark their performance and identify appropriate management strategies. Cost elements taken into consideration included amongst others capital equipment, operation and maintenance costs, material costs and activity related costs. The main findings were that water-based spraying is the cheapest dust suppression option over the short term. Over the longer term however, the polymer-emulsion option is marginally cheaper with added benefits such as improved road surfaces during wet weather, reduced erosion and dry skid resistance (Thompson & Visser, 2000).

Kalgold currently implements the use of water sprays on the unpaved roads.

9.2 SURFACE WATER MONITORING

The surface water quality monitoring programs provide for an integrated evaluation of physical, chemical, and biological characteristics of aquatic systems in relation to human health concerns, ecological conditions,

and designated uses. The Kalgold Mine operation conducts monthly surface water monitoring at the following positions:

- Crawford Dam and Norman Dam;
- Water Tank Pit;
- A Zone Pit;
- Central Dam;
- South Dam;
- CIL Return Water Dam;
- D zone Pit;
- Plant process water dams;
- Oil separator effluent; and
- River diversion (upstream, middle and downstream).

Water is analysed for the following parameters: pH ; EC; TDS; SS; SO4; Mn; Mg (as CaCO3); Ca (as CaCO3); Na; Hardness; Cl; Fe; Zn; Cu; Ni; Pb; Cd; F; B; Al; U; Free CN; WAD CN and Total CN.

9.3 AQUATIC BIOMONITORING

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. Aquatic biomonitoring is currently being undertaken for the Kalgold Mine as per conditions of the Water Use Licence (WUL).

Four sites were selected to determine the toxic effects of chemicals on living organisms in the aquatic environment, namely:

- Crafford Dam;
- Norman Dam;
- Morokwa Downstream; and
- D-Zone Pit.

9.4 GROUND WATER MONITORING

A groundwater monitoring programme is currently in place. The water levels at the borehole localities identified in the hydrogeological study should be measured on at least a quarterly basis for inclusion into the groundwater database with the objective of groundwater model calibration at a later stage. The groundwater qualities should be analysed as prescribed by the WUL. This monitoring schedule should be re-assessed by a qualified person every year. Monitoring will be very important to verify the model simulations and to adjust should that be necessary. The following is recommended in terms of monitoring:

- Water volumes pumped from the various opencast pits should be measured with flow meters and recorded daily.
- Rainfall should be measured daily to distinguish between rainfall and groundwater inflow into the opencast pits.
- The quality of the in-pit water should be monitored regularly. If it is necessary to discharge surplus water into the surface streams this activity will have to be licenced. The licence will specify monitoring requirements in terms of frequency and parameters to be analysed.
- Groundwater quality monitoring in the mine monitoring boreholes should continue as per the WUL requirements.

- It is recommended that the private boreholes are also sampled and analysed annually. The previous sampling was conducted in 2011 as part of the hydro census. The private boreholes listed as "Medium and High Risk in the groundwater report should be included in this sampling (14 boreholes).
- The borehole and pump installation depths of these private boreholes should also be measured if possible, to allow for a more accurate risk assessment in terms of the available drawdown and risk of drying up.
- Groundwater levels in the mine monitoring boreholes, as well as the "High Risk" private boreholes identified in the groundwater report (MvB052/20/A037, October 2020) should be monitored quarterly. They include borehole KFBH1, KFBH2, KFBH3 and KFBH20. This rigorous monitoring programme is recommended due to the sensitivity of this "Sole Supply Aquifer" and to provide the mine with sufficient and defendable information should claims against the mine arise.

The following boreholes form part of the groundwater monitoring network:

- **WB64:** S 26° 10' 12.8" E 25° 14' 46.7"
- **WB99**: S 26° 10' 48.4" E 25° 14' 56.2"
- **WB24**: S 26° 14' 44.9" E 25° 14' 50.3"
- **WB82**: S 26° 14' 23.3" E 25° 13' 0.7"
- **WB82**: S 26° 09' 44.1" E 25° 15' 32.4"
- **WB15**: S 26° 09' 47.2" E 25° 15' 37.7"
- **WB13:** S 26° 09' 53.3" E 25° 16' 00.2"
- **WB88:** S 26° 09' 56.6" E 25° 15' 55.6"

The following high-risk boreholes must also form part of the monitoring network

- **KFBH1**: S 26° 10' 25.5" E 25° 12' 32.98"
- **KFBH2**: S 26° 9' 17.78" E 25° 13' 16.32"
- **KFBH3:** S 26° 8' 59.78" E 25° 16' 22.48"
- **KFBH20:** S 26° 8' 34.84" E 25° 12' 30.96"

The water samples collected from the above boreholes are analysed quarterly for the following parameters: PH, EC; TDS; Total Alkalinity; Ca (as $CaCO_3$); Mg; K; NH_3; Cl; Nitrate; SO_4; Fe; COD; Total Hardness; F; Mn; Cu; Cr; Zn; Al; As; Cd; Co; Ni and Pb.

9.5 BLAST MONITORING

A monitoring program is currently in place. An array consisting of four seismic monitoring stations is used to monitor blasts. 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. Monitoring could be done using permanent installed stations

9.6 NOISE MONITORING

A noise monitoring programme is in place. The aim of the annual noise monitoring programme is to assess the noise levels emanating from the Kalgold mining activities and whether it is impacting on any surrounding noise sensitive receptors, such as farmsteads and residential dwellings.

The objective of the monitoring programme is to take a 24hour noise measurement at the nearest noise sensitive receiver. The long term 24-hour measurements taken at the nearest noise sensitive receiver will allow for the accurate assessment of the noise level that is perceived at the exact location of the noise

sensitive receiver. The approach used in investigating noise impacts for this project is based on guidelines provided by the SANS 10103:2008 guidelines. According to the SANS 10103:2008, the sound pressure level is used as the measurement unit for noise guidelines

9.7 HERITAGE RESOURCES

Despite an intensive walkthrough of the footprint area, no evidence for any archaeological or heritage sites could be identified within the footprint of the infrastructure or activities proposed for the expansion project. As a result, no impact is expected from the proposed development on heritage. However, given the nature of heritage resources the following management measures and guidelines should still be considered.

The project will encompass a range of activities during the construction phase for the expansion project, including ground clearance, the establishment of construction camp areas and small-scale infrastructure development associated with the project. It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however, foundation holes do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure developments, such as construction camps and laydown areas, are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for. During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the chance find procedure detailed below be implemented.

9.7.1 GRAVE MANAGEMENT GUIDELINES

The HIA identified several burial Grounds and Graves (BGG). These will require management and mitigation if any of the resources will be affected by any construction-related activities. The following should be included in the Management Plan to be drafted for the BGG to be retained in situ in the project area:

- Direct what needs to be done, how the identified and accidentally discovered BGG must be protected and managed, and who will be responsible;
- Define the goals to be achieved and the type of activities;
- Guide any future construction or development-related activities;
- Determine the monitoring methodology;
- Assist with stakeholder engagement and identification of interested parties, if needed;
- Explain the permitting procedure;
- Describe any professional requirements and clarify responsibilities;
- Identify the significance of the heritage resources and provide guiding principles for activities on site;
- Identify the site value and provide guiding principles for activities on-site;
- Minimise loss or avoid adverse impacts on heritage resources;
- Ensure that cultural heritage is incorporated in spatial planning and linked to social strategies;
- Improve the understanding of cultural heritage and the contribution it makes to the broader management processes; and
- Ensure that proper investigation, recording and stakeholder meetings take place.
- Includes the Chance Finds Procedure, which outlines the process to follow if any culturally significant heritage resources are found during construction/or operation related activities

9.7.2 CHANCE FIND PROCEDURE

- An appropriately qualified heritage practitioner/archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted.
- The qualified heritage practitioner/archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner/archaeologist.

9.7.3 POSSIBLE FINDS DURING CONSTRUCTION AND OPERATION

Soil clearance for infrastructure as well as the proposed reclamation activities could uncover the following:

- stone foundations;
- ash middens associated with the historical structures that can contain bone, glass and clay ceramics, ash, metal objects such as spoons, forks, and knives.
- unmarked graves.

9.7.4 TIMEFRAMES

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames.

10 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

Shangoni Management Services compiled the original 2014 upon which this EMPr update is based. EIMS has been appointed by Kalahari Goldridge Mining Company (Pty) Ltd (Kalgold) as the Independent EAP and to assist in preparing the updated Kalgold EMPr with respect to activities associated with the proposed amendment project. This report does not supersede the previous EAPs responsibility in so far as It relates to the activities not covered by the amendment application.

11 TECHNICAL SUPPORTING INFORMATION

The following reports have been included as Appendices to this report:

Appendix 1: EAP CV

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