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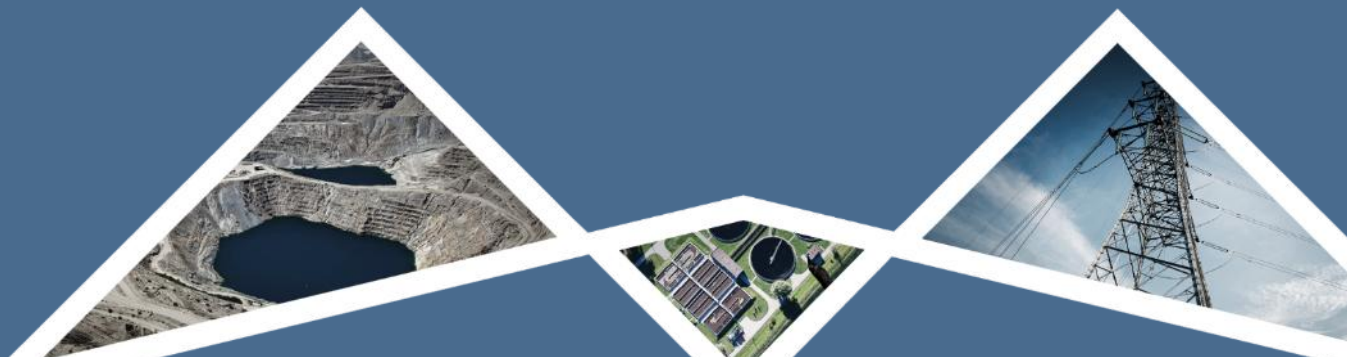
ENVIRONMENTAL MANAGEMENT PROGRAMME

HARMONY GOLD:
SAVUKA 7A & 7B TAILINGS STORAGE FACILITY PROJECT

JUNE 2025



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1 INTRODUCTION

1.1 REPORT STRUCTURE

This report is a new Environmental Management Programme (EMPr) for the proposed Savuka 7a and 7b Tailings Storage Facilities (TSFs) height extension project, and as such 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. This standalone EMPr for the Savuka 7a & 7b TSFs should be considered as an addendum to the existing approved EMPr (DMRE Reference (GP) 30/5/1/2/2 (01) MR.aa

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;	Section 1.5
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 3
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;	Section 1.4
Appendix 4(1)(1)(d):	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified though the environmental impact assessment process for all phases of the development including – i. Planning and design; ii. Pre-construction activities; iii. Construction activities; iv. Rehabilitation of the environment after construction and where applicable post closure; and v. Where relevant, operation activities;	Section 4
Appendix 4(1)(1)(f):	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to – i. Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Section 5

Environmental Regulation	Description	Section in Report
	ii. Comply with any prescribed environmental management standards or practices; iii. Comply with any applicable provisions of the act regarding closure, where applicable; ands iv. Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	
Appendix 4(1)(1)(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 3.2
Appendix 4(1)(1)(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 3.3
Appendix 4(1)(1)(i):	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 3.1 and 3.5 and 5
Appendix 4(1)(1)(j):	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 5
Appendix 4(1)(1)(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 3.5
Appendix 4(1)(1)(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 2.4
Appendix 4(1)(1)(m):	An environmental awareness plan describing the manner in which – i. The Project Proponent 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 2.7
Appendix 4(1)(1)(n):	Any specific information that may be required by the competent authority.	Specific information will be provided in various sections of the Final EMPr in line with DMRE comments, once received.

1.2 INTRODUCTION TO THE PROJECT

Golden Core Trade and Invest (Pty) Ltd - (a subsidiary of Harmony) also referred to as the 'Applicant', own and operate a number of Gold Mines and Plants in the West Wits region in the Gauteng Province, including the Mponeng Operations Gold Mine where the Savuka Plant is located, near Carletonville.

The Savuka Plant currently deposits tailings onto the Savuka 5a, 5b, 7a & 7b Tailings Storage Facilities (TSFs). However, these facilities are approaching their final and approved height i.e. 60 metres above ground level (magl), and the current planned Life of Mine (LOM) for the West Wits region exceed the available deposition capacity of these TSFs. Accordingly, Harmony is undertaking a feasibility assessment to increase the height of the Savuka 7a & 7b TSFs by 5 to 10 metres, to a total height of not more than 70 magl.

Subsequently, Harmony has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required Environmental Authorisation (EA) processes (including the statutory public participation), and to compile and submit the required documentation in support of an application for:

- Environmental Authorisation (EA) in accordance with the National Environmental Management Act, 1998 (NEMA) EIA Regulations - Listed activities:

  Listing Notice 1, Activity 34.

- Water Use Authorisation (WUA) in accordance with the National Water Act (Act 36 of 1998) – Section 21 Listed activities:
  - Section 21 (c);
  - Section 21 (g); and
  - Section 21 (i).

Waste Management License in accordance with the National Environmental Management: Waste Act 59 of 2008:

- Category A: 13.

The proposed height extension of the Savuka 7a & 7b TSFs Project falls within: Merafong City Local Municipality Wards 5 & 27 (West Rand District Municipality) administrative area. The project area is situated within 2 farm properties distributed between Portion 25 of the Farm Doornfontein 118 IQ and Portion 93 of the Farm Blyvooruitzicht 116 IQ.

The Public Participation Process (PPP) as required by Regulation 41(2) of the EIA Regulations, 2014 as amended has commenced. To date the following PPP has been conducted:

- Initial call to register:
  - Newspaper Advertisement: Placement of advertisement in English and SeTswana in the Carletonville/Fochville Herald Newspaper;
  - Placement of site notices: Placement of 6 A1 Correx site notices in English and SeTswana at locations along, within and surrounding the perimeter of the proposed project study area and 7 additional A3 posters in public areas surrounding the study area;
  - Notification of landowners, occupiers and other key I&APs: Notification letters, were distributed to pre-identified I&APs through either email, fax, and/or registered mail where contacts were available.

The draft BAR, including the draft EMPr are made available to Interested and Affected Parties (I&APs) for comment for a minimum period of 30 days from the 27th of June 2025 until the 28th of July 2025. All comments received during this period will be included in the Final BAR for submission to the DMRE Gauteng Region for their decision-making process.

1.3 DESCRIPTION OF THE PROPERTY

Table 2 indicates the farm portions that fall within the proposed project including details on the project location as well as the distance from the proposed project area to the nearest towns.

Table 2: Locality details

Property	The proposed project is located on two properties i.e. Portion 25 of the Farm Doornfontein 118 IQ and Portion 93 of the Farm Blyvooruitzicht 116 IQ.
Application Area (Ha)	The two Savuka 7a & 7b TSFs is approximately 270 Ha in extent.
Magisterial District	West Rand District Municipality
Distance and direction from nearest towns	The proposed extension of the Savuka 7a & 7b TSFs Project falls within: Merafong City Local Municipality Wards 5 & 27 and is located approximately 6.5 km southwest of the central business district of Carletonville (refer to Figure 1).
Surrounding land uses	The project area is located in an area with predominately mining development and industrial activities. Other dominant land uses in the project area include the local access roads, dirt roads, tar national road and existing pipeline and powerline servitudes. The proposed properties are expected to be generally flat, with a few steep TSFs in adjacent properties. The area is predominantly characterised by TSFs and other infrastructure related to the mining activities from the Harmony Savuka Mine and other Harmony mining activities in the area.

The locality and extent of the proposed TSF is shown in Figure 1 .

1.4 SENSITIVE AREAS

No “no-go” areas were identified in the area surrounding the TSFs. The only identified sensitive areas on site relate to the aquatic sensitive areas. The sensitivity map is provided in Figure 2.[1]

[1] Note that the Department of Water and Sanitation requested that the Savuka TSF 5a and 5b be included in the assessment for the existing c) and i) water uses. For this, only the wetland study was required to be updated and included these sections in the sensitivity map, and not the hydrological study sensitivity.

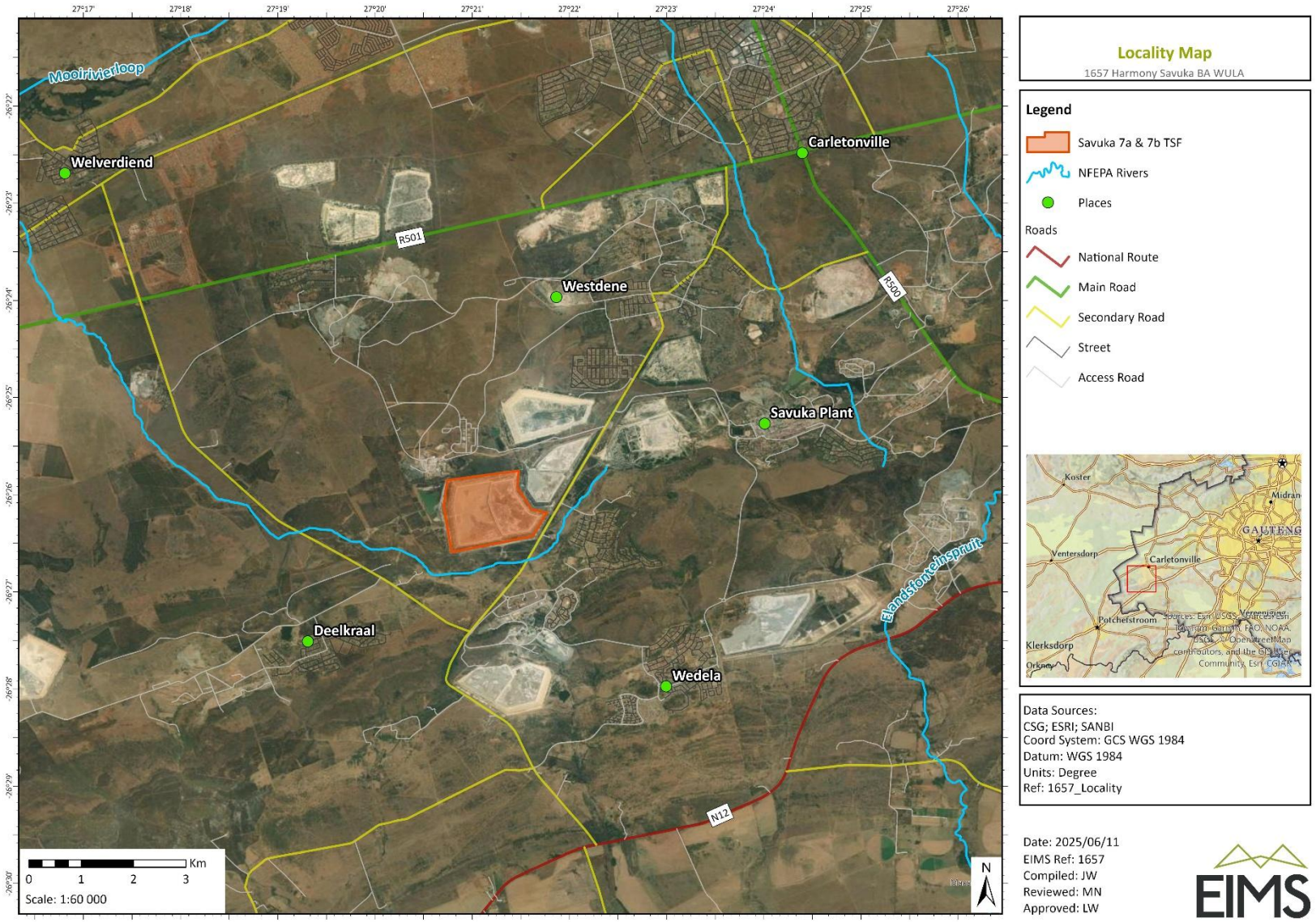

Figure 1: Locality Map

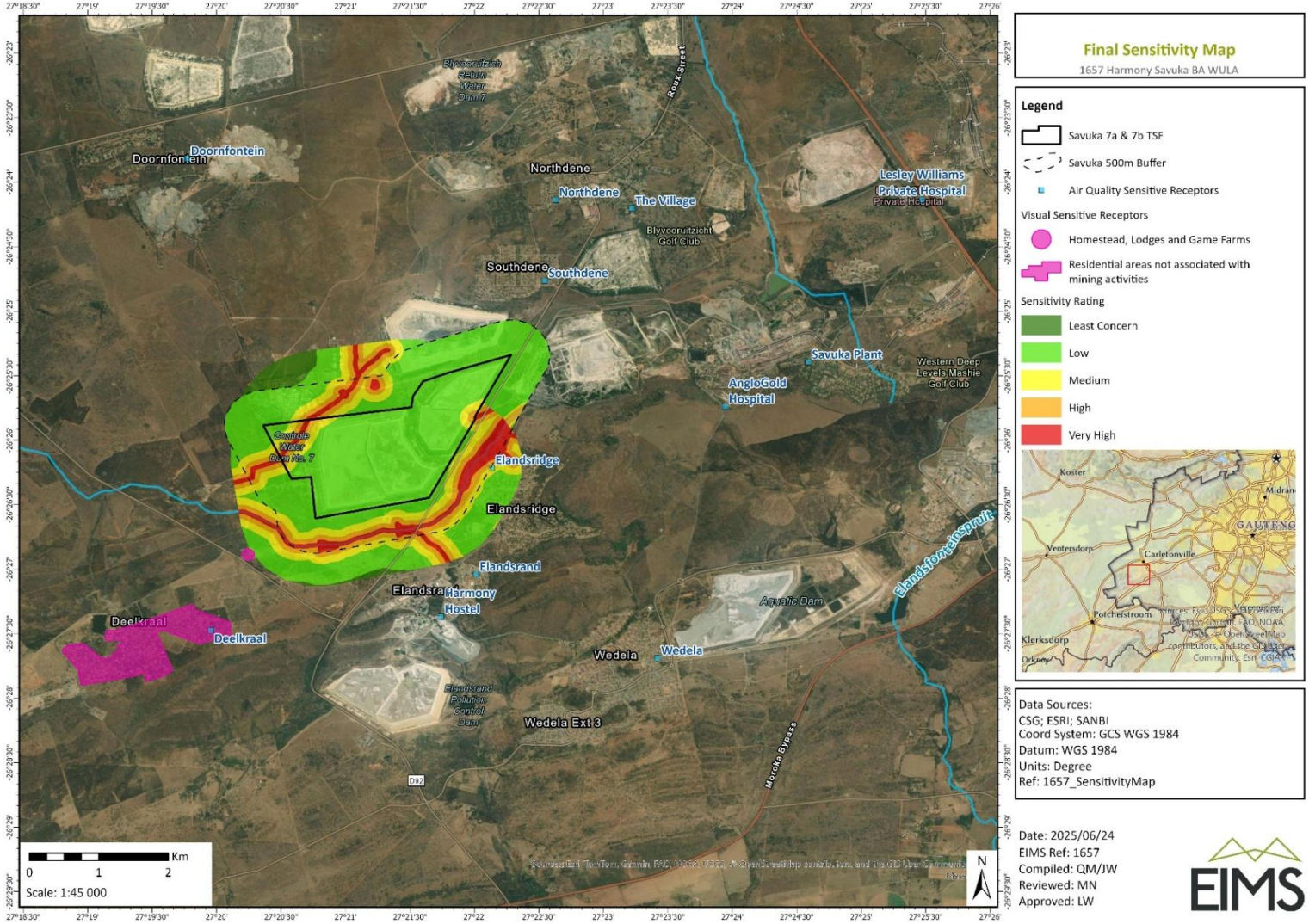

Figure 2: Sensitivity Map

1.5 DETAILS OF THE EAP

EIMS has been appointed by Harmony Gold Mining Company as the Independent EAP and to assist in preparing and submitting the EA application, Basic Assessment (BA) Reports, and undertaking a Public Participation Process (PPP) in support of the proposed project. The contact details of the EIMS consultant who compiled this EMPr are that s follows:

- Name of the consultant: Monica Niehof
- Tel No.: 011 789 7170
- Fax No.: 011 787 3059
- E-mail address: monica@eims.co.za

1.5.1 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 Project Proponent to manage the application. EIMS has been appointed by the Project Proponent 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 environmental regulations and all other applicable legislation;
- Takes into account all relevant factors relating to the application; and
- Provides full disclosure to the Project Proponent and the relevant environmental authority.

1.5.2 SUMMARY OF EAP'S PAST EXPERIENCE

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS has in excess of 30 years' experience in conducting EIA's, including many EIA's for mines and mining related projects. Please refer to the EIMS website (www.eims.co.za) for examples of EIA documentation currently available. Monica Niehof is a senior consultant at EIMS and has been involved in numerous significant projects during her 13 years experience as an EAP. She has experience in Project Management, small to large scale Environmental Impact Assessments, Environmental Auditing, Water Use Licensing, and Public Participation.

2 ENVIRONMENTAL MANAGEMENT SYSTEM

Management of operational risk is a key consideration for mines operating within the social and economic context of South Africa. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. Operational risks and impacts are usually managed through the implementation of the Environmental Management System (EMS) (i.e. ISO 14001:2015-EMS) and Health and Safety (HS) system. A EMS is an important requirement for establishing and maintaining effective environmental management and should be undertaken during the planning phase of the Project. As such the Project Proponent shall be required to ensure all the aspects listed in this section are included as part of the EMS existing on the mine. Adequate resources (people, financial and technical) need to be made available to ensure effective establishment, implementation, maintenance and continual improvements of the EMS. The roles and responsibilities for these key environmental personnel should be clearly defined and communicated throughout the organisation. The EMS should include the requirement to constantly monitor environmental performance and assess the adequacy of environmental resources provided for the mine. If required, the mine would need to procure further environmental resources to ensure the successful implementation of the EMS and EMPr. The development and implementation of an EMS will guide compliance with relevant regulatory and other requirements.

2.1 EMS FRAMEWORK

The Savuka 7a & 7b TSFs height extension project EMS will be based on:

- The mine's corporate vision;
- South African legal requirements; and
- Mining best practice.

Ultimately an effective EMS should provide for effective management of social and environmental risks and impacts whilst maintaining legal compliance and meeting international standards of best practise where these are feasible and appropriate. Harmony subscribe to ISO 14001:2015-EMS, an EMS which is currently in place which will be applicable to the Savuka 7a&7b TSFs project.

2.1.1 STAKEHOLDER ENGAGEMENT

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

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

- To identify and assess the processes and/or mechanisms that will improve the communication between local communities, the wider community and the 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.

This stakeholder engagement plan will assist the Project Proponent to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the project. Such a

plan cannot be considered a once off activity and should be updated on a regular basis to ensure that it stays relevant and to capture new information. The Stakeholder Engagement Plan should consist of the following components:

- Stakeholder Identification and Analysis – time should be invested in identifying and prioritising stakeholders and assessing their interests and concerns;
- Information Disclosure – information must be communicated to stakeholders early in the decision-making process in ways that are meaningful and accessible, and this communication should be continued throughout the life of the project;
- Stakeholder Consultation – each consultation process should be planned out, consultation should be inclusive, the process should be documented, and follow-up should be communicated;
- Negotiation and Partnerships – add value to mitigation or project benefits by forming strategic partnerships and for controversial and complex issues, enter into good faith negotiations that satisfy the interest of all parties;
- Grievance Management – accessible and responsive means for stakeholders to raise concerns and grievances about the project must be established throughout the life of the project;
- Stakeholder Involvement in Project Monitoring – directly affected stakeholders must be involved in monitoring project impacts, mitigation and benefits. External monitors must be involved where they can enhance transparency and credibility;
- Reporting to Stakeholders – report back to stakeholders on environmental, social and economic performance, both those consulted and those with more general interests in the project and parent company;
- Management Functions – sufficient capacity within the company must be built and maintained to manage processes of stakeholder engagement, track commitments and report on progress; and
- It is of critical importance that stakeholder engagement takes place in each phase of the project cycle and it must be noted that the approach will differ according to each phase.

2.1.2 GRIEVANCE MECHANISM

- The TSFs to be heightened are situated in a mining area where there are already high levels of impact and complex social dynamics. Given its proximity to other mining areas, it is not expected that the project will cause a significant influx of people into the area, as there are no additional human resources needed to continue with deposition of tailings.
- From a social perspective, the TSF extension will mostly result in existing impacts continuing or slightly increasing, due to the increase in height and duration of the operational impacts. The height extension will not add significant social impacts. It must be considered that there are also positive social impacts, such as skills development, CSI projects and SLP projects that will continue.
- In order for the community to be comfortable with the TSF height extension, it is critical that the mine and the community come to an agreement on how to deal with the issues between themselves and the mine, if any arise. If the mine can resolve some of the current issues, if there are any, and prevent any issues from occurring, but implementing this EMPr, it will assist with maintaining and improving their social licence to operate.
- The following recommendations are made:
    - The mine must continue to invest in their Stakeholder Relations Division.
    - The mine must implement a community-friendly external grievance mechanism in conjunction with communities;

- The mine must develop a community relations strategy to plan for and guide its involvement with the community. The strategy should include feedback mechanisms about aspects of concern to the community;
- The mine should put measures in place to ensure the most effective local employment strategy, in conjunction with local leadership; and
- The mine must ensure that social requirements as specified in the mitigation measures are included in their contracts with sub-contractors.

2.1.3 INTERNAL GRIEVANCE PROCEDURE

Harmony 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.

2.2 DOCUMENT CONTROL

A document handling system must be established, if not already established (then maintained), to ensure accurate updating of EMPr documents, and availability of all documents required for the effective functioning of the EMPr. The document handling system must be devised by the project proponent and/or Contractors and agreed upon by all key parties. Responsibilities must be assigned to relevant personnel for ensuring that the EMPr documentation system is maintained and that document control is ensured through access by and distribution to identified personnel.

- Supplementary EMPr documentation could include:
  - EMPr implementation activity specifications;
  - Emergency preparedness and response procedures;
  - Incident reports;
  - Training records;
  - Records of chemicals or hazardous substances kept on site;
  - Records of alien invasive plant control activities;
  - Site inspection reports;
  - Monitoring reports;
  - Auditing reports; and
  - Complaints received.

The Senior Environmental Officer (EO) and Regional Environmental Manager (EM) should be responsible for ensuring that the registration and updating of all relevant EMPr documentation is carried out. It is usually the responsibility of the Project 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. Clear procedures must be specified at the beginning of the project for making changes to EMPr documents, circulating updated documents, and destroying obsolete versions. Documents must be revised as required by changing circumstances. Distribution lists and document change control sheets must be kept for all documents.

2.3 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. The Project Proponent (Applicant) is, therefore, required to develop and maintain a procedure for the identification, storage, protection, retrieval, retention and disposal of records as part of the EMS. Records must be legible, identifiable and traceable.

2.4 AUDITING AND REPORTING PROCEDURES

Reporting procedures must be developed at the start of the project, for conveying information from the monitoring activities and to ensure that management is able to take rapid corrective action should certain thresholds be exceeded. Different reporting procedures to deal with may include:

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

2.5 RESPONDING TO NON-COMPLIANCES

If the mitigation measures stated in the EMPr are not adequately implemented, or do not achieve the desired result, the authorities may stop the project until corrective actions have been taken and the desired environmental objective or target has been met. A system for dealing with non-compliances must be employed to ensure that the EMPr is adequately implemented. The system to be used must be determined described in the EMPr, included in the tender documents and contracts, and made clear to all project workers.

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; and
- **Reporting** on a quarterly basis.

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

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

2.6 ENVIRONMENTAL INCIDENTS

For the purposes of this project, environmental incidents will be dealt with according to the Mponeng Operations incident management and reporting procedure.

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 Project Proponent shall notify the relevant authorities in accordance with legal requirements (e.g. Section 30 of NEMA and Section 20 of the NWA).

2.7 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

Training is essential for ensuring that the EMPr provisions are implemented efficiently and effectively. Training needs should be identified, based on the available and existing capacity of site and project personnel (including the project proponent, Contractors and Sub- contractors) to undertake the required EMPr management actions and monitoring activities. It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard. In addition to these parties, general environmental awareness must be fostered among the general workforce to encourage the implementation of environmentally sound practices. This ensures that environmental accidents are minimized and environmental compliance maximized. Environmental awareness could be fostered by induction course for all workers on site, before commencing work on site, as well as during regular "toolbox talks". Workers should also be alerted to particular environmental concerns associated with their tasks for the area/habitat in which they are working. Courses must be given by suitably qualified personnel and in a language and medium understood by workers/employees.

2.7.1 MANNER IN WHICH EMPLOYEES WILL BE INFORMED OF ENVIRONMENTAL RISKS

The Human Resources Development Programmes of the Project Proponent, include appropriate training and skills development programmes as required by the workforce in support of operation specific business plans. Training is offered in portable skills, being competencies that will enable employees to find jobs elsewhere within the mining industry, or to become self-employed. Harmony Training Centre will continue to provide skills training to mine workers during their employment at the operation. This training will be fully accredited, ISO registered and all skills development Programmes will be unit standards-driven and thereby portable within the industry. The Workplace Skills Development Plan is formulated; developed and implemented in line with the skills development plan as accorded by the Skills Development Act of 1997 and the Mining Qualifications Authority requirements.

All training, short courses and tertiary studies will adhere to the above-mentioned criteria and will be guided and aligned to affiliate processes inherent of managing downscaling and local economic development. These income-generating skills will be informed by the relative IDP/LED priorities of the relevant municipality and will be facilitated timeously.

There is a Mining Qualifications Authority accredited (Adult Basic Education and Training) ABET Programme in place for the operation offering both part and full-time classes. The venue where these are presented is appropriate and classrooms can adequately accommodate 20 learners per class.

Training initiatives have focused on the development of both technical and managerial skills of senior and middle management. At the operational level, training initiatives include mine management commitment to the ABET initiatives.

Broadly the Skills Development Plan for Harmony details the respective training that is being provided as per the requirements of the shaft business plans and articulates the measures that are in force to ensure that continued career progression of Historically Disadvantaged South Africans (HDSA's) into management levels and women in the mining industry.

As part of the training process, teams / parties are encouraged to:

- Promote and encourage inspections/reporting on environmental impacting incidents;
- Practice concurrent rehabilitation;
- Support regional environmental management awareness campaigns/programmes and systems; and
- Be aware of your actions on the environment.

- Initial environmental induction and periodic toolbox talks should be made a requirement for all contractors.

2.7.2 MANNER IN WHICH ENVIRONMENTAL RISKS WILL BE DEALT WITH

Environmental incident reporting is a vital part of communication for the Environmental Department at the Operation. Employees are required to report any and all environmentally related problems, incidents and pollution, so that the appropriate remedial action can be implemented timeously. Rehabilitation and mitigation capacity resides within the various operational functions, i.e. surface engineering, metallurgical, etc. Where specific engineering or metallurgical capacity is lacking in-house, use will be made of external facilities. Further support for the Environmental Management function is derived from the various departments within the group. The Harmony incident reporting procedure is provided in Figure 3.

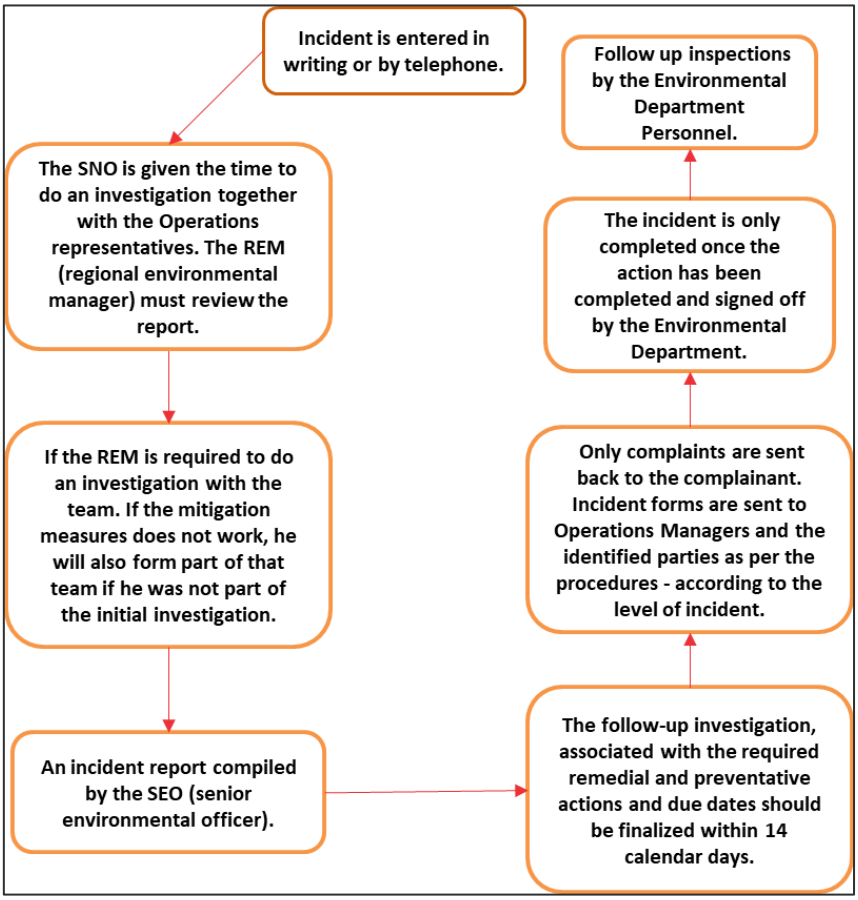

Figure 3: Incident Reporting procedure

Communication is a management responsibility. As mentioned before the Environmental Management Function (EMF) resides within the portfolio of Environmental Management. Structures and reporting mechanisms have been put in place to ensure that the Board is kept fully informed of environmental matters within the group.

2.7.3 EMERGENCY RESPONSE PLAN

It should be noted that Harmony conforms with ISO 14001 and abide by its guidance regarding emergencies and risk & impacts. They should ensure that potential emergencies are identified and their current procedures for preventing and responding to them are adequate. There are several options for dealing with high priority impacts and risks, as the paradigm has two components, probability and consequence. The design of control measures rest on the understanding the cause and effect. Best practise is to intervene with the ultimate factors were feasible, rather than treat the outcomes. Emergency response therefore has the option of reducing probability, or reducing the consequence, reducing the probability is the preferred option. Below are some common emergency preparedness approaches:

- Threat consequence if and when the risk eventuates, when the risk becomes an issue.
- Combine reducing the probability and treating the consequence.
- Offset environmental losses by investing in other assets.
- Not manage some of the risks because there are too many.
- Make provision to manage residual impacts or issues that arise because of shortcomings in risk identification and rating, avoidance and mitigation or because a rare event has occurred.
- Residual impacts are those impacts that despite reducing the probability and consequence might still occur. In these cases, parties will have to be compensated, pollution cleaned up and damage to the environment remediated.
- The Project Proponent shall be required to develop and implement an Emergency Preparedness and Response Plan prior to commencing work. The Emergency Preparedness and Response Plan should be based on a baseline Hazard and Risk Assessment and should provide for the following as a minimum:
- Risk assessment (identification of areas where accidents and emergency situations may occur, communities and individuals that may be impacted).
    - Response procedures.
    - Provision of equipment and resources.
    - Designation of responsibilities.
    - Communication and reporting (including that with potentially Affected Communities).
    - Periodic training to ensure effective response.
    - Periodic review and revision, as necessary, to reflect changing conditions.
- The Project Proponent must ensure that the Emergency Preparedness and Response Plan makes provision for environmental emergencies, including, but not limited to.
    - Fire Prevention.
    - Fire Emergency Response.
    - Spill prevention.
    - Spill Response.
    - Contamination of a water resource.
    - Accidents to employees.
    - Use of hazardous substances and materials, etc.

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

2.7.3.1 FIRE

Fires represent a significant risk to mining operations and require special attention in the Emergency Response Plan. Sparks generated during welding, spontaneous combustion, cutting of metal or gas cutting can result in fires. Every possible precaution shall therefore be taken when working with this equipment near potential sources of combustion. The Project Proponent must take all reasonable measures to ensure that fires are not started as a result of activities on site. No smoking is allowed near containers with flammable contents or at

areas that are highly flammable. Smoking is only permitted at areas designated for smoking. No open fires are permitted on site and no burning of waste is to be allowed on site. The Project Proponent shall ensure that there is sufficient fire-fighting equipment available on site at all times. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities. The Project Proponent is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. Appropriate and correctly serviced equipment must be available for all activities that are likely to generate fire.

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

2.7.3.2 HEALTH AND SAFETY

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

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

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

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

2.7.3.3 SPILL RESPONSE PROCEDURE

All employees, staff and labourers must be instructed regarding implementation of spill prevention measures and spill response procedures. In the event of a spill, the following general requirements shall apply, and the detailed spill procedure must cater for these requirements. Harmony has a spill response plan in place which should be utilized in case of spills occurring. In terms of the existing Harmony spill response plan the following general actions are recommended:

- Any oil, diesel, petrol, tailings (including slurry) or hazardous chemical spill, must be reported as an environmental incident (by any employee) to the person responsible for coordination of the Corrective action on site.
- The person that first noted the spill must take steps to prevent the spill from spreading and report it.
- Personal Protective Equipment (PPE) must be worn when handling oil, diesel, solvents or other chemicals as required by the Material Safety Data Sheet (MSDS).
- Consult the MSDS to determine the toxicity of the substance and which PPE must be worn.
- Should a spill occur, the person responsible must take the necessary steps to contain the spill to minimize the area affected and prevent contamination of a water source, e.g. storm water.
- Once contained, the spill should be cleaned up in a manner appropriate to the spill as in the table below.

- If harmful substances, other than oil, fuel or lubricant, are spilled into water the contaminated water must be contained and pumped to an area where it can either be rectified or correctly disposed of.

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

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

- Limit the size of the area to be disturbed as far as is practically possible;
- Conduct regular TSF inspections in line with the regulatory requirements;
- Establish and maintain dirty and clean water systems in line with the regulatory requirements;
- Contain potential pollutants and contaminants (where possible) at source;
- Handling of potential pollutants and contaminants (where possible) must be conducted in bunded areas and on impermeable substrates;
- Ensure the timeous clean-up of any spills;
- Implement a waste management system for all waste stream present on site;
- Investigate any I&AP claims of pollution or contamination as a result of mining activities;
- Rehabilitate the proposed mining site in line with the requirements of the detailed rehabilitation and closure plan; and
- Implement the impact management objectives, outcomes and actions.

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

3 COMPLIANCE MONITORING

3.1 RESPONSIBLE PERSONS

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

Different parties have different responsibilities and roles in the implementation of the EMPr. A summary is included in Figure 4.

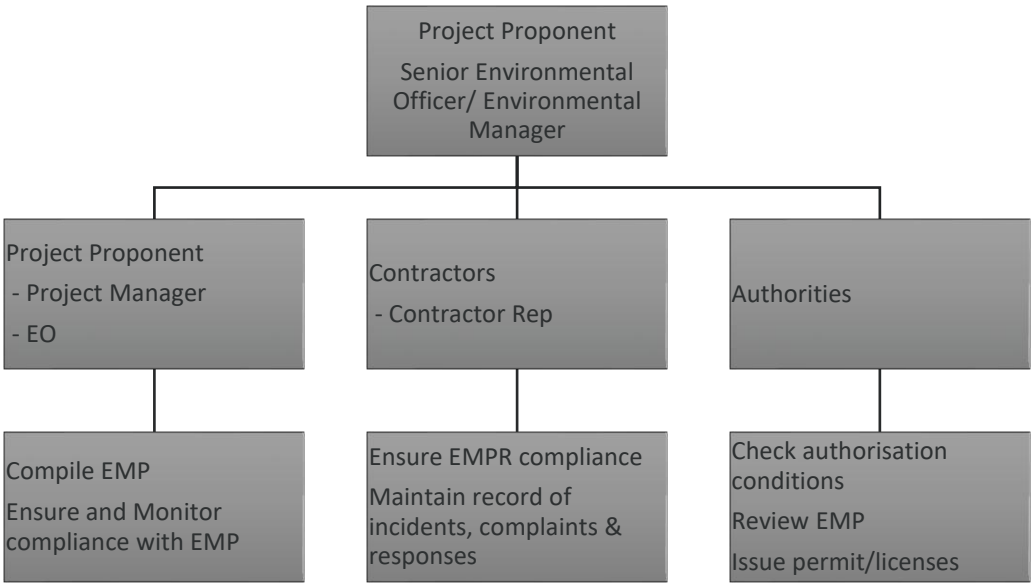

Figure 4: Responsibilities And Roles For Identified Actions

3.1.1 PROJECT PROPONENT

The Project Proponent is the principal party of the project. The accountability for correct implementation of the relevant requirements of the EMPr falls primarily upon the Project Proponent and must therefore be built into all contractor's contractual agreements.

The Project Proponent is responsible for the following tasks:

- Provide for all necessary supervision during the execution of the project including appointment of key personnel to act on his/her behalf during the project (e.g. Regional Environmental Manager/Project Manager). The key personnel will be tasked with ensuring that the various employees and contractors comply with the necessary provisions of the EMPr and relevant legislation and guidelines;
- Ensure that the a senior environmental officer (EO) is employed, ensuring daily compliance with the EMPr and relevant legislation and guidelines by employees, various contractors and applicable sub-contractors, throughout the execution of the relevant project components;
- Ensuring the Regional Environmental Manager with the Senior Environmental Officer undertake periodic audits on the various contractors works;
- Notify the relevant competent authority of any significant environmental impacts;
- Assess the various contractors' environmental performance, in consultation with the Senior Environmental Officer on site and the Regional Environmental Manager;
- Ensure compliance with regulations;
- To implement the projects as per the approved project plan;
- To ensure that implementation is conducted in an environmentally acceptable manner;

- To inform and educate all employees about the environmental risks associated with the different activities that should be avoided and lessen significant impacts to the environment;
- Notify DMPR and / or any other competent authority of changes in the mining operation resulting in significant environmental impacts;
- Assess the Contractors environmental performance during mining in consultation with the Regional Environmental Manager and Senior Environmental Officer; and
- Ensure compliance with regulations.

Therefore, ultimately, the Project Proponent is responsible for the development and implementation of the EMPr and, where relevant, ensuring that the conditions in the authorisation are satisfied. Where mining activities are contracted out (e.g. to Contractors and Subcontractors), the liability associated with non-compliance still rests with the Project Proponent (unless otherwise agreed upon between the authorities, the Project Proponent and the contracting parties). The Project Proponent (and not the Contractor) is therefore responsible for liaising directly with the relevant authorities with respect to the preparation and implementation of the EMPr and meeting authorisation conditions.

3.1.2 PROJECT MANAGER

The Project Manager i.e. the Regional Manager is accountable for ensuring compliance with the EMPr. The Regional Manager will oversee the Senior EO. The EO must objectively monitor the implementation of the EMPr according to relevant environmental legislation and guidelines. The Project Manager is further responsible for providing and giving mandate to enable the EO to perform responsibilities.

During the project, a number of contractors and sub-contractors may be undertaking activities on the project (Intasol management of the TSF). The Project Manager would oversee all contractors and sub-contractors from a project management point of view.

Responsibilities of the Project Manager include:

- Be fully conversant with applicable environmental legislation and guidelines relating to the project, as well as the EMPr;
- Ensure that all stipulations within the EMPr are communicated and adhered to by the Project Proponent and its Contractor(s);
- Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation;
- Ensure that periodic environmental performance audits are undertaken on the project implementation;
- The Project Manager acts on behalf of the Project Proponent regarding the administration of contracts to sub-contractors, etc.;
- Provides and/or approves scheduling, aspects of co-ordination and estimation;
- Ensures implementation of the project plan within cost, time and quality constraints; and
- Keeps the Project Proponent informed of progress made during the life cycle of the project.

3.1.3 SENIOR ENVIRONMENTAL OFFICER

The Senior Environmental Officer (EO) will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities.

Responsibilities:

- Be fully conversant with the EMPr;

- Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;
- Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) and its sub-contractor(s);
- Confine the development site to the demarcated area;
- Conduct environmental audits with regards to EMPr compliance;
- Assist the contractors in addressing environmental challenges on site;
- Assist in incident management;
- Reporting environmental incidents to the Project Manager (Regional Environmental Manager) and ensuring that corrective action is taken, and lessons learnt shared;
- Assist the contractor in investigating environmental incidents and compile investigation reports;
- Follow-up on pre-warnings, defects, incident reports;
- Measure and communicate environmental performance to the Contractor;
- Conduct environmental awareness training on site;
- Ensure that the necessary legal permits and / or licenses are in place and up to date; and
- Acting as Developer's Environmental Representative on site.

3.1.4 CONTRACTORS

The contractor is usually a third party appointed by the developer/project manager to undertake any activities on the site. For the purposes of this section, any contractor (regardless of who appointed them) is referred to as the "contractor".

The relevant contractors are answerable to the Project Manager (Regional Environmental Manager and Senior EO for all environmental issues associated with the project. Contractor performance will, amongst others, be assessed on health, safety and environmental management criteria. The principal contractor/s, any other contractors and sub-contractors will be required to comply with the provisions contained herein, and accordingly, the EMPr and its provisions must form part of any contractual arrangements between the Developer and contractors, and contractors and their sub-contractors, etc. The contractor must comply with EMPr and ensure that all employees and sub-contractors appointed are familiar with the EMPr. The legal accountability for correct implementation of the relevant requirements of the EA and EMPr must be contractually bound to the appointed contractor.

Responsibilities:

- Project delivery and quality control for the development services as per appointment;
- Employ a suitably qualified person to monitor and report to the Developer's appointed person on the daily activities on-site;
- Ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely;
- To ensure that management of the TSF or any other activities are conducted in an environmentally acceptable manner;
- To fulfil all obligations as per the agreed contract; and

Ensure that the Contractors staff and employees have received the appropriate environmental awareness training prior to working on site.

The Contractor is answerable to the Project Manager for all environmental issues associated with the project. Contractor performance will, amongst others, be assessed on health, safety and environmental management criteria.

The Project Proponent must inform the Contractor of the EMPr obligations (which have ideally been integrated into the tender document), as well as environmental training to be undertaken by the Contractor in terms of these obligations. Contractors must communicate these obligations to their Sub-contractors, if any and ensure that there is compliance.

3.1.5 AUTHORITIES

The authorities may be required to perform the following roles:

- Participate in a meeting(s) with the Project Proponent at the start of the EMPr process in order to reach agreement on the approach to the EMPr.
- Review the draft EMPr submission.
- Review Monitoring and Audit reports, if required.
- Review whether there is compliance by the Project Proponent and Contractor with the terms of the EMPr and permit/license conditions. Whenever necessary, the authorities should assist the Project Proponent in understanding and meeting the specified requirements.

The authorities may perform random controls to check compliance. In case of persistent non-compliance, the Project Proponent will be required to provide an action plan with corrective measures and have it approved by the authorities. The key authorities that should be involved are the Department of Mineral and Petroleum Resources (DMPR), and Department of Water and Sanitation (DWS).

3.2 METHOD OF MONITORING IMPACT MANAGEMENT ACTIONS

Harmony Gold Mining Company 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 Project Proponent and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to ensure accountability. Harmony 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 3: Proposed framework for compliance monitoring and audits

Resource	Document	Implementation		Checking/Monitoring/Audit	
		Responsible Party	Frequency	Type	Reporting Frequency
Project Manager (Regional Environmental Manager)	EMS Procedures	Harmony	As Required	Report Review	As Required
	EMP/EMPr	Harmony	As Required	Report Review	As Required
	IWWMP	Harmony	As Required	Report Review	As Required
	IWULA	Harmony	As Required	Report Review	As Required
	NEMA EA	Harmony	As Required	Report Review	As Required
	Other Licences, Permits or Approvals	Harmony	As Required	Report Review	As Required
Harmony Senior Environmental Officer	EMS Procedures	Harmony	Monthly	Site Inspection	Monthly
	EMP/EMPr	Harmony	Monthly	Site Inspection	Monthly
	IWWMP	Harmony	Monthly	Site Inspection	Monthly
	IWULA	Harmony	Monthly	Site Inspection	Monthly
	NEMA EA	Harmony	Monthly	Site Inspection	Monthly
	Other Licences, Permits or Approvals	Harmony	Monthly	Site Inspection	Monthly

3.3 MONITORING AND REPORTING FREQUENCY

The following auditing and reporting shall be required during operation:

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

3.4 EMPR AUDITING

- 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. An EMPr audit report shall be submitted to the Department of Mineral and Petroleum Resources (DMPR) on an annual basis (each year of mining and before applying for closure). The holder of the mining right may appoint an independent qualified person for the monitoring and to compile a report, but the responsibilities remain the holders. The audit will include:
- The period when the audit was conducted;
- The scope of the assessment;
- The procedures used for conducting the audit;
- Interpreted information gained from monitoring the EMPr (e.g. EO reports);
- Evaluation criteria used during the audit; and
- Results of the assessment are to be discussed and mention must be made of any gaps in the EMPr and how it can be rectified.

3.5 MECHANISMS FOR MONITORING COMPLIANCE

Table 4 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 4: 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
TSF Operation	All Impacts Identified during the BA	Site Inspections and checklists	Environmental Officer	Monthly inspections and checklists and monthly reports
		Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required
		Site Inspections and Audits	Environmental Officer	Monthly Inspections
				Monthly Reports
				Annual Internal Audit Reports
			Independent Environmental Auditor	Annual External Audit Reports
Decommissioning Activities	All Impacts Identified during the BA	Site Inspections and checklists	Environmental Officer	Monthly inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required
		Site Inspections and Audits	Environmental Officer	Monthly 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
			Environmental Control Officer	Annual Internal Audit Reports
			Independent Environmental Auditor	Annual External Audit Reports
Rehabilitation	All Impacts Identified during the BA	Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required
		Site Inspections and Audits	Environmental Officer	Monthly inspections
				Monthly Reports
				Annual Internal Audit Reports
			Independent Environmental Auditor	Annual External Audit Reports
Closure - Aftercare and Maintenance	All Impacts Identified during the BA	Report Review and Development of Action Plans for Corrective Action	Environmental Manager	As Required
		Site Inspections and Audits	Environmental Officer	Monthly Inspections
				Monthly Reports
				Annual Audit
			Independent Environmental Auditor	Annual Audit

3.6 REVIEW AND REVISION OF THE EMPR

It is important to note that this EMPr is made legally binding on the Project Proponent 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 Project Proponent 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.

Harmony EMS procedures will be updated and improved over time. The references made to procedures contained in the EMS are subject to change as the system evolves and improves and the EMPr in such instances will change to align with the company system over time.

4 IMPACT MANAGEMENT OUTCOMES

This section of the EMPr provides the impact management outcomes identified for the Savuka 7a & 7b TSFs height extension project. The impact management objectives, including the standard to be achieved, are summarised in Table 5 below.

Table 5: Impact Management Outcomes

Activity	Potential Impact	Aspects Affected	Phase	Objective / Outcome	Standard to be Achieved
TSF Operation	Erosion	Soils Biodiversity Air Quality	Operation Decommissioning Rehabilitation and Closure	Minimise potential for further soil erosion. Avoid and control through preventative measures (storm water infrastructure maintenance, erosion control and monitoring).	CARA
TSF Operation **Water management**	Soil Pollution / Contamination	Groundwater Wetlands Soils Biodiversity	Operation Decommissioning Rehabilitation and Closure	Avoid pollution through preventative measures (e.g. bunding, spill kits), prevent pollution plume from reaching natural water resources and water used by groundwater users in the area. Control through implementation of mitigation measures (monitoring and phytoremediation). Remedy through clean-up and waste disposal.	Hazardous Substances Act NWA NEMA Duty of Care NEMWA Incident reporting procedures DWS minimum standards for waste disposal Hazardous Substances Act SANS 10206
TSF Operations **General decommissioning activities**	Damage / Disruption of Ecosystem Services	Land Use Biodiversity Wetlands	Operation Decommissioning	Prevent unnecessary clearance of vegetation, loss in habitat and disturbance of species.	NEMBA TOPS

Activity	Potential Impact	Aspects Affected	Phase	Objective / Outcome	Standard to be Achieved
			Rehabilitation and Closure	Control through implementation of EMPr mitigation measures (e.g. limit area of disturbance, training, prevent damage caused by pipe leaks and or spills).	
TSF Operation **General decommissioning activities** **Post Closure Monitoring and Maintenance** **Water management**	Direct and indirect mortality of flora and fauna	Biodiversity	Operation Decommissioning Rehabilitation and Closure	Prevent the injury, trapping or death of local fauna. Prevent unnecessary clearance of vegetation, loss in habitat and disturbance of species. Control through implementation of EMPr mitigation measures (e.g. limit area of disturbance, training, prevent damage caused by pipe leaks).	NEMBA TOPS
TSF operations **General decommissioning activities** **Post Closure Monitoring and Maintenance** **Water management**	Introduction / invasion by alien (non-native) species	Biodiversity	Operation Decommissioning Rehabilitation and Closure	Prevent proliferation of alien species. Control through implementation of EMPr mitigation measures (e.g. alien vegetation management plan). Avoid/Stop through preventative measures	NEMBA TOPS Alien vegetation management plan

Activity	Potential Impact	Aspects Affected	Phase	Objective / Outcome	Standard to be Achieved
				(e.g. limit extent of disturbance).	
TSF operations **Post Closure Monitoring and Maintenance** **Water management**	Pollution of surface water resources	Wetlands and Wonderfontein Spruit	Operation Decommissioning Rehabilitation and Closure	Protect watercourses and sources of water. Avoid pollution 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
TSF Operations **General decommissioning activities** **Water management** **Post Closure Monitoring and Maintenance**	Pollution of groundwater / decreased water quality	Groundwater	Operation Decommissioning Rehabilitation and Closure	Minimisecontamination of groundwater resources. Avoid and control through implementation of preventative measures. Control through implementation of mitigation measures (monitoring and phytoremediation).	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines Rehabilitation and closure plan

Activity	Potential Impact	Aspects Affected	Phase	Objective / Outcome	Standard to be Achieved
TSF Operations **General decommissioning activities** **Water management**	Loss and disturbance of wetland habitat	Wetlands	Operation Rehabilitation and Closure	Protect watercourses and sources of water. Avoid and control through implementation of preventative measures (e.g. limit area of wetland disturbance for wetlands around the edges of the site, maintain stormwater infrastructure).	NWA GN704 NEMA Duty of Care NEMA Polluter Pays Principle DWS best practice guidelines Rehabilitation and closure plan
General decommissioning activities	General Environmental Pollution	Environmental Pollution	Decommissioning	Avoid pollution caused by fuel spillages and improper storage of materials. Avoid and control through implementation of EMPr mitigation measures (e.g. Spill prevention, Hydrocarbon Storage).	Hazardous Substances Act NWA MSDS OHSA MHSA NEMA Duty of Care NEMA Polluter Pays Principle NEMWA Incident reporting procedures DWS minimum standards for waste disposal

Activity	Potential Impact	Aspects Affected	Phase	Objective / Outcome	Standard to be Achieved
					DMR Code of Practice for Mine Residue Deposits
TSF operations **Post Closure Monitoring and Maintenance** **Water management**	Hydrocarbon spills / contamination	Environmental Pollution	Operation Decommissioning Rehabilitation and Closure	Avoid pollution caused by fuel spillages and improper storage of materials. Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal.	Hazardous Substances Act NWA MSDS OHSA MHSA NEMA Duty of Care NEMWA Incident reporting procedures DWS minimum standards for waste disposal
TSF Operations **General decommissioning activities**	Economic growth and Employment Opportunities	Socio-Economic	Operation Decommissioning	Maximise through optimisation of economic growth opportunities.	SLP Commitments
Closure	Loss of jobs and economic opportunities	Socio-Economic	Rehabilitation and Closure	Minimise impacts of job loss through skills development and livelihood restoration.	SLP Commitments
TSF Operations **General decommissioning activities**	Radiation and health Impacts	Health and Safety	Operation Decommissioning	Ensure safety of property, workers and people living in the vicinity.	NRWMP OHSA MHSA

Activity	Potential Impact	Aspects Affected	Phase	Objective / Outcome	Standard to be Achieved
Rehabilitation and Closure **Post-Closure**			Rehabilitation and Closure	Check through implementation of mitigation measures (radiation monitoring).	SLP Commitments Grievance Mechanism DMR Code of Practice for Mine Residue Deposits
TSF Operations **General decommissioning activities** **Rehabilitation and Closure** **Post-Closure**	Flood risk due to dam wall break impact on safety and livelihoods.	Health and Safety	Operation Decommissioning Rehabilitation and Closure Post-closure	Ensure safety of property, workers and people living in the vicinity. Check through implementation of mitigation measures (stability monitoring and audits)	OHSA MHSA SLP Commitments Grievance Mechanism DMRE Code of Practice for Mine Residue Deposits
TSF Operations **General decommissioning activities**	Visual impact of light at night	Visual	Operation Decommissioning	Avoid and control through implementation of EMPr mitigation measures (e.g. directional down lighting).	Security specifications
TSF Operations **General decommissioning activities**	Visual impact of mine infrastructure, stockpiles and dust	Visual	Operation Decommissioning	Avoid and control through implementation of EMPr mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation).	Rehabilitation and Closure Plan
TSF Operations **General decommissioning activities**	Fugitive emissions (Dust and PM particles)	Air Quality	Operation Decommissioning	Minimise and prevent dust and air pollution. Avoid through preventative measures	Road Traffic Act NEMAQA Dust regulations

Activity	Potential Impact	Aspects Affected	Phase	Objective / Outcome	Standard to be Achieved
				(e.g. speed limit enforcement) Control through implementation of EMPr mitigation measures (e.g. dust suppression).	
TSF Operations **General decommissioning activities**	Disturbing and / or nuisance noise	Noise	Operation Decommissioning	Reduce the impact of noise associated with the mining activities on the surrounding area. 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

5 IMPACT MANAGEMENT ACTIONS: MANAGEMENT PROGRAMME

Table 6 below provides measures for management of the environmental aspects that are impacted on during the different phases of the project.

Table 6: Description of the proposed impact management actions.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
5.1 ENVIRONMENTAL MANAGEMENT SYSTEM						
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall implement the existing Environmental Management System (EMS), - The EMS should include and provide for the following as a minimum: • Environmental Policy; • Ongoing Identification of risks and impacts; • Social and Environmental Management programs; • Organisational capacity and competency; • Emergency preparedness; • Stakeholder engagement; and • Monitoring and review.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	Project Proponent Project Manager	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall ensure that Social and Environmental human resources have the knowledge, skills, and experience necessary to perform their work with competence and efficiency.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	Project Proponent Project Manager	Throughout LoM, Decommissioning and Rehabilitation and Closure

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall appoint a suitably qualified and competent EO who shall preferably be independent from the Project Proponent. The EO must preferably have a tertiary qualification in an Environmental Management or appropriate field. The EO should have appropriate qualification and experience in the implementation of environmental management specifications. The EO shall be tasked with inspecting the mines environmental compliance on a regular basis (monthly). The Project Proponent shall provide the EO with the necessary support to ensure that the environmental aspects relating to the development is adhered to.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	Project Proponent	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine must have a copy of this EMPr at the point of use and should be briefed by the Mine EO with regards to the use and implementation of the EMPr.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	EO	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The EMPr must be made binding on all sub-contractors (if utilised) operating on behalf of the Mining Right Holder.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	Project Proponent	Throughout LoM, Decommissioning and Rehabilitation and Closure

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall ensure that all sub-contractors (if utilised) abide by the requirements of the EMPr through the inclusion of the EMPr and applicable environmental requirements in contractual agreements for all sub-contractors.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	Project Manager	Throughout LoM, Decommissioning and Rehabilitation and Closure
5.2 EMERGENCY RESPONSE						
General Mine Management	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 to ensure effective response; and • Periodic review and revision, as necessary, to reflect changing conditions.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	Project Proponent Project Manager	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The necessary provisions (financial, resources, materials) shall be made in order to ensure compliance with the Emergency Preparedness and Response Plan.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	Project Proponent Project Manager	Throughout LoM, Decommissioning and Rehabilitation and Closure

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
5.3 HEALTH AND SAFETY						
General Mine Management	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	Project Proponent	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life.	All staff and sub-contractors must be informed about any community concerns. Toolbox talks can be used for this. Speed limits on the road to the mine must be enforced. People that do not adhere to the speed limits shall receive the appropriate disciplinary action.	OHS and MHSA	EO	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life.	The mine shall provide appropriate Personal Protective Equipment (PPE) to employees wherever required and in accordance with the risks associated with their activities.	OHS and MHSA	Project Proponent	Throughout LoM, Decommissioning and Rehabilitation and Closure

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
General Mine Management	Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life.	The mine shall undertake safety audits to ensure compliance with: • Occupational Health and Safety Act (Act No. 85 of 1993) and associated regulations; and • Mine Health and Safety Act (Act 29 of 1996) as amended and associated regulations.	OHS and MHSA	Project Proponent	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life.	The mine shall implement a safety reporting procedure to ensure that all accidents and incidents (safety and environmental) are recorded and reported to the Mine Manager and EO.	OHS and MHSA	Project Proponent	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	Health risks are classified as high significance due to the value of human life.	The mine shall implement an infectious diseases management plan to address health issues with the workforce, or continue with an existing one.	OHS	Project Proponent	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning	Health and safety risks are classified	Any containers in which hazardous substances (e.g. fuel, paints, solvents) are stored shall be clearly marked	OHS and MHSA	Project Manager	Throughout LoM, Decommissioning

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Rehabilitation and Closure	as high significance due to the value of human life.	as to the contents therein (in accordance with OHSA regulations).			and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life.	• One of the key risks of a TSF is the safety and environmental implications in the event of dam failure. As part of the regular conformance monitoring the daily and weekly inspections according to the criteria specified in section 8.7.8.3 of the COP - WS_COP_GEN_002 -allows for checking of signs of instability and/or structural failure. • In the event of dam failure Harmony's slime dam emergency preparedness and emergency response procedure should be followed. • The emergency response and management plan must be available at all times and staff and visitors should receive training and or awareness of this with relevant signs erected where required. • Updated designs should be drafted by registered and suitably qualified engineers and submitted and approved by relevant authorities; and • The relevant standards and legislation related to the management and design of the TSFs described in this report should be adhered to at all times.	OHS and MHSA	EO	Throughout LoM, Decommissioning and Rehabilitation and Closure

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
General Mine Management	Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life.	If a storm of more than 30 mm of rain occurs in a 24-hour period then the emergency actions noted in Harmony's Mandatory Code of Practice for mine residue deposits should be followed (COP - WS_COP_GEN_002 -).	OHS and MHSA	EO	Throughout LoM, Decommissioning and Rehabilitation and Closure
5.4 ENVIRONMENTAL AWARENESS						
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	All employees and visitors to the site must undergo a visitors induction which shall include basic environmental awareness and site-specific environmental requirements (e.g. site sensitivities and relevant protocols/procedures). This induction should be presented or otherwise facilitated by the Mine EO wherever possible. Regular toolbox talks can be used for this.	NEMA	EO	Throughout LoM, Decommissioning and Rehabilitation and Closure
5.5 LAND USE, SOCIAL AND SOCIO-ECONOMIC						
General Mine Management	Operation	No direct physical disturbance	Set up a communication forum with local communities where representatives could voice concerns related to the mining activities, if one have not yet been established. If one have been established, this forum should be maintained. Communicate the mine's grievance mechanism (that forms part of the mine's	Adherence to corporate policies	Project Proponent Project Manager	Prior to height extension of the project, after Environmental Authorisation.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
			Stakeholder Engagement Plan) to local stakeholders (e.g. through the local media), including how to access the grievance mechanism and the mine's commitment to address grievances lodged through this system.			
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall comply with the conditions of the SLP developed for the mine to ensure the socio-economic benefits of the mine are maximised.	SLP commitments	Project Proponent	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall comply with all relevant legislation pertaining to labour recruitment and employment.	Compliance with legislation including Labour Act and Employment Act.	Project Proponent	Throughout LoM, Decommissioning and Rehabilitation and Closure
General Mine Management	Operation Decommissioning	No direct physical disturbance	A grievance register must be maintained by the mine to log grievances from landowners, communities, occupants and other Interested and Affected Parties, and 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), • Person receiving grievance,	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	Project Manager EO	Developed as early as possible and implemented throughout LoM and during Decommissioning.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
			• Agreed corrective action, • Responsible party for corrective action, • Summary of actions taken (and date action was taken), • Status of grievance (open, closed-out, awaiting feedback etc.). The grievance mechanism must be communicated to all stakeholders and communities. The mine should communicate the mine's grievance mechanism through the local media and ensure that stakeholders know how to access the grievance mechanism. Grievances must be addressed timeously.			
General Mine Management	Operation Decommissioning	No direct physical disturbance	If investigations prove actual losses due to the activities performed by Harmony, Harmony will enter into discussions with the landowners.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework	Project Proponent Project Manager	Commence in the operational phase and continue throughout the life of the project.
General Mine Management	Operation Decommissioning	No direct physical disturbance	The Stakeholder Relations Manager should establish relationships with the surrounding landowners and users. This can include a yearly courtesy visit and sharing of environmental data to keep the public informed. All meetings should be recorded, and records must be included in the communication register.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework	Project Proponent Project Manager	Commence in the operational phase and continue through to the operation phase of the project.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
General Mine Management	Operation Decommissioning	No direct physical disturbance	Maintain the groundwater model for the mine and repeat water census periodically as recommended by the relevant specialists.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework	Project Manager EO	Throughout the LoM and during decommissioning.
5.6 TERRESTRIAL BIODIVERSITY						
Maintenance and operation of site infrastructure and facilities **Post Closure Monitoring and Maintenance**	Operation Decommissioning Rehabilitation and Closure	Additional impacts on flora due to the proposed extension has the potential to be of low to very low significance.	The Mine's Alien Invasive Plant Management Plan should be regularly updated to reflect the annual changed in AIP composition.	NEMA NEMBA CARA	Project Manager	Implementation throughout LoM
Storm water management **Water management**	Operation Decommissioning	Additional impacts on air quality due to the proposed extension has the potential to	Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources.	NEMA	EO	Throughout the LoM and during decommissioning.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		be of low significance.	The current dust-reducing mitigation measures need to be re-assessed for the different method of deposition to see if frequencies need to be increased.			
	Operation	Additional impacts on flora and fauna due to the proposed extension has the potential to be of low to very low significance.	A fire management plan needs to be implemented to restrict the impact fire would have on the surrounding areas.	NEMA NEMBA CARA Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	Project Proponent Project Manager	Throughout LoM
	Operation Decommissioning	Additional impacts on flora and fauna due to the proposed extension has the potential to be of low to very low significance.	Any materials may not be stored for extended periods of time and must be removed from the Project Area, if maintenance is completed. No permanent maintenance structures should be permitted. No storage of vehicles or equipment will be allowed outside of the designated parking areas.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	EO	Throughout the LoM and during decommissioning.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Operation Decommissioning Rehabilitation and Closure	Additional impacts on flora and fauna due to the proposed extension has the potential to be of low to very low significance.	No further clearing of vegetation is allowed, other than invasive and alien species as part of the approved Alien Invasive Plant Management Plan. All activities must be restricted to within the authorised areas. Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should not be disturbed further, if not approved. All vehicles and personnel must make use of existing roads and walking paths as far as possible, especially operational vehicles.	NEMA NEMBA CARA Shall adhere to the EMS developed to ensure compliance with the regulatory framework.	EO	Throughout LoM, Decommissioning and Rehabilitation and Closure
	Operation Decommissioning Rehabilitation and Closure	Small and localized	Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks. Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week.	NEMA Shall adhere to the EMS developed to ensure compliance with the regulatory framework	EO	Throughout LoM, Decommissioning and Rehabilitation and Closure
	Operation Decommissioning	Pollutants has the potential to pollute the environment and can vary from localized to	• A hydrocarbon 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. Any contractors or workers shall be in possession of an emergency spill kit that must always be complete and available on site.	NEMA NEMBA CARA Shall adhere to the EMS developed to ensure compliance	Contractor EO	Throughout the LoM and during decommissioning.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		large scale impacts	• Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • Handle hydrocarbons carefully to limit spillage. • Ensure vehicles are regularly serviced so that hydrocarbon leaks are limited. • No servicing of equipment on site unless 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 from leaking and entering the environment. • Maintenance activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. • All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the Project Area.	with the regulatory framework		

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Operation Decommissioning	Impacts on fauna and flora has the potential to be a relatively low significance in the context of the specific site.	It must be made an offence for any staff member to take any indigenous plant species out of any portion of the Project Area, or to bring any alien plant species into any portion of the Project Area. This is to prevent the spread of exotic or invasive species or the illegal collection of plants.	NEMA NEMBA CARA Shall adhere to the EMS developed to ensure compliance with the regulatory framework	Project Manager EO	Throughout the LoM and during decommissioning.
	Operation Decommissioning	Impacts on fauna has the potential to be a relatively low significance.	Pest control plan must be put in place and implemented.	NEMA NEMBA CARA Shall adhere to the EMS developed to ensure compliance with the regulatory framework	Project Manager EO	Throughout the LoM and during decommissioning.

Description			Implementation			
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Operation Decommissioning	Impacts on fauna and flora has the potential to be a relatively low significance in the context of the specific site.	Use environmentally friendly cleaning and dust suppressant products.	NEMA NEMBA CARA Shall adhere to the EMS developed to ensure compliance with the regulatory framework .	Project Manager EO	Throughout the LoM and during decommissioning.
	Operation Decommissioning	Impacts on fauna and flora has the potential to be a relatively low significance in the context of the specific site.	All 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 be enforced to ensure that road killings and erosion is limited Measures (for example; speed bumps and signs) must should be erected to enforce slow speeds.	NEMA NEMBA CARA Internal speed limits for haul roads and declared legal speed limits for public roads.	EO	Throughout the LoM and during decommissioning.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Operation Decommissioning	Impacts on fauna and flora has the potential to be a relatively low significance in the context of the specific site.	All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the Project Area to inform contractors and site staff of the presence of protected species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr.	Induction training shall comply with EMS Framework	EO	Throughout the LoM and during decommissioning.
	Operation Decommissioning	Impacts on fauna and flora has the potential to be a relatively low significance in the context of the specific site.	Contractors and employees must all undergo the induction and must be made aware of any sensitive areas to be avoided.	Induction training shall comply with EMS Framework	EO	Throughout the LoM and during decommissioning.

Activities	Description		Implementation			
	Phase	Impact and Size and Scale of Disturbance	Mitigation Measures / Management Actions	Compliance with Standards	Responsible Person	Time Period
	Operation Decommissioning	Impacts on fauna and flora has the potential to be a relatively low significance in the context of the specific site.	A stormwater management plan must be updated, if required, and implemented.	NEMA NEMBA CARA NWA	Project Manager EO	Throughout the LoM and during decommissioning.
	Operation Decommissioning	Impacts on fauna and flora has the potential to be a relatively low significance in the context of the specific site.	No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard.	NEMA NEMBA CARA	EO	Throughout the LoM and during decommissioning.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
5.7 SOILS						
TSF operations **Decommissioning**	Operation Decommissioning	Contaminants has the potential to pollute the environment and can vary from localized to large scale impacts	All contractors must have spill kits available and be trained in the correct use thereof. All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping".	CARA NEMA	EO	Throughout the LoM and during decommissioning.
	Operation Decommissioning	Contaminants have the potential to pollute the environment and can vary from localized to large scale impacts	Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the soil. The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly.	CARA NEMA	EO	Throughout the LoM and during decommissioning.

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Operation Decommissioning Rehabilitation and Closure	Small scale and localised	Monitor erosion on site on at least a monthly basis.	CARA NEMA In accordance with Rehabilitation and closure plan		Throughout LoM, Decommissioning and Rehabilitation and Closure
5.8 POLLUTION PREVENTION						
Water management Infrastructure construction **TSF operations** **Maintenance and operation of site infrastructure and facilities**	Operation Decommissioning Rehabilitation and Closure	Contaminants have the potential to pollute the environment and can vary from localized to large scale impacts	Any equipment that may leak, and does not have to be transported regularly, shall be placed on watertight drips 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.	NEMA Polluter Pays Principle NEMA Duty of Care NWA OHSA MHSA Shall adhere to the EMS developed to ensure compliance with the regulatory framework	EO	Throughout LoM, Decommissioning and Rehabilitation and Closure
	Operation Decommissioning	Contaminants have the potential to pollute the environment	Appropriate measures must be implemented to ensure that rainwater does not run into areas containing cement, oil, diesel etc. as this could result in a pollution	NEMA Polluter Pays Principle NEMA Duty of Care NWA	EO	Throughout LoM, Decommissioning and Rehabilitation and Closure

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
General decommissioning activities		and can vary from localized to large scale impacts	threat. Storage areas for these substances should be placed on high-lying ground.	OHSA MHSA Shall adhere to the EMS developed to ensure compliance with the regulatory framework		
	Operation Decommissioning	Contaminants has the potential to pollute the environment and can vary from localized to large scale impacts	Servicing and maintenance of vehicles may only take place in a 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.	NEMA Polluter Pays Principle NEMA Duty of Care NWA OHSA MHSA Shall adhere to the EMS developed to ensure compliance with the regulatory framework	EO	Throughout LoM
	Operation Decommissioning	Contaminants have the potential to pollute the environment and can vary	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	NEMA Polluter Pays Principle NEMA Duty of Care NWA	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		from localized to large scale impacts	must be taken to prevent pollution in the event of a spill.	OHSA MHSA Shall adhere to the EMS developed to ensure compliance with the regulatory framework		
	Operation Decommissioning	Moderate significance and potentially a moderate scale disturbance	Hazardous substances shall be confined to specific and secured areas, and in such a way that does not pose any danger of pollution even during times of high rainfall. Hazardous storage areas shall be bunded (impermeable) with adequate containment (at least 110% the total volume stored) for potential spills or leaks. Bunded storage areas shall be either provided with an oil separator or sump. Waste from spillages will then be removed and recycled or disposed of responsibly.	NEMA Polluter Pays Principle NEMA Duty of Care NWA OHSA MHSA Shall adhere to the EMS developed to ensure compliance with the regulatory framework	EO	Throughout LoM
	Operation Decommissioning	Moderate significance and potentially a moderate	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	NEMA Polluter Pays Principle NEMA Duty of Care NWA	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		scale disturbance	which drains to a sump/oil separator). The Project Proponent must ensure that employees and labourers do not smoke or take part in any activity that may results in sparks in the vicinity of fuels and other flammable substances to prevent ignition.	OHSA MHSA Shall adhere to the EMS developed to ensure compliance with the regulatory framework		
	Operation Decommissioning	Moderate 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.	NEMA Polluter Pays Principle NEMA Duty of Care NWA OHSA MHSA Shall adhere to the EMS developed to ensure compliance with the regulatory framework	EO	Throughout LoM
	Operation Decommissioning	Moderate significance and potentially a moderate	Any excess or waste material or chemicals should be removed from the site and should preferably be recycled (e.g. oil and other hydrocarbon waste products). Any waste materials or chemicals that cannot be recycled shall be disposed of at a suitably licensed waste facility.	NEMWA DWS minimum requirement for waste disposal	Project Manager EO	Throughout LoM

Activities	Description		Implementation			
	Phase	Impact and Size and Scale of Disturbance	Mitigation Measures / Management Actions	Compliance with Standards	Responsible Person	Time Period
		scale disturbance				
	Operation Decommissioning	Moderate 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	Project Manager	Throughout LoM
	Operation Decommissioning	Potential health risks are considered high significance	All relevant personnel on site must be properly trained concerning the proper use, handling and disposal of hazardous substances applicable to their line of work. If required, advice shall be obtained from the manufacturer with regard to the safe handling and storage of hazardous materials.	MSDS specifications OHSA MHSA	EO	Throughout LoM
	Operation Decommissioning	No direct physical disturbance	The EO shall maintain a list of all hazardous materials that would be present on site. The EO shall develop and maintain a hazardous substance register for all hazardous materials that shall be kept on site during all phases of the project. The register shall be provided to the ECO upon request. Material Safety Data Sheets (MSDS) must be available on site at the point of use and readily accessible for all hazardous substances stored.	OHSA MHSA	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
5.9 WASTE MANAGEMENT						
Maintenance and operation of site infrastructure and facilities **TSF operations**	Operation Decommissioning	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The mine shall update, if necessary and implement a waste management plan for the TSFs which complies with the principles of the NEMWA and provides a mechanism for the effective management of waste throughout the LoM. This plan shall ensure the appropriate management of all solid waste, including maintenance debris (cement bags, wrapping material, timber, cans, wire, nails, etc.), waste and surplus food, food packaging, organic waste etc.	NEMWA NEMA cradle to grave DWS minimum requirement for waste disposal Shall adhere to the EMS developed to ensure compliance with the regulatory framework	Project Manager EO	Throughout LoM
Maintenance and operation of site infrastructure and facilities **General decommissioning activities**	Operation Decommissioning	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The waste management system shall provide for adequate waste storage (in the form of waste skips and bins with lids), waste separation for recycling, and frequent removal of non-recyclable waste for permanent disposal at an appropriately licensed waste disposal facility. No waste material is to be disposed of on site.	NEMWA NEMA cradle to grave DWS minimum requirement for waste disposal	Project Manager EO	Throughout LoM
	Operation Decommissioning	Waste has the potential to pollute	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	NEMWA NEMA cradle to grave	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		the environment and can vary from localized to large scale impacts.	excessive periods to reduce risk of environmental contamination Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in appropriate receptacles.	DWS minimum requirement for waste disposal		
	Operation Decommissioning	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The Mine shall implement a waste removal regime that ensures waste skips do not exceed their capacity before being removed from site for disposal.	NEMWA NEMA cradle to grave	Project Manager EO	Throughout LoM
	Operation Decommissioning	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	Littering shall be strictly prohibited. The site shall remain in a neat and tidy condition at all times. If required, the mine shall make use of regular litter patrols to remove litter and ensure the site remains clean, neat and tidy.	NEMWA NEMA cradle to grave	EO	Throughout LoM

Activities	Description		Implementation			
	Phase	Impact and Size and Scale of Disturbance	Mitigation Measures / Management Actions	Compliance with Standards	Responsible Person	Time Period
	Operation Decommissioning	No direct physical disturbance .	The mine shall maintain a waste register which shall be used to track all waste removed from site. Proof of appropriate waste disposal shall be kept on file at the site for auditing purposes.	NEMA cradle to grave	EO Project Manager	Throughout LoM
	Operation Decommissioning	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in the prescribed and correct manner.	NEMA cradle to grave	Project Manager	Throughout LoM
5.10 NOISE						
TSF Operations **General decommission activities**	Operation Decommissioning	Noise has the potential to result in low significance impacts to sensitive receptors at a small scale	• Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised.	SANS10103 ECA Noise Regulations World Bank EHS guidelines OHSA MHSA	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Operation Decommissioning	Noise has the potential to result in low significance impacts to sensitive receptors at a small scale	• Trucks, machinery and equipment will be regularly serviced to ensure acceptable noise levels are not exceeded. Quieter equipment will be sought where possible when purchasing new equipment. Silencers will be utilised where possible. Point sources will be enclosed where possible. Acoustic screens will be considered if I&AP complaints are received.	SANS10103 ECA Noise Regulations World Bank EHS guidelines OHSA MHSA	Project Manager EO	Throughout LoM
5.11 AIR QUALITY						
TSF Operations **General decommission activities**	Operation Decommissioning Rehabilitation and Closure	The additional impacts on air quality as a result of the extension have a low significance and may occur at a few sensitive receptors.	• The mine shall comply with the National Dust Control Regulations, Promulgated under the National Environmental Management: Air Quality Act (Act 39 of 2004). If dust levels exceed the specified thresholds in terms of the dust control regulations, the Project Proponent shall appoint a suitably qualified specialist to identify sources of the excessive dust levels and to suggest suitable and reasonable mitigation measures.	NEMAQA Dust regulations	Project Proponent Project Manager EO	Throughout LoM
	Operation	The additional	• Performance indicators are usually selected to reflect both the source of the emission directly (source monitoring) and the impact on the	NEMAQA	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Decommissioning Rehabilitation and Closure	impacts on air quality as a result of the extension have a low significance and may occur at a few sensitive receptors.	receiving environment (ambient air quality monitoring). Ensuring that no visible evidence of windblown dust exists represents an example of a source-based indicator, whereas maintaining off-site dust fall levels, at the identified AQSRs, to below 600 mg/m²-day represents an impact- or receptor-based performance indicator. Source monitoring at operational activities can be challenging due to the fugitive and wind-dependent nature of particulate emissions. The focus is therefore rather on receptor-based performance indicators i.e. compliance with ambient air quality standards and dust fall regulations. ○ It is recommended that the current dust fall monitoring network be maintained and the monthly dust fall results used as indicators to tract the effectiveness of the applied mitigation measures. Dust fall collection should follow the ASTM method as per the NDCRs. The ASTM method covers the procedure of collection of dust fall and its measurement and employs a simple device consisting of a cylindrical container exposed for one calendar month (30 ±2 days).	Dust regulations		

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Operation Decommissioning Rehabilitation and Closure	The additional impacts on air quality as a result of the extension have a low significance and may occur at a few sensitive receptors.	• Mitigation measures aimed at reducing wind erosion from the active TSFs, i.e. the grassing of TSF side slopes. • A Dust Management Plan (DMP) for the Savuka 7a & 7b TSFs should follow an iterative process, including: implementation, monitoring, reporting, reviewing and adjustment to the necessary steps. o The establishment of objectives and targets with regards to fugitive emissions are important to minimise the impacts of these emissions on the surrounding environment. The objective of the DMP generally is to reduce dust emissions within specific target ranges, by employing appropriate dust suppression strategies. o Windblown dust from the current and future Savuka 7a & 7b TSFs could be significant sources of dust emissions if not managed. o Dust Management Measures: Target control efficiencies are presented for the main dust emission sources identified in the emissions inventory, so that the overall objective is achieved. • Wind Erosion	NEMAQA Dust regulations	Project Proponent Project Manager EO	Throughout LoM

Description				Implementation		
Activities	Phase	Impact and Size and Scale of Disturbance	Mitigation Measures / Management Actions	Compliance with Standards	Responsible Person	Time Period
			○ Any approach that either binds the particles together and make it more resistant to wind erosion or reduce to the force of the wind will result in a reduction in windblown dust emissions. ○ Surface treatment techniques to reduce dust generation include: wet suppression, chemical stabilisation, covering of surface with less erodible aggregate material and the vegetation of open areas. Wet suppression (the use of sprinklers) can achieve results in the short-term but will require constant maintenance and management to remain effective. ○ Substantial research has been done on erosion from gold mine tailings. Parameters which have the potential to impact on the rate of emission of fugitive dust include the extent of surface compaction, moisture content, ground cover, the shape of the storage pile, particle size distribution, wind speed and precipitation. Any factor that binds the erodible material or otherwise reduces the availability of erodible			

Description				Implementation		
Activities	Phase	Impact and Size and Scale of Disturbance	Mitigation Measures / Management Actions	Compliance with Standards	Responsible Person	Time Period
			material on the surface, decreases the erosion potential of the fugitive source. High moisture contents, whether due to precipitation or deliberate wetting, promote the aggregation and cementation of fines to the surfaces of larger particles, thus decreasing the potential for dust emissions. Surface compaction and ground cover similarly reduces the potential for dust generation (Burger et al., 1997). ○ Vegetal cover retards erosion by binding the residue with a root network, by sheltering the residue surface and by trapping material already eroded. Sheltering occurs by reducing the wind velocity close to the surface, thus reducing the erosion potential and volume of material removed. Vegetation is also considered the most effective control measure in terms of its ability to also control water erosion. In investigating the feasibility of vegetation types the following properties are normally taken into account: indigenous plants; ability to establish and regenerate quickly; proven effective			

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
			for reclamation elsewhere; tolerant to the climatic conditions of the area; high rate of root production; easily propagated by seed or cuttings; and nitrogen-fixing ability. The long-term effectiveness of suitable vegetation selected for the site will be dependent on (a) the nature of the cover, and (b) the availability of aftercare. Multi-layer covers are frequently being used to ensure the best results (Dixon, 1997; Jewell and Newson, 1997; Ritchey, 1989). Erosion losses from grassed slopes measured by Blight (1989) were found to be in the order of 100 t/ha/year compared to uncontrolled slopes from which losses of up to 500 t/ha/year were recorded. ○ The removal of the TSF would be the most effective mitigation measure, providing the exposed footprint be vegetated and rehabilitated.			
	Operation Decommissioning	The additional impacts on air quality as a result of	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	NEMAQA Dust regulations	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		the extension have a low significance and may occur at a few sensitive receptors.	such meetings. Given the proximity of the study site to the nearby communities and farmsteads, it is recommended that such meetings be scheduled and held at least on an annual basis. A complaints register must be kept at all times.			
	Operation Decommissioning	The additional impacts on air quality as a result of the extension have a low significance and may occur at a few sensitive receptors.	Speed limits will be established and enforced on the mine to minimise dust generation. When haul trucks need to use public roads, the vehicles need to be cleaned of all mud and the material transported must be covered to minimise windblown dust.	NEMAQA Dust regulations	EO	Throughout LoM
	Operation Decommissioning	The additional impacts on air quality as a result of the	Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions.	NEMAQA Dust regulations	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		extension have a low significance and may occur at a few sensitive receptors.				
5.12 WETLANDS						
TSF Operations **General decommission activities**	Operation	Additional impacts on wetlands as a result of the extension are considered to be of low significance and can range from localized to impacts which are large in extent.	• Implement and maintain silt traps and sediment basins at strategic stormwater discharge points. • Establish and maintain vegetated buffer zones (using indigenous grass species) between the TSF and nearby wetlands, within 15 m from the TSF. • Regularly inspect and clear sediment traps and drains to ensure continued functionality.	NWA	EO	Throughout LoM
	Operation	Additional impacts on	• Install energy dissipation structures (e.g., riprap, gabions, or concrete stilling basins) at	NWA	EO	

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Rehabilitation Decommissioning	wetlands as a result of the extension are considered to be of low significance and can range from localized to impacts which are large in extent.	stormwater outflows to reduce flow velocity, if not already installed and where required. • Stabilize slopes and embankments where required. • Implement a controlled release of stormwater through designed drainage channels to prevent concentrated flows from reaching wetland areas. • Conduct regular inspections of stormwater management infrastructure and repair erosion-prone areas immediately. • No machinery or vehicles should be allowed to parked in any wetlands. All activities to be restricted to authorized areas only. • Restrict heavy vehicle access to designated and authorized roads.			
	Operation Decommissioning Rehab and closure.	Additional impacts on wetlands as a result of the extension are considered to be of low significance and can range from localized to	• Remove alien vegetation manually or mechanically rather than using herbicides, to avoid contamination risks. This should be conducted annually. • Implement a maintenance program to ensure that previously cleared areas do not become re-infested with alien vegetation	NWA	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		impacts which are large in extent .				
	Rehab and closure	Additional impacts on wetlands as a result of the extension are considered to be of low significance and can range from localized to impacts which are large in extent	Relandscape to gentler gradients and re-vegetate all cleared areas, which includes the areas adjacent to the proposed infrastructure, as soon as possible to limit erosion potential. Sandbags and geotextiles should be used to assist until vegetation has established in these reworked areas.	NWA MPRDA	EO	After construction
	Operation	Additional impacts on wetlands as a result of	Regularly maintain stormwater infrastructure, pipes, pumps and machinery to minimise the potential for	NWA	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		the extension are considered to be of low significance and can range from localized to impacts which are large in extent	leaks. Check for oil leaks, keep a tidy operation, install bins and promptly clean up any spills or litter.			
	Operation	Additional impacts on wetlands as a result of the extension are considered to be of low significance and can range from localized to impacts which are	In terms of mitigating the effects of groundwater phytoremediation on surface water, the following is recommended: • Use indigenous plant species that are well-adapted to local conditions. This helps maintain the ecological balance and supports local biodiversity. • Monitor water levels by means of the current groundwater monitoring programme to detect any significant changes in the water table. The geohydrologist is to advise on the suitability of the programme, and to recommend any changes. • The geohydrologist is to also advise on 'allowable' changes to the groundwater levels,	NWA	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		large in extent.	and to prescribe remedial actions if levels are exceeded. • Manage the density of phytoremediation plants to prevent excessive water uptake and potential lowering of the water table. This can be achieved by spacing plants appropriately and using mixed planting strategies.			
	Operation Decommissioning Closure and Rehab Post-Closure	Additional impacts on wetlands as a result of the extension are considered to be of low significance and can range from localized to impacts which are large in extent.	In terms of monitoring the following is recommended: • Review and update the surface, groundwater and also aquatic biomonitoring programmes for the operation. In the event no monitoring programmes are available, these must be informed by the relevant specialists. It is recommended that an annual wetland monitoring programme be considered for the necessary authorisation, for this project. • Conduct regular inspections along the TSFs to ensure the integrity of the facility. • Monitor groundwater levels. • Conduct routine water quality monitoring at key points downstream of the TSF to detect contamination early. • Implement groundwater quality monitoring. • Implement a long-term wetland monitoring program to track ecological changes and implement adaptive management strategies.	NWA	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
5.13 IMPACTS ON TRANSPORTATION AND INFRASTRUCTURE						
TSF Operations **General decommission activities**	Operation Decommissioning	Impacts on transportation infrastructure and traffic can have a significant extent although typically low in significance.	The mine shall ensure that the internal haul roads are adequately maintained, including monthly scraping and removal where required. Together with road maintenance, the storm water system to direct storm water that falls within the roads shall be kept maintained.	Road Traffic Act OHSA MHSA	EO	Throughout LoM
	Operation Decommissioning	Impacts on transportation infrastructure and traffic can have a significant extent although typically low in significance.	On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation on site, and to minimise disruption of traffic.	Road Traffic Act OHSA MHSA	EO Contractor	Throughout LoM

Activities	Description		Mitigation Measures / Management Actions	Implementation		
	Phase	Impact and Size and Scale of Disturbance		Compliance with Standards	Responsible Person	Time Period
	Operation Decommissioning	Impacts on transportation infrastructure and traffic can have a significant extent although typically low in significance.	In the case of dual or multiple use of access roads by other users, arrangements for multiple responsibility must be made with the other users. If not, the maintenance of access roads will be the responsibility of the Project Proponent. Road conditions must be assessed regularly for signs of damage.	Road Traffic Act OHSA MHSA	Project Proponent EO	Throughout LoM
	Operation Decommissioning	Impacts on transportation infrastructure and traffic can have a significant extent although typically low in significance.	All intersections with main tarred roads will be clearly signposted.	Road Traffic Act OHSA MHSA	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Operation Decommissioning	Impacts on transportation infrastructure and traffic can have a significant extent although typically low in significance.	Road signs and safety features such as rumble strips will be maintained to ensure the writing is legible and the haul road crossings are visible to motorists.	Road Traffic Act OHSA MHSA	EO	Throughout LoM
	Operation Decommissioning	Impacts on transportation infrastructure and traffic can have a significant extent although typically low in significance.	All 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.	Road Traffic Act OHSA MHSA	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
5.14 VISUAL						
TSF Operations **Rehabilitation** **General decommission activities**	Operation	Visual impacts have an impact on the perception and sense of place in the area – added visual impacts for the Savuka TSFs extension are expected to be of low significance.	Develop and implement a post-closure rehabilitation plan to ensure acceptable topographic and ecological conditions, particularly for the waste facilities.	In accordance with Rehabilitation and closure plan.	Project Manager EO	Planning phase
	Rehabilitation and Closure	Visual impacts have an impact on the perception and sense of place in the area – added visual	Ensure the post-closure rehabilitation plan is geared toward acceptable topographic and ecological conditions.	In accordance with Rehabilitation and closure plan.	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		impacts for the Savuka TSFs extension are expected to be of low significance.				
	Operation Decommissioning Rehabilitation and Closure	Visual impacts have an impact on the perception and sense of place in the area – added visual impacts for the Savuka TSFs extension are expected to be of low significance.	"Housekeeping" procedures should be developed for the project to ensure that the Project site and lands adjacent to it are kept clean of debris, garbage, fugitive trash, or waste generated onsite; procedures should extend to control of "track out" of dirt on vehicles leaving the active sites and entering the public domain.	In accordance with Rehabilitation and closure plan	Project Manager	Throughout LoM
	Operation Decommissioning	Visual impacts have an impact on	• Should light fixtures be installed, ensure precisely directed illumination to reduce light "spillage" beyond the site's immediate surroundings.	In accordance with Rehabilitation and closure plan	Project Manager	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Rehabilitation and Closure	the perception and sense of place in the area – added visual impacts for the Savuka TSFs extension are expected to be of low significance.	• Avoid high pole-top security lighting along the periphery of the site and use only lights that are activated upon illegal entry. • Minimise the number of light fixtures to the bare minimum, including security lighting.			
	Operation Decommissioning Rehabilitation and Closure		In terms of monitoring the following is recommended: • During the operational phase, the mine's environmental officer should monitor or report on adherence to the proposed management measures monthly. • During the closure and rehabilitation phase, the mine's environmental officer should monitor or report on adherence to the proposed management measures quarterly.	In accordance with Rehabilitation and closure plan	Project Manager	Throughout LoM
5.15 RADIATION						
TSF Operations	Operation Rehabilitation and Closure	The TSFs' radiation impact has a potentially	Maintain and implement the air quality management and monitoring plan for the Savuka TSFs, to ensure compliance at upwind and downwind locations.	NRWMP ICRP	Project Manager EO	Throughout operations

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
General decommission activities **Post Closure Monitoring and Maintenance**		moderate significance but will be restricted to the site and immediate surrounding areas.				
	Operation Rehabilitation and Closure	The TSFs' radiation impact has a potentially moderate significance but will be restricted to the site and immediate surrounding areas.	• The most effective way to reduce the radon exhalation rate for the TSF is to provide a covering layer. This will increase the diffusion length to allow for the decay of the radon progeny before being released from the tailings surface. • Vegetate exposed areas of the TSFs and use wind barriers to reduce wind erosion and/or the application of dust suppressants.	NRWMP ICRP	EO	Throughout operations
	Operation Decommissioning Rehabilitation and Closure	The TSFs' radiation impact has a potentially moderate significance but will be	Implementation of a passive groundwater remediation system downstream of the TSFs to capture the contaminant plume. Phytoremediation as recommended by the geohydrologist, to be implemented.	NRWMP ICRP	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		restricted to the site and immediate surrounding areas.				
	Operation Decommissioning Rehabilitation and Closure Post-closure phase	The TSFs' radiation impact has a potentially moderate significance but will be restricted to the site and immediate surrounding areas.	Implementation of radiation monitoring programme as described in Section 7.3.3 of this EMPr.	NRWMP ICRP	Project Manager EO	Throughout LoM
5.16 GROUNDWATER						
Maintenance and operation of site infrastructure and facilities	Operation Decommissioning Rehabilitation and Closure	The TSFs' impact on groundwater has a potentially moderate significance	The mine must take all reasonable measures to avoid and limit pollution of ground water resources as a result of site activities. Pollution could result from the release, accidental or otherwise, of chemicals, oils, fuels, sewage, waste water containing organic waste, detergents, solid waste etc. The Project Proponent shall comply with the requirements relating to hazardous materials and spill management presented in this EMPr.	NEMA Duty of care NWA GN704 DWS best practice guidelines	EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
TSF Operations **Post Closure Monitoring and Maintenance**		and at a local scale.	The site should be maintained to be free draining. Where relevant, areas should be compacted/shaped.	Shall adhere to the EMS developed to ensure compliance with the regulatory framework		
	Operation Decommissioning	The TSFs' impact on groundwater has a potentially moderate significance and at a local scale.	Rainfall runoff should be separated into clean and dirty water. Rainfall falling on the site should be allowed to drain quickly/freely.	NEMA Duty of care NWA GN704 DWS best practice guidelines Shall adhere to the EMS developed to ensure compliance with the regulatory framework	EO	Throughout LoM
	Operation	The TSFs' impact on groundwater has a potentially moderate significance and at a local scale.	In the event of pollution caused as a result of activities, the responsible party, according to section 20 of the National Water Act (Act No. 36 of 1998) shall be responsible for all costs incurred by organisations called to assist in pollution control and/or to clean up polluted areas.	NEMA Duty of care NWA GN704 DWS best practice guidelines Shall adhere to the EMS developed to ensure compliance	Project Proponent	Throughout LoM

Activities	Description		Implementation			
	Phase	Impact and Size and Scale of Disturbance	Mitigation Measures / Management Actions	Compliance with Standards	Responsible Person	Time Period
				with the regulatory framework		
	Operation Decommissioning Rehabilitation and Closure	The TSFs' impact on groundwater has a potentially moderate significance and at a local scale.	For the Savuka TSFs' application, current and proposed Phytoremediation as per the recommendation of the geohydrologist to be implemented. This option will change the risk from High Negative to Low Negative during the operational phase. After closure the RWD will be decommissioned and rehabilitated whereafter the risk rating improves marginally. This option has the best rating and is the recommended long-term management option.	NEMA Duty of care NWA GN704 DWS best practice guidelines Shall adhere to the EMS developed to ensure compliance with the regulatory framework	Project Manager EO	Throughout LoM
	Operation Rehabilitation and Closure	The TSFs' impact on groundwater has a potentially moderate significance and at a local scale.	The exiting monitoring network is comprehensive and sufficient to quantify the impact from the RWD and the TSF. The boreholes are generally close to the TSF, referred to as source boreholes. It is important to drill monitoring boreholes further from the contaminant sources to be able to quantify plume migration, as well as close to the property boundary or receptors. These boreholes are referred to as compliance boreholes. Four additional compliance borehole pairs (one shallow and one deep) are recommended as shown in Figure 6. The aim of these boreholes is to monitor the effectiveness of the phyto-remediation.	NEMA Duty of care NWA GN704 DWS best practice guidelines Shall adhere to the EMS developed to ensure compliance with the regulatory framework	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	Phase	Impact and Size and Scale of Disturbance	Mitigation Measures / Management Actions	Compliance with Standards	Responsible Person	Time Period
			The following is recommended in terms of monitoring (refer to section 7.3.2): • Groundwater levels. • Groundwater quality. • Data should be stored electronically in an acceptable database. • On the completion of every sampling run a monitoring report should be written. Any changes in the groundwater levels and quality should be flagged and explained in the report. • A compliance report can be submitted to DWS once a year, if required. • A comprehensive bi-annual analysis of the dedicated monitoring boreholes. • Groundwater levels should be monitored monthly in the dedicated groundwater monitoring boreholes. • Rainfall should be monitored daily. • Samples should be submitted to a SANAS accredited laboratory. The following recommended parameters to be analysed for include: o pH. o Electrical Conductivity. o Total Dissolved Solids. o Total Alkalinity. o Anions and Cations (Ca, Mg, Na, K, NO3, NH4, Cl, SO4, F, Fe, Mn, Al, Cr).			

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
5.17 HYDROLOGY						
Maintenance and operation of site infrastructure and facilities **TSF Operations**	Operations Decommissioning Rehabilitation and Closure	The extension of the TSFs' impact on surface water has a potentially low significance and at a regional scale.	Ensure the existing stormwater management plan is sufficient (per GN704 and TSF-specific requirements). • Monitor the TSFs to ensure areas of potential erosion are identified and managed appropriately. • Additional guidance on erosion control is available in: Landcom Soils and Construction, Volume 1, 4th edition from 2004 (otherwise known as the Blue Book).	NEMA Duty of care NWA GN704 DWS best practice guidelines	EO	Throughout LoM
		The extension of the TSFs' impact on surface water has a potentially low significance and at a regional scale.	Further develop the TSFs using sound engineering to limit the likelihood of a failure. Pollution potential within watercourses must be considered in the designs to stop an unforeseen failure or breach.	NEMA Duty of care NWA GN704 DWS best practice guidelines	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		The extension of the TSFs' impact on surface water has a potentially low significance and at a regional scale.	Keep activity within the managed dirty water footprint where possible.	NEMA Duty of care NWA GN704 DWS best practice guidelines Shall adhere to the EMS developed to ensure compliance with the regulatory framework	EO	Throughout LoM
	Operation	The extension of the TSFs' impact on surface water has a potentially low significance and at a	Undertake surface water monitoring to enable change detection related to contaminants originating from the site. In terms of monitoring the following is recommended: • Potential contaminants of concern that need to be monitored are expected to have already been identified based on the historical quarterly surface water quality monitoring that has been undertaken. The understanding of the mine's processes and the associated	NEMA Duty of care NWA GN704 DWS best practice guidelines	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
		regional scale.	contaminants that might be released in the event of a failure in an aspect of the TSF's (e.g. toe paddock rupture or RWD overflow) is likewise expected to be clearly understood with monitoring reflecting this. • Quarterly monitoring reports should be produced to differentiate seasonal variations and general trends due to the mining activities, with a comparison of water samples to standards and guidelines set by the Department of Water and Sanitation (DWS) and an analysis of parameters over time so that trends can be established. • The recommended monitoring points are also provided in the specialist report and should be included in the EMPr.			
	Operation	The extension of the TSFs' impact on surface water has a potentially low significance and at a regional scale.	Maintain and operate the TSFs/RWD to limit the potential for overfilling of the RWD that leads to a spill. Remove any soil from the site which has been contaminated by hydrocarbon spillage.	NEMA Duty of care NWA GN704 DWS best practice guidelines	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
	Operation	The extension of the TSFs' impact on surface water has a potentially low significance and at a regional scale.	Ensure that flood protection of the TSFs is sufficient to manage flood risk from both adjacent river systems (north and south) and	NEMA Duty of care NWA GN704 DWS best practice guidelines	Project Manager EO	Throughout LoM
	Decommissioning and Closure	The extension of the TSFs' impact on surface water has a potentially low significance and at a regional scale.	• Rehabilitation should include topsoil replacement, re-vegetation and maintenance/aftercare for disturbed areas insofar as it should be developed for disturbed areas. • Concurrent rehabilitation of the TSFs should ideally occur during the life of the TSFs. This would likely include revegetation with final TSFs rehabilitation resulting in fully vegetated site.	NEMA Duty of care NWA GN704 DWS best practice guidelines RSIP	Project Manager EO	Throughout LoM

Description				Implementation		
Activities	**Phase**	**Impact and Size and Scale of Disturbance**	**Mitigation Measures / Management Actions**	**Compliance with Standards**	**Responsible Person**	**Time Period**
5.18 CLIMATE CHANGE						
TSF Operations	Operation		Harmony will be required to report carbon dioxide equivalent (CO^2e) emissions annually. From an adaption perspective, additional support infrastructure can reduce the climate change impact on the employees. For example, improving the thermal and electrical efficiency of buildings to reduce electricity consumption for air conditioning, ensuring adequate water supply for staff drinking water, amending summer operating hours to avoid the hottest part of the day and potential health and safety impacts for employees, having shaded green rest areas for employees during their shift breaks. These options should be investigated by Harmony.	NAAQS	Project Manager EO	Annual reporting

6 CLOSURE AND REHABILITATION

6.1 CLOSURE AND REHABILIATION GOALS AND OBJECTIVES

Apart from the short short-term objectives and strategies that will require implementation and monitoring over the full life of mine, even after closure of operation, The specific objectives that Harmony will adopt for rehabilitation and closure are to:

- Comply with national regulatory requirements;
- Protect the environment and public health and safety by using safe and responsible closure practices;
- Improve water quality;
- Establish self-sustaining vegetation that will stabilize the TSF;
- Develop end land uses that incorporate beneficial uses;
- Prevent health and safety risks to the surrounding community;
- Reduce the requirement for long-term monitoring and maintenance by establishing stable landforms;
- Enhance a positive socio-economic impact by achieving a sustainable land-use condition or alternatively as agreed upon with the applicable government regulator and affected communities; and
- Avoid or reduce costs and long-term liabilities to the company, government and public.

The closure of TSFs will involve their rehabilitation. Contour walls will be constructed, after which additives will be applied in order that favourable conditions for plant growth can occur. Once this has been achieved, vegetation will be planted on top and on the sides of the tailings to stabilise the tailings against wind and water erosion. When the vegetation has been established maintenance and monitoring of the tailings dam will take place. The maintenance will take place over a period of three years, while the monitoring will take place over a period of five years on a quarterly basis by analysing samples for pollutants.

The closure components which are applicable to the Harmony TSF include the following:

- Preparation and planning for closure- This includes all of the tasks leading up to the finalisation of the closure plan for implementation.
- Dismantling and removal of any on site infrastructure (apart from the TSF itself which will remain in perpetuity).
- Rehabilitation of access roads. It is anticipated that certain of these access roads will be retained as smaller local access to the site to allow for controlled access during closure and post closure monitoring and maintenance.
- Rehabilitation activities at the TSF side slopes and surface area, until the areas are self-sustaining.
- General surface rehabilitation- including soil amelioration and planting of vegetative cover for the affected natural areas, and planting of crops on the defined arable land areas.
- Limit dust emissions such that dust emission regulations are met.
- Limit ingress and seepage from the tailings.
- Minimize erosion to an acceptable level.
- Management of water within the mine area- this will include the management and maintenance of surface water controls, as well as ongoing closure phase monitoring of the water resources. The management of polluted water into the post-closure phase will be included and dealt with as a residual and latent impact.

- Maintenance and aftercare- Maintenance and aftercare is typically applied during the closure period (i.e. once active rehabilitation and closure is completed). Typically, aftercare and maintenance includes general maintenance activities including, soil amelioration, ongoing monitoring, control of alien invasive, and stability and settlement actions. It should be noted that for the purposes of this report and the associated financial provisions, that the relevant monitoring and maintenance/ aftercare actions are included in the other closure components listed in the Closure Plan.

Table 7 provides procedures for the decommissioning, closure and rehabilitation of the affected site.

Table 7: Decommissioning, Rehabilitation and Closure Actions

Closure component	Planning (pre-commencement)	TSF Progressive Rehabilitation (~8 years)	Decommissioning and Rehabilitation (1-3 years)	Closure and post closure (~50-100yrs) - or until closure certificate is received.
Planning and preparation for Closure	- Develop Final Rehabilitation and Decommissioning Closure Plan (FRDCP) for consideration in the EA decision making. - Appointment of dedicated rehabilitation specialist to ensure ongoing implementation of rehabilitation and closure actions and plans. - Ensure that sensitive environmental areas and soil stockpile areas are clearly demarcated to prevent unnecessary disturbance. - Develop a change management procedure to manage the impact of any changes to the mine plan.	- Annual review and update to FRDCP- including review of monitoring data and updated risk assessment. - 3 yearly review and update of hydrogeological model. - Regular consultation with I&AP's on closure planning and rehabilitation progress, and any intrusive activities. - Application for EA, WML and/or WUL (as applicable to implement closure plan) for decommissioning and closure activities (at least 18 months prior to scheduled closure). - Regular awareness training on rehabilitation and closure commitments to all site staff and contractors- including sensitivity of flora and faunal species, noise control.	- Implementation of final FRDCP. - Develop a post closure water balance and Storm Water Management Plan (SWMP).	- Implementation of final FRDCP. - Implementation of SWMP.

Closure component	Planning (pre-commencement)	TSF Progressive Rehabilitation (~8 years)	Decommissioning and Rehabilitation (1-3 years)	Closure and post closure (~50-100yrs) - or until closure certificate is received.
	- Develop a site specific operational stormwater management plan.	- Implementation and assessment of environmental monitoring as defined in the FRDCP. - Implement a site specific operational stormwater management plan		
Dismantling and removal of any on site infrastructure	- Relevant financial provisioning.	Annual assessment of obsolete infrastructure or facilities which can be decommissioned and removed- update annual rehabilitation plan.	- Removal of all services, structures, machinery, and infrastructure unless these are specifically required for post-mining land-use, - All infrastructure should be broken down to natural ground level (apart from TSF). - Areas where infrastructure was demolished should be assessed through a risk based system to determine if there is any residual contamination of risk and appropriate remediation measures implemented. - Implementation of the waste management plan. - A waste and infrastructure hierarchical principal should be applied to all	Ongoing rehabilitation monitoring and maintenance until relinquishment.

Closure component	Planning (pre-commencement)	TSF Progressive Rehabilitation (~8 years)	Decommissioning and Rehabilitation (1-3 years)	Closure and post closure (~50-100yrs) - or until closure certificate is received.
			decommissioned infrastructure or wastes, as follows: Reduce, re-use, recycle, dispose. - Monitor and manage dust generated from decommissioning activities to relevant standards.	
Rehabilitation of access roads	Develop mine layout plan to utilise existing access routes where possible.	Restrict vehicular movements to designated access and haulage routes to avoid unnecessary soil compaction.	- Conclude final closure layout plan defining access roads required for ongoing monitoring, management and maintenance. - Retained access roads to be designed in accordance with relevant engineering standards and specifications- including specific management of stormwater. - Restrict vehicular movements to designated access and access routes to avoid unnecessary soil compaction. - Closure, decommissioning, and rehabilitation of all access roads (incl	- Ongoing rehabilitation monitoring and maintenance until relinquishment. - Restrict vehicular movements to designated access routes to avoid unnecessary soil compaction.

Closure component	Planning (pre-commencement)	TSF Progressive Rehabilitation (~8 years)	Decommissioning and Rehabilitation (1-3 years)	Closure and post closure (~50-100yrs) - or until closure certificate is received.
			associated structures, signage, culverts, etc) unless these are specifically required for post-mining land-use, post-mining SDF projects or have been requested by the post-mining landowner. - Revegetation. - Apply dust suppression (e.g. water sprays) where necessary.	
Rehabilitation of the TSF	- Long term material settlement factors. - Develop an Invasive Species Control and Eradication Plan.	- Manage erosion. - Monitoring of groundwater, air quality and radiation. - Assess findings of monitoring programmes - Develop and implement an Invasive Plant Species Control and Eradication Plan. - Prevent erosion (wind/water) through implementation of temporary control measures.	- Post-closure Groundwater, air quality and radiation monitoring programmes - The implementation of the National Nuclear Regulator (NNR)-approved decommissioning plan.	- Post-closure Groundwater, air quality and radiation monitoring programmes . - Safety and stability checks.

Closure component	Planning (pre-commencement)	TSF Progressive Rehabilitation (~8 years)	Decommissioning and Rehabilitation (1-3 years)	Closure and post closure (~50-100yrs) - or until closure certificate is received.
Rehabilitation of soil stockpile areas	Ensure correct placement of soil stockpiles to: - Reduce surface water flows and velocities and associated erosion risks. - Minimise disruption and disturbance by mining or other activities. - Avoid identified wetland areas as far as possible.	- Stockpile footprints to be effectively demarcated to restrict activities which may disturb/ contaminate the stockpiles (e.g. vehicular movement). Compaction and contamination of the stockpiles must be prevented. - Once established the soil stockpiles must not be moved until soil placement for rehabilitation is undertaken.	- Stockpile footprints following removal of all soils for rehabilitation, must be landscaped (shaped and levelled) to natural contours , ripped to loosen all soil, and revegetated. - The rehabilitated area must be re-vegetated in accordance with the post closure mine plan and monitored for success. - Manage and remediate surface erosion.	- Ongoing rehabilitation monitoring and maintenance until relinquishment. - Manage and remediate surface erosion.
Water management	- Develop numerical groundwater model. - Utilise model to define and assess extent and timing of mine affected water pollution plume. - Begin implementation of phyto-remediation measures (where investigations prove feasible)	- Continue monitoring including general water quality. - Update numerical groundwater model – every 3 years. - Amend the mine closure plan where necessary based on the results.	- Continue monitoring including general water quality and water levels in surrounding areas. - Update numerical groundwater model (including monitoring results) – every 3 years. - Amend the mine closure plan where necessary based on the results.	- Update and implement groundwater management plan. - Update numerical groundwater model. Specific attention to be placed on long term water liability assessment. - Amend the residual and latent impacts risk assessment and closure

Closure component	Planning (pre-commencement)	TSF Progressive Rehabilitation (~8 years)	Decommissioning and Rehabilitation (1-3 years)	Closure and post closure (~50-100yrs) - or until closure certificate is received.
		- Implement and monitor the Groundwater Management Plan. - Installation, operation, and maintenance of phyto-remediation measures.	- Implement and monitor the Groundwater Management Plan.	plan associated financial provisions. - Implement and monitor the Groundwater Management Plan. - Install plume interception boreholes and/or trenches as required. - Continue groundwater monitoring.
Social and economic change management	- Public review and comment on rehabilitation, decommissioning and closure planning. - Develop SLP in accordance with relevant regulations and guidelines, and in consultation with local municipality and other authorities.	- Regular consultation with I&AP's on closure planning and rehabilitation progress, and any intrusive activities. - Provide clear communication to the stakeholders to ensure awareness of the mine's limitations in terms of funding and that funding will cease upon mine closure. - Develop mechanisms to assist employees during the transition to closure.	- Continued implementation of SLP obligations and commitments. - Implement approved retrenchment mechanisms as per the approved SLP. - Assist employees in accessing available and suitable employment opportunities with other mining companies or within the local agricultural sector.	

Closure component	Planning (pre-commencement)	TSF Progressive Rehabilitation (~8 years)	Decommissioning and Rehabilitation (1-3 years)	Closure and post closure (~50-100yrs) - or until closure certificate is received.
		- Implement SLP obligations including defined skills development programmes focusing on non-mining supply links to facilitate easier transitioning to local suppliers and industries.		

7 ENVIRONMENTAL MONITORING

7.1 FUNCTIONAL REQUIREMENTS OF MONITORING PROGRAMMES

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

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

7.2 LIST OF ASPECTS THAT REQUIRE MONITORING PLANS

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

- Air quality;
- Radiation;
- Groundwater;
- Surface water; and
- Post-closure.

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

7.3 MONITORING PLANS FOR ENVIRONMENTAL ASPECTS

The monitoring of various environmental aspects and the impact on them as a result of the proposed project 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.

7.3.1 AIR QUALITY

Source monitoring at operational activities can be challenging due to the fugitive and wind-dependent nature of particulate emissions. The focus is therefore rather on receptor-based performance indicators i.e. compliance with ambient air quality standards and dust fall regulations.

It is recommended that the current dust fall monitoring network (Figure 5) be maintained and the monthly dust fall results used as indicators to track the effectiveness of the applied mitigation measures. Dust fall collection should follow the American Standard Testing Methodology (ASTM) method as per the National Dust Control Regulations (NDCRs). The ASTM method covers the procedure of collection of dust fall and its measurement and employs a simple device consisting of a cylindrical container exposed for one calendar month (30 ±2 days). The method provides for a dry bucket, which is advisable in the dry environment. The cause of the high dust fall rates should be investigated and these levels should be reduced to be within compliance with the NDCR.

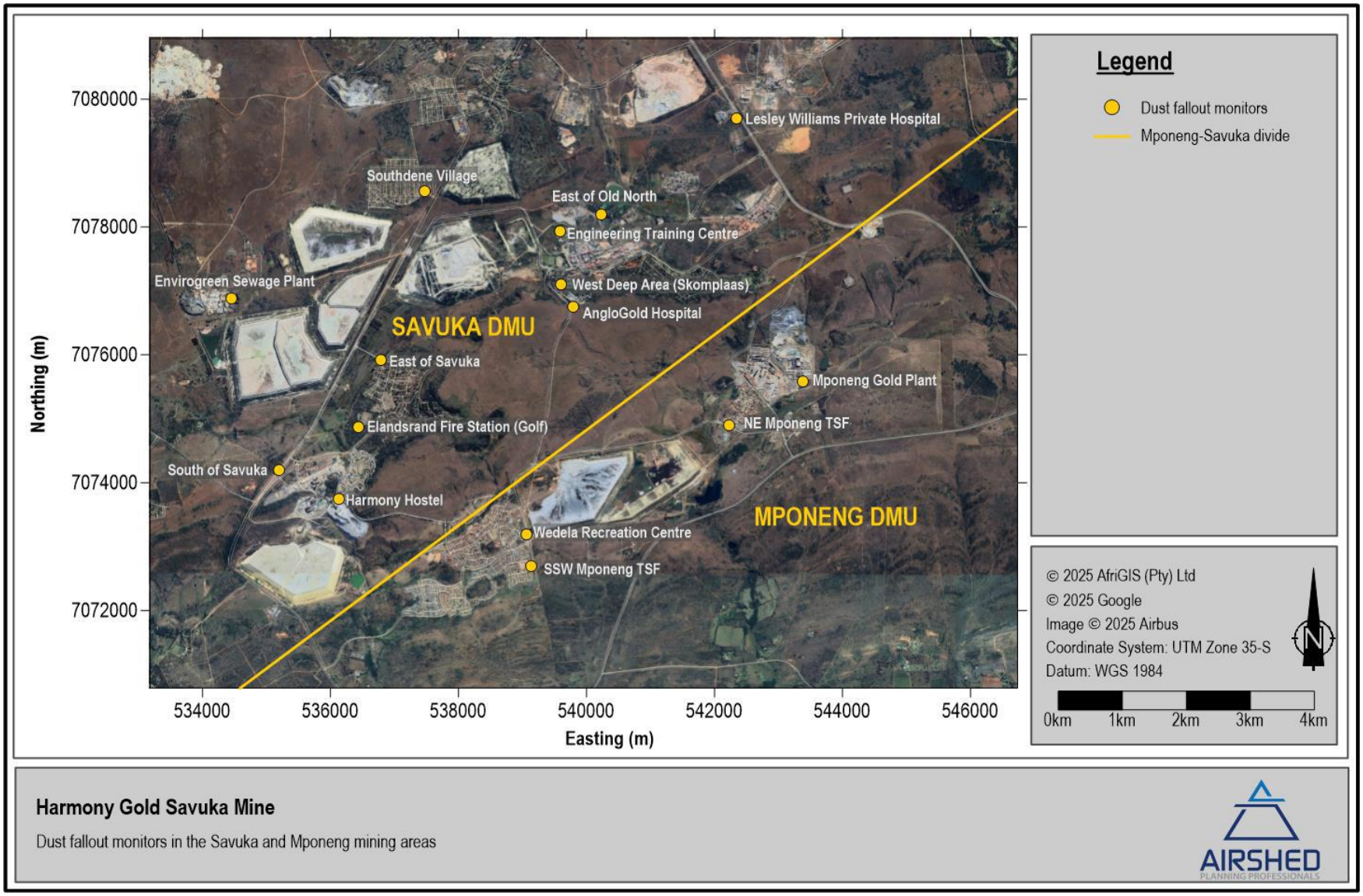

Figure 5: Proposed dust fallout sampling locations

7.3.2 GROUND WATER MONITORING

The exiting monitoring network is comprehensive and sufficient to quantify the impact from the RWD and the TSF. The boreholes are generally close to the TSF, referred to as source boreholes. It is important to drill monitoring boreholes further from the contaminant sources to be able to quantify plume migration, as well as close to the property boundary or receptors. These boreholes are referred to as compliance boreholes. Four additional compliance borehole pairs (one shallow and one deep) are recommended as shown in Figure 6. The aim of these boreholes is to monitor the effectiveness of the phyto-remediation.

The following is recommended in terms of monitoring:

- Groundwater levels.
- Groundwater quality.
- Data should be stored electronically in an acceptable database.
- On the completion of every sampling run a monitoring report should be written. Any changes in the groundwater levels and quality should be flagged and explained in the report.
- A compliance report can be submitted to DWS once a year, if required.
- A comprehensive bi-annual analysis of the dedicated monitoring boreholes.
- Groundwater levels should be monitored monthly in the dedicated groundwater monitoring boreholes.
- Rainfall should be monitored daily.
- Samples should be submitted to a SANAS accredited laboratory. The following recommended parameters to be analysed for include:
    - pH.
    - Electrical Conductivity.
    - Total Dissolved Solids.
    - Total Alkalinity.
    - Anions and Cations (Ca, Mg, Na, K, NO3, NH4, Cl, SO4, F, Fe, Mn, Al, Cr).

Figure 6: Proposed groundwater monitoring locations

7.3.3 RADIATION MONITORING

The following forms part of the radiation monitoring programme proposed for Savuka TSF.

7.3.3.1 BASELINE CHARACTERISATION

The purpose of the radiological baseline characterisation programme is to establish the radiological conditions observed at the site and surroundings before the commissioning of the project. No baseline characterisation has been done in the area yet. It should include, to the extent possible, soil, surface water and groundwater samples, as well as an airborne environmental radon survey in the area using Radon Gas Monitors (RGMs).

In addition to these sampling and analysis, it is proposed that a full gamma radiation and dose rate survey on a grid basis be conducted after site preparation and cleaning. Soil samples should again be collected for full-spectrum radio analysis of the U-238, U-235 and Th-232 decay chains in the affected areas at locations that will be informed by the gamma radiation survey.

7.3.3.2 MONITORING PROGRAMME

The Projects TSF falls within the scope of CoR-3 with an approved public Radiation Protection Programme (RPP), which makes provision for environmental monitoring and analysis to ensure that members of the public are sufficiently protection from releases into the environment. The responsibility for the implementation and execution of the monitoring programme lies with the Radiation Protection Function (RP Function) which may include legally appointed persons consisting of a Radiation Protection Monitor(s) (RPM), a Radiation Protection Officer (RPO), and a Radiation Protection Specialist (RPS).

Table 8 summarises the proposed monitoring programme for the Project aimed at public radiation protection.

Table 8: Summary of the environmental monitoring programme proposed for the Project aimed at public radiation protection.

Monitoring Element	Comment	Frequency
Surface water	Full-spectrum analysis (U-238, U-235, Th-232 and progeny)	Biannually
	Total Uranium and Thorium	Quarterly
Sediments	Full-spectrum analysis (U-238, U-235, Th-232 and progeny)	Annually
	Total Uranium and Thorium	Biannually
Groundwater	Full-spectrum analysis (U-238, U-235, Th-232 and progeny)	Once every two years
	Total Uranium and Thorium	Biannually
Radon gas	Environmental radon gas using Radon Gas Monitors (RGMs)	Quarterly for a period of 2 to 3 months
Dust fallout	Total Uranium and Thorium	Annually

The full-spectrum analysis is suitable for detailed dose analysis but is an expensive procedure with long lead times to perform the analysis, which is why less frequent intervals are proposed. The total uranium and thorium analyses are relatively inexpensive with fast turnaround times. These results will monitor variations in activity concentration over the monitoring period.

Large variations in the activity concentration over a short period are not expected in groundwater, as opposed to surface water, for example. Therefore, a less frequent sampling schedule is proposed for groundwater. The same principle applies to the sediment samples at the same locations as the surface water sample.

The RGMs monitor the variation in radon gas works in monitoring periods of 2 to 3 month, after which the RGMs is replaced with new RGMs for the next monitoring period. The dust fallout samples are generated quarterly but are used to generate an annual sample for the total U and Th analysis. The reason for this is that the volume of material collected in a dust bucket is too little for quarterly analysis.

7.3.3.3 PROPOSED MONITORING POINTS

Most monitoring points proposed to be part of the monitoring programme coincide with the monitoring programme for the environmental pathways (e.g., soils surface water and groundwater). Considering the surface infrastructure that will be developed for the Projects, the following can be noted:

- The surface water monitoring locations should coincide with the existing surface water monitoring points currently included in the public RPP. The principle to be applied is that the monitoring locations should be upstream and downstream of the Projects area in potentially affected surface water streams, as well as upstream and downstream of potential discharge points.
- The sediment monitoring locations should coincide with the surface water monitoring points, applying the same principles.
- The groundwater monitoring points should coincide with the existing groundwater monitoring points. The principle to be applied is that the monitoring locations should be upstream and downstream of the Projects area, as well as upstream and downstream of specific surface facilities. The exact location will be determined by the availability of water-bearing boreholes in the specific area.
- The dust fallout monitoring locations should coincide with the monitoring points (dust buckets) proposed in Airshed AQIA (2025).
- The environmental radon monitoring locations do not have to coincide with specific locations. The principle to apply is that it should be widespread over the mining rights area, in the dominant wind direction where receptors are located, complemented with monitoring locations in what can be considered as background. The exact location is often influenced by whether a secured location is available to improve the recovery rate of the RGMs.

7.3.4 POST-CLOSURE MONITORING

Post-Closure monitoring requirements and frequencies are indicated in Table 9. Considering that a decommissioning plan of the Savuka TSFs is not available at present but will be defined and implemented, the following activities were identified that may result in a radiological impact on the receptors during the post-closure phase:

- Implementation of the approved decommissioning plan;
- Exhalation of radon gas and the emission of particulates matter (PM10 and TSP) that contain radionuclides from the remaining facilities (e.g., TSF); and
- Leaching and migration of radionuclides from the remaining facilities (e.g., TSF).
- The implementation of the NNR-approved decommissioning plan will result in a positive impact in the sense that surface infrastructure that contained or that is contaminated with radionuclides is demolished, decontaminated (to the extent possible) and removed from the site and compliance with clearance criteria has been demonstrated. Generally, this would involve performing a gamma radiation survey supplemented with full-spectrum radio analysis of soil samples performed at the infrastructure sites, followed by appropriate rehabilitation and clean-up operations for conditional or unconditional clearance from the regulatory authority. However, in this case for the TSF that would remain at the surface during the post-closure period, the level of clean-up that can be performed is limited to areas

outside the TSF footprint area that may have become contaminated during or because of operational activities. These areas outside the TSF footprint can still be rehabilitated and cleaned-up for conditional or unconditional clearance.

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Table 9: Post closure monitoring requirements.

Aspect	Functional Requirement	Performance indicator/ target	Frequency	Reporting Mechanism	Adaptive management action
Groundwater	Standards: - SANS 5667-1:2008/ISO 5667-1:2006 Water Quality – Sampling Part 1: Guidance on the design of sampling programmes and sampling techniques. - SANS 5667-3:2006/ISO 5667-3:2003 Water Quality – Sampling Part 3: Guidance on the preservation and handling of water samples. - SANS 5667-11:2015/ISO 5667-11:2009 Water Quality – Sampling Part 11: Guidance on sampling of groundwater. - Use of SANAS Accredited analytical laboratory. Parameters: pH, Electrical Conductivity, Total Dissolved Solids, Total Alkalinity, Anions and Cations (Ca, Mg, Na, K, NO3, NH4, Cl, SO4, F, Fe, Mn, Al, Cr).	- Monitoring network must comply with the risk-based source-pathway - receptor principle. - Compliance with WUL water quality thresholds. - Trend analysis in relation to identified latent impact trigger.	Biennial	Biennial water quality report.	Undertake a final groundwater model update as and when the indicator parameters reach trigger values at dedicated plume monitoring boreholes. The revised groundwater model to be used to refine and revise the long term water management actions.
Radiation	The proposed radiological monitoring programme for the project includes recommendations for the monitoring of surface water, groundwater, sediment, environmental radon, well as dust fallout, including the frequency and type of analysis. Most monitoring points proposed to be part of the monitoring programme coincide with the monitoring programme for the environmental pathways (e.g., soils surface water and groundwater.	- Monitoring network must comply with the risk-based source-pathway - receptor principle. - Compliance with WUL water	Biennial	Biennial monitoring reports.	Under the responsibilities as outlined in the radiation function procedure, specific actions need to be taken the day the incident or accident is identified, while several actions need to be taken as soon as possible after the event. These include, amongst others: • Assessing the extent of physical damage to property, people, and the environment, as well as the extent of the contamination in and around

Aspect	Functional Requirement	Performance indicator/ target	Frequency	Reporting Mechanism	Adaptive management action
	• Parameters: • Exhalation of radon gas and the emission of particulates matter (PM10 and TSP) that contain radionuclides from the remaining facilities (e.g., TSF).; and • Leaching and migration of radionuclides from the remaining facilities (e.g., TSF).	quality thresholds. - Trend analysis in relation to identified latent impact trigger.			where the event occurred using appropriate radiation survey equipment and taking water samples upstream and downstream of the incident, as appropriate; • Inform the NNR about the event, including the current situation and its development, measures are taken to protect workers and members of the public, and the exposures that have occurred and those expected to be incurred; • Initiate the clean-up process, with due consideration of the extent of the contamination, the potential radiological impact on workers and members of the public, and appropriate mitigation measures that can be implemented in the interim to contain the risks; and • Capture all relevant information in an Occurrence Report to be submitted to the NNR according to the Procedure for the Reporting of Occurrences, taking cognisance of how, when and where the event happened, corrective actions and clean-up operations, and the radiological impact on workers and members of the public.