



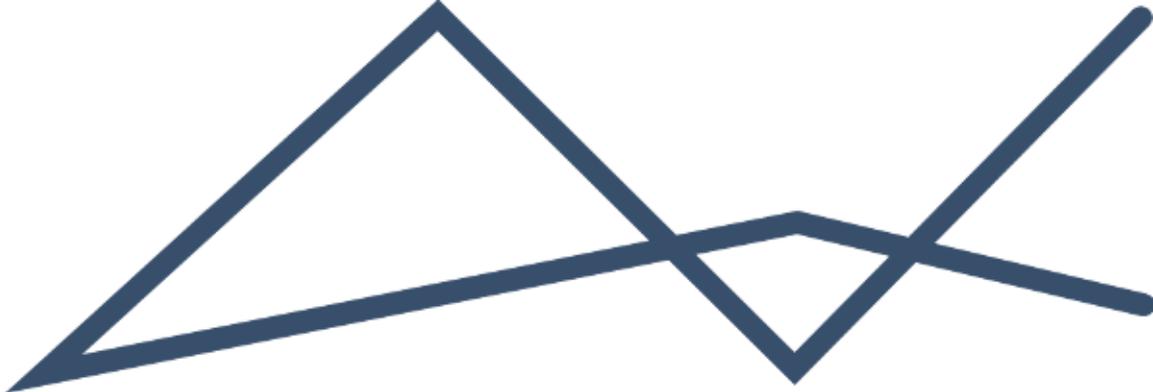
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OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME

EASTERN BASIN AMD TREATMENT PLANT
TCTA





DOCUMENT DETAILS

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TCTA EASTERN BASIN AMD TREATMENT PLANT

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Abbreviations

AMD	:	Acid Mine Drainage
DFFE	:	Department of Forestry, Fisheries and Environment (formally DEA)
DWAF	:	Department of Water Affairs and Forestry (now DWS)
DWS	:	Department of Water and Sanitation (formally DWA / DHSWS)
EA	:	Environmental Authorisation
EAP	:	Environmental Assessment Practitioner
ECO	:	Environmental Control Officer
EO	:	Environmental Officer
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Services (Pty) Ltd
EMPr	:	Environmental Management Programme
EPRP	:	Emergency Preparedness and Response Plan
HDS	:	High Density Sludge
HSE	:	Health, Safety and Environment
I&AP	:	Interested and Affected Party
ISO	:	International Standards Organisation
MSDS	:	Material Safety Data Sheet
NEMA	:	National Environmental Management Act (Act No. 107 of 1998)
NEMAQA	:	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEMBA	:	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEMWA	:	National Environmental Management: Waste Act (Act No. 59 of 2008)
NWA	:	National Water Act (Act No. 36 of 1998)
OHSA	:	Occupational Health and Safety Act (Act No. 85 of 1993)
OEMPr	:	Operational Environmental Management Programme
QMS	:	Quality Management System
SABS	:	South African Bureau of Standards
SANAS	:	South African National Accreditation System
SWMP	:	Storm Water Management Plan
TCTA:	:	Trans-Caledon Tunnel Authority
WUL	:	Water Use License



1 INTRODUCTION

Trans-Caledon Tunnel Authority (TCTA) was instructed by the National Government, through the Minister of Water and Environmental Affairs to implement the short-term interventions to treat Acid Mine Drainage (AMD) in the three Basins. This entails the pumping of water from the Western, Central and Eastern Basins to reduce and prevent surface decant (refer to Figure 2 for the general locality of the Witwatersrand Gold Fields basins). On the Eastern Basin the water will be neutralised in a newly constructed High-Density Sludge (HDS) treatment plants, before release into the environment.

The Eastern Basin AMD treatment plant is situated approximately 4,6 km east of the Springs CBD at Grootvlei Mine Shaft No. 3. The area is zoned as 'industrial' and the natural environment immediately surrounding the project is significantly disturbed. The AMD treatment process includes:

- Abstraction of AMD via pumps to Grootvlei Shaft No. 3 or 4 to keep the water from rising above the Environmental Critical Level at 1 280 mamsl.
- Pumping and treating an average of 106 Mℓ/day.
- Operation of the new HDS plant.
- Construction of a treated water pipeline to a suitable discharge point on the Blesbokspruit.
- A treated sludge pipeline.

The Department of Water and Sanitation (DWS) received an Environmental Authorisation (EA) with reference number 12/12/20/2403 for the installation of an Acid Mine Drainage Treatment Plant (AMD Treatment Plant) at the Grootvlei mine area at the Eastern Basin. The EA was received on the 7th of January 2013 from the Department of Environmental Affairs (DEA). DWS gave TCTA a Directive to implement the AMD Project. TCTA through Nafasi Water Technologies, which is the Plant's Operator, appointed Environmental Impact Management Services (Pty) Ltd (EIMS) to update the Operational Environmental Management Plan (OEMPr).

An additional Environmental Authorisation (Reference Number: 14/12/16/3/3/3/111), dated 12 May 2016, was also issued for the "establishment of a Sludge Disposal Facility (SDF) and pipeline associated with the treatment of Acid Mine Drainage (AMD)". The SDF will be established on the Remainder of farm Grootvaly 124 IR, Grootvlei 6/L/16, Springs Gauteng. Infrastructure associated with the SDF includes a pipeline to transport sludge to the SDF and a return pipe to transport water from the SDF facility back to the AMD treatment facility.

2 SCOPE OF THIS DOCUMENT

This OEMPr is an update of the 2016 OEMPr for the Eastern Basin AMD Treatment Plant (AECOM, May 2016). The OEMPr has been updated based on the following reasons:

- Findings from latest internal and external audit reports have identified areas where the OEMPr could be improved. The previous OEMPr was not developed prior to operations commencing. Now that operations have commenced certain aspects are out of date or are not specific to the actual operations. The OEMPr has been updated to include more detail regarding certain of these site-specific operational aspects.
- The HAZOP report completed for the treatment plant by TCTA has also identified environmental risks and issues associated with certain components of the plant and the OEMPr has been updated to include more detail with regard to management of certain aspects.
- The structure of the OEMPr has been revised to ensure all EMP requirements identified by NEMA are included in the OEMPr as well as to remove redundancy of certain recommendations included in the original OEMPr.
- A directive issued by DWS has been revised to accommodate the capability of the High-Density Sludge plant on site.

Details of the exact amendments are listed in Table 1 below:



Table 1: Detailed description of amendments to the Eastern Basin OEMPr

OEMPr Reference	Wording in Original 2016 EMPr	Amended / New Wording (underlined text)	Motivation
12.4 (H, I and J)	These mitigation measures and additional monitoring requirements were not included in 2016 OEMPr. These are new actions identified based on the HAZOP report completed for the facility.	<p>The following recommendations have been added:</p> <ul style="list-style-type: none"> • <u>Regular daily inspections of the quench water system to discover leaking valves should be undertaken.</u> • <u>Conduct regular inspections of the pipe wall including thickness tests and wear rates, whenever the thickeners are empty or on planned maintenance. Include regular planned maintenance. Replace valves if worn.</u> • <u>Conduct regular inspection of the condition of the air entrainment weirs in the sludge feed channels before the flow enters the pipe. Rebuild weirs as required.</u> 	Additional mitigation measures identified from operational HAZOP reports now included in OEMPr.
12.5 (A)	<p>Dust fallout monitoring must take place</p> <p>Odour monitoring must take place.</p> <p>Air monitoring frequency:</p> <p>Dust fallout: Monthly</p> <p>Odour: Daily</p>	<p>Dust fallout monitoring must take place</p> <p>Odour monitoring must take place.</p> <p>Dust fallout: (monthly)</p> <p>Odour (monthly)</p> <p><u>Should complaints be lodged regarding an odour nuisance, this should be assessed and investigated. Should it be found that it is possible that a nuisance exists, an odour assessment can be completed as further corrective action.</u></p>	Odour is not an issue on site as indicated from monitoring and audits conducted thusfar. Should complaints be lodged regarding an odour nuisance, this should be assessed and investigated. Should it be found that it is possible that a nuisance exists, an odour assessment can be completed as further corrective action.
12.6 (F)	The Operator shall routinely spray all dust generating surfaces with water, a dust suppressing agent or similar substance to prevent dust generation. Potable and	The Operator shall routinely spray all dust generating surfaces with water, a dust suppressing agent or similar substance to prevent dust generation <u>in the event that any significant amount of dust is</u>	Dust is not an issue on site, dust suppression only required in the event that a significant amount of



OEMPR Reference	Wording in Original 2016 EMPr	Amended / New Wording (underlined text)	Motivation
	contaminated water will not be used as a dust suppressing agent and only recycled and/or rain water is to be used, when available.	<u>generated on site.</u> Potable, <u>treated and</u> contaminated water will not be used as a dust suppressing agent and only recycled and/or rain water is to be used, when available.	dust is generated on site.
12.6 (I)	Investigate and mitigate any odour sources that produce nuisance impacts or unacceptable smell.	Additional Mitigation: Investigate and mitigate any odour sources that produce nuisance impacts or unacceptable smell. <u>Should complaints be lodged regarding an odour nuisance, this should be assessed and investigated. Should it be found that it is possible that a nuisance exists, an odour assessment can be completed as further corrective action.</u>	Odour is not an issue on site however should complaints be received in the future then an assessment and corrective actions must be undertaken.
12.9 (P)	Sludge will initially be disposed down Grootvlei Shaft 3, the shaft from which AMD is being extracted. Once established, sludge will be disposed of via a pipeline to the Sludge Disposal Facility (SDF) on the Remainder of the farm Grootvaly 124 IR, Grootvaly 6/L/16, near Springs	Replaced with: <u>Sludge will be disposed of via a pipeline to the Sludge Disposal Facility (SDF) or at Grootvlei Shaft 4. Currently sludge is disposed in Shaft 4.</u>	Sludge is now planned to be disposed of at Grootvlei Shaft 4, and no longer at shaft 3. Once established, sludge will be disposed of via a pipeline to the Sludge Disposal Facility (SDF) on the Remainder of the farm Grootvaly 124 IR. Approval has been obtained for disposal at Shaft 4.
12.10 (C)	A waste sorting facility will be built at the site office / yard. Solid waste will be separated into recyclable and non-recyclable waste.	<u>A waste sorting facility will be built at the site office / yard.</u> Solid waste will be separated into recyclable and non-recyclable waste.	Waste sorting is done by wheelie bins.
12.10 (F)	Noise: Implement regular noise monitoring procedures to Comply with SANS 10103:2008	Replaced with: • The Noise Management Plan must always be adhered to, to ensure that sensitive receptors are not impacted on.	Historical results indicate noise is not an issue and that continuous noise monitoring is not required as long as Noise Management Plan is adhered to.
12.14 (B)	Awareness and Training:	Replaced with: <u>Registers of the proof that training was conducted</u>	It is not feasible / possible to have proof



OEMPR Reference	Wording in Original 2016 EMPr	Amended / New Wording (underlined text)	Motivation
	<p>A system of evaluation of the effectiveness of training must be developed.</p> <p>Develop a Training Impact Matrix to evaluate the effectiveness of training and identify remedial or new actions.</p> <p>Results must reflect that training has been effective.</p>	<p><u>must be kept. Certificate should be kept in cases where the training was outsourced.</u></p>	<p>of effectiveness of the training, training register considered is sufficient.</p>
12.16 (M)	<ul style="list-style-type: none"> • The AMD (raw) testing must include: <ul style="list-style-type: none"> ○ pH ○ Cyanide ○ Fortnightly Scans for metals, including arsenic, zinc, chromium (III) and (VI), nickel, mercury and cadmium must be carried out as required. • As a minimum effluent water to be released into the Blesbokspruit shall comply with: <ul style="list-style-type: none"> ○ pH 6.5-9.5 ○ Iron < 1 mg/l ○ Manganese < 3 mg/l ○ Aluminium < 1 mg/l ○ Uranium < 50 µg/l (measured bi-weekly) ○ Sulphates < 2400 mg/l <p>Data from the first six months of operation must be reviewed and a revised sampling frequency submitted to the DFFE and DWS for approval.</p>	<ul style="list-style-type: none"> • Minimum effluent parameters must be in line with the latest DWS directive issued. 	<p>The DWS directive was revised on 3 October 2016 to accommodate the capacity of the HDS plant. Effluent Monitoring and parameters must be in line with the latest DWS directive issued and as a new directive may be issued in the future it is preferable to rather refer to this directive instead of listing the monitoring parameters in the OEMP.</p> <p>Sampling frequency is determined by the quality of the water when results are received.</p>
General update	N/A	<p>Overall update to bring OEMPr structure in line with NEMA requirements for EMPs including details of the EAP who prepared the EMP, detailed auditing procedures, a document structure table, more detailed legal requirements, abbreviations list and a locality map.</p>	<p>Overall update to bring OEMPr structure in line with NEMA requirements.</p>



OEMPR Reference	Wording in Original 2016 EMPr	Amended / New Wording (underlined text)	Motivation
General update	N/A	Correction of several spelling / formatting errors and other minor non-substantive changes to the wording in the original OEMPr.	Correction of errors and other minor non-substantive changes.

The purpose of an EMPr is to give effect to precautionary measures, which are to be put in place for controlling the activities that take place during the various phases of the project. The EMPr also provides guidance to assist in ensuring compliance with relevant national legislative and regulatory requirements. It should be borne in mind, however, that the EMPr is a working document that should be updated on a regular basis, as and when necessary. Formal risk identification forms an integral part of EMPr management and assists with prioritizing and focusing the control of risks. The EMPr thus supports this on-going proactive mitigation and the duty of care to the environment. The EMPr shall therefore allow for risk minimization, rather than just ensuring legal compliance. The purpose of this EMPr is thus also to allow the user to make minor amendments to ensure continual revision and improvement of risk mitigation through the continual re-assessment of risks associated with the activity.

The Operational Environmental Management Programme (OEMPr) is required to be completed as a condition of the Environmental Authorisation for the project (Environmental Authorisation Ref No: 12/12/20/2403, Dated: 7 January 2013). Clause 26: "The holder of this authorisation must compile an Operational EMPr for the operational phase of the activity and submit to the Department for written approval prior to commencement of operations or alternatively, if the holder has an existing operational environmental management system, it must be amended to include the operation of the authorised activity."

The document was drafted to ensure that there is compliance with the requirements of reasonable protection of the environment as imposed by NEMA, in particular Section 28 referring to the "Duty of Care" during the operational phase. NEMA stipulates in Section 28 (1) that anyone who causes pollution or degradation of the environment is responsible for preventing impacts occurring, continuing or recurring and for the costs of repair of the environment.

The mitigation measures required in terms of Section 28, subsection (1) may include measures to –

- Investigate, assess and evaluate the impact on the environment;
- Inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;
- Cease, modify or control any act, activity or process causing the pollution or degradation;
- Contain or prevent the movement of pollutants or the cause of degradation;
- Eliminate any source of the pollution or degradation; or
- Remedy the effects of the pollution or degradation.

This OEMPr, as a standalone document, shall be used to guide and regulate environmental performance on the AMD project through the operational and maintenance stages of the scheme. It contains the following elements:

- Goal setting and performance measurement;
- Compliance management;
- Assessment and management system;
- Community relations;
- Roles, responsibilities and accountabilities;



- Risk management;
- Emergency preparedness and response; and
- Incident reporting and investigation.

To achieve these environmental management requirements, a well-defined and implementable system must be in place. This system encompasses "what and how." The OEMPr indicates what is required by setting objectives with measurable targets in place for the successful management. The Operator is required to formulate procedures and / or guideline documents in compliance with its Quality Management System (QMS) requirements on how the objectives will be met. The OEMPr outlines the impacts and mitigation measures for the operation and control of the Eastern Basin Water Treatment Works. The roles, responsibilities and reporting procedures have been identified in the OEMPr. The OEMPr also contains a series of environmental specifications designed to avoid, minimise and ultimately manage the potential environmental impacts during the operation control phase.



3 DOCUMENT STRUCTURE

Table 2: EMPr Structure in terms of NEMA requirements.

Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(a)	<p>Details of –</p> <ul style="list-style-type: none"> (i) The EAP who prepared the EMPR; and (ii) The expertise of that EAP to prepare an EMPR, including a curriculum vitae; 	Section 4 and Appendix A
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 2
Appendix 4(1)(1)(c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Figure 2
Appendix 4(1)(1)(d)	<p>A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including –</p> <ul style="list-style-type: none"> (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 12
Appendix 4(1)(1)(f)	<p>A description of proposed impact management actions, identifying the manner in which the impact management contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to –</p> <ul style="list-style-type: none"> (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practices; (iii) Comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable; 	Section 12



Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 12
Appendix 4(1)(1)(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 12
Appendix 4(1)(1)(i)	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 12
Appendix 4(1)(1)(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 12
Appendix 4(1)(1)(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 12
Appendix 4(1)(1)(l)	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 8
Appendix 4(1)(1)(m)	An environmental awareness plan describing the manner in which – <ul style="list-style-type: none"> (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and 	Section 10 and 12.17
Appendix 4(1)(1)(n)	Any specific information that may be required by the competent authority.	N/A



4 REQUIREMENTS OF AN EAP

In terms of Regulation 13 of the EIA Regulations, 2014, an independent EAP, must be appointed by the applicant to manage the application. EIMS has been appointed as the EAP and is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations and Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

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

The declaration of independence of the EAPs involved and the Curriculum Vitae (indicating the experience with environmental impact assessment and relevant application processes) of the consultants that were involved in the EMP process and the compilation of this report are attached as Appendix A.

4.1 Details of the EAP

EIMS was appointed as the EAP to compile this report. The contact details of the EIMS consultants who compiled the report are as follows:

Table 3: EAP Details

Name of Practitioner	Mr John von Mayer (Consultant)
Tel No.:	011 789 7170
E-mail:	john@eims.co.za

4.2 Expertise of the EAP

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS has in excess of 27 years' experience in conducting EIAs, including many EIAs for mines and mining related projects.

Mr John von Mayer is a senior consultant at EIMS and has been involved in numerous significant projects the past 10 years. He has experience in Project Management, small to large scale Environmental Impact Assessments, Environmental Auditing, Water Use Licensing, and Public Participation. He is a Registered Professional Natural Scientist (400336/11) with the South African Council Natural and Scientific Professions (SACNASP) as well as a registered EAPASA Environmental Practitioner (2019/1247).

5 PROJECT DESCRIPTION

The AMD plant treatment process includes:

- Abstraction of AMD via pumps in the Grootvlei Shaft 3 to keep the water from rising above the Environmental Critical Level at 1280 mamsl;
- Pumping and treating an average of 106 Ml/day;
- Operation of a new High-Density Sludge (HDS) plant; and
- The construction of an effluent water pipeline to an acceptable discharge point in the Blesbokspruit.

Treatment technology and chemical reagent combinations recommended for the treatment of the Witwatersrand AMD is as follows:

- Pre-neutralisation with limestone;



- Oxidation by aeration;
- Neutralisation and metals removal with lime, produced by the slaking of quicklime; and
- Gypsum crystallisation to remove excess sulphate from solution.

The HDS plant to be constructed for the short-term intervention is based on technology that is proven to be effective (and cost effective) in the treatment of AMD at full-scale large volume applications. Other neutralising chemicals can be used, but these are generally a lot more expensive than limestone and lime.

Key impact areas are:

- Pumping of acid water from underground and risks associated;
- Storage or stockpile of material used in the HDS plant;
- Operations of the HDS plant and the risks associated;
- Discharge of treated water into the Blesbokspruit;
- Air and water monitoring;
- Servicing of the plant (cleaning water, oils from servicing the pumps with potential to contaminate the sludge in the reactors);
- Disposing of the sludge into the shaft (sludge pipe burst);
- Dust on the access road; and
- Contaminated stormwater potentially entering the adjacent wetland.

Refer to Figure 1 for a schematic of the potential impacts during operations.

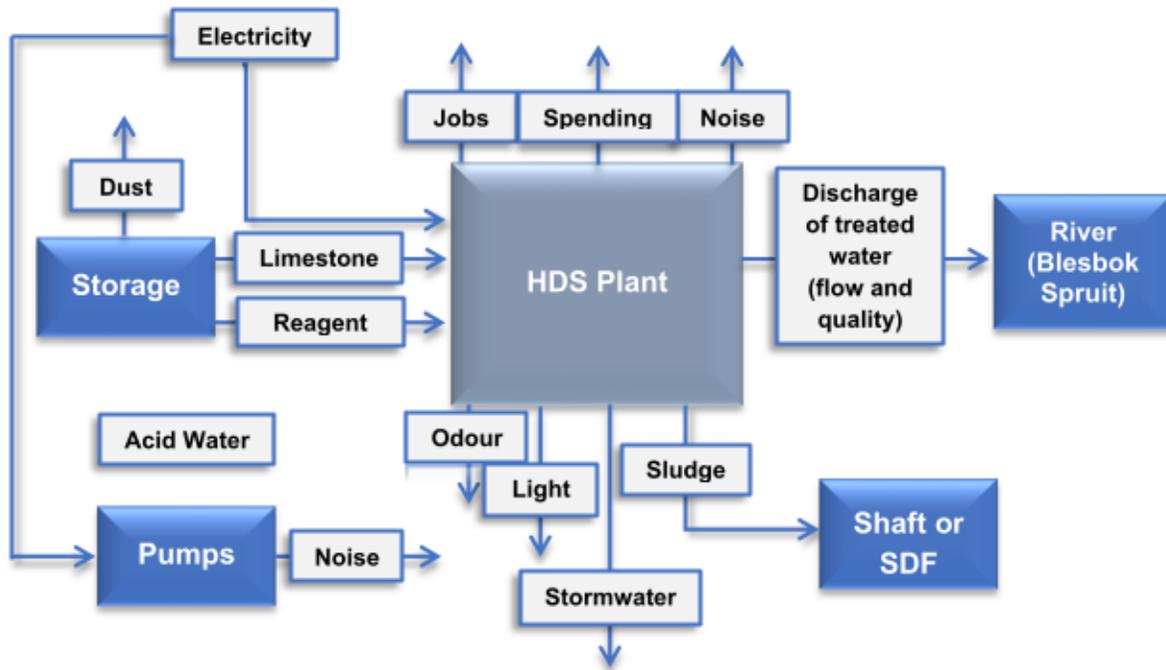


Figure 1: Environmental Aspects associated with the operation of the AMD treatment plant

6 SITE DESCRIPTION

The Eastern Basin AMD treatment plant is situated approximately 4,6 km east of the Springs CBD at Grootvlei Mine Shaft No. 3. The area is zoned as 'industrial' and the natural environment immediately surrounding the project is significantly disturbed. Refer to Figure 2 for a locality map of the Eastern Basin AMD treatment plant.

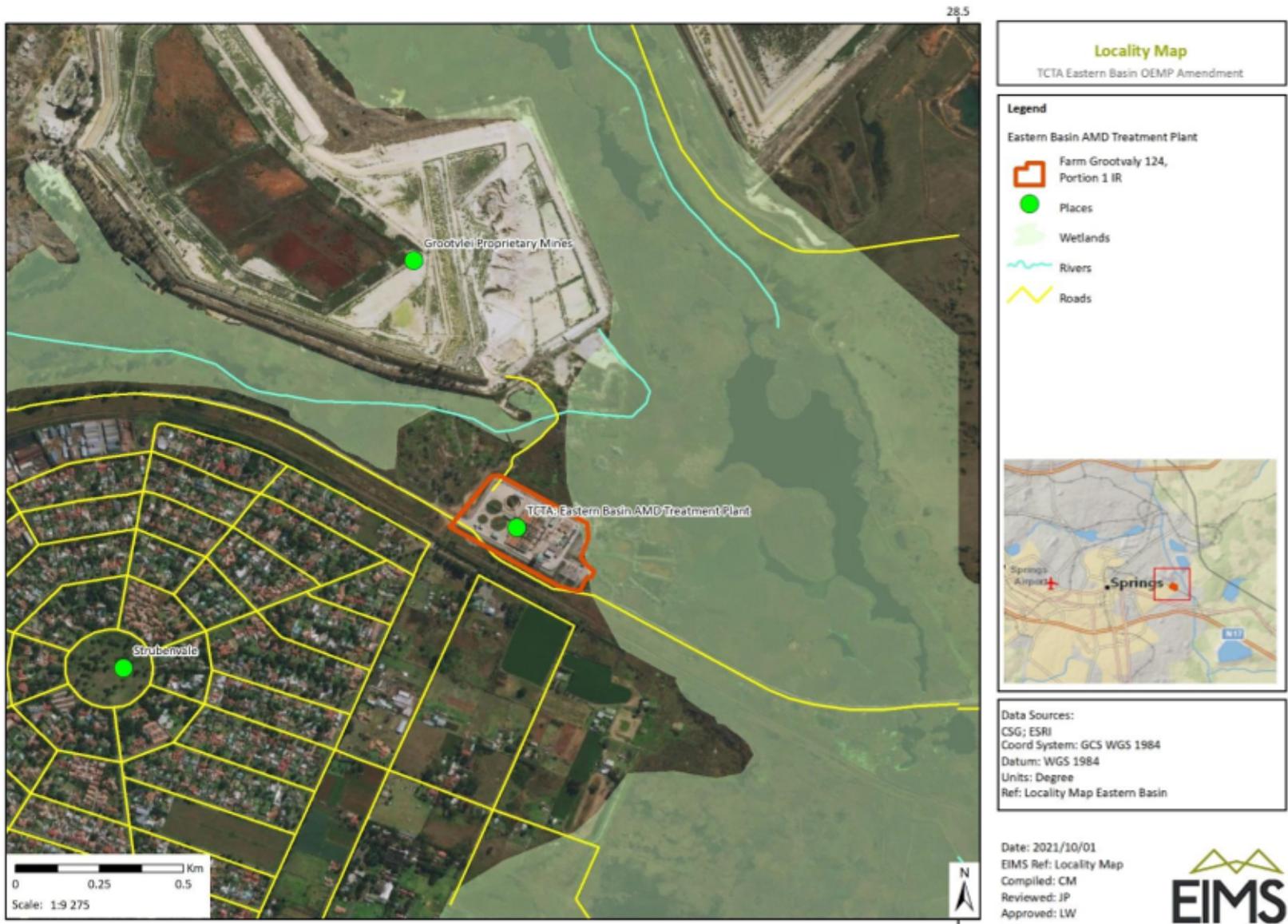


Figure 2: Locality Map



7 ROLES AND RESPONSIBILITIES

The Operator will be responsible for ensuring overall compliance with the provisions of the EMPr. Implementation is the key to the success of the EMPr. In order to ensure that the EMPr and its mitigation measures are implemented, roles and responsibilities need to be clearly defined and documented prior to commencement. This section serves as a guide on which party is normally responsible for certain tasks. Specific roles are designated in the specific environmental management and mitigation requirements in this EMPr. The relationship, roles and responsibilities of the respective OEMPr related role-players and reporting lines are indicated below (refer to Figure 3).

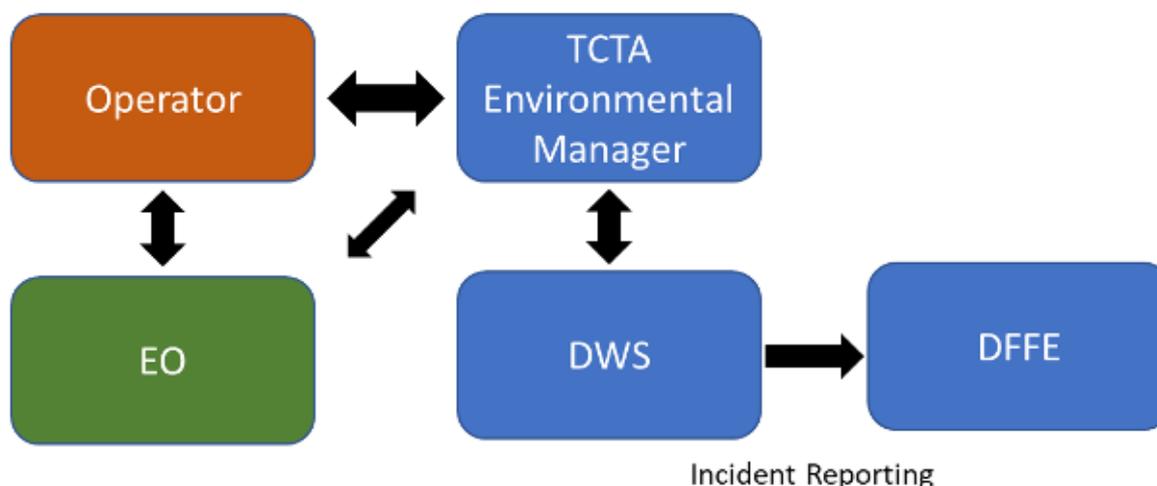


Figure 3: Institutional Relationships

With reference to Figure 3 above, the Operator is responsible for operating the AMD facility and to ensure a safe and healthy working environment. Included in this responsibility, is the requirement that the Operator is cognisant of environmental requirements and avoids or mitigates negative environmental aspects. The OEMPr provides the framework within which these activities take place.

The **Operator** is accountable to the Client, TCTA and the Department of Water and Sanitation (DWS). Any incidents which occur will be reported to the Client who will in turn report the incidents to the DFFE, if applicable. The Operator must appoint an Environmental Officer. The responsibilities of the Operator and the Environmental Officer are indicated in the following section.

7.1 Operator

The Operator shall ensure that the project complies with the requirements of the OEMPr, the Environmental Authorisation as well as any requirement from other relevant legislation. The Operator shall take action if the requirements are not followed.

The Operator's responsibilities include:

- Adherence to the requirements of the OEMPr and the Environmental Authorisation;
- Appointing a suitably qualified and experienced Environmental Officer;
- Management of the legal and contractual framework;
- Minimising the impact and maintaining the integrity of affected water resources;
- Monitoring and maintaining storm water infrastructure;
- Overall environmental control during the operational and maintenance phases of the project;



- Provision of adequate capacity and resources for the management, maintenance and operation of the Water Treatment Works; and
- Responding to any project-related complaints.

7.2 Environmental Officer

The responsibilities of the Environmental Officer include the following aspects:

- Assisting in finding environmentally responsible solutions to problems;
- Checking the undertaking of environmental awareness training for all new personnel coming onto site;
- Confirming that necessary environmental authorisations and permits have been obtained. A register of all the required authorisations and permits must be kept. As a minimum the register must provide a description of the permit, the authorising body, the date on which authorisation was given and the expiry date of each authorisation and permit;
- Ensuring that effective communication channels with adjacent landowners are established and maintained;
- Keeping a photographic record of progress on site from an environmental perspective. A description of the activities or observations must accompany each photograph;
- Keeping a register of all audit findings, incidents and related matters;
- Maintaining a register of public complaints and ensure timely responses on comments or issues;
- Monitoring and verifying that environmental impacts are kept to a minimum;
- Other matters that may emerge during the process, as indicated by the Operator;
- Undertaking a continual internal review of the OEMPr; and
- Undertaking site audits and report on the compliance of the works in accordance with the OEMPr and relevant legislation. Consolidated monthly internal site audit reports must be sent to TCTA.

The EO's responsibilities include, but are not limited to the development and implementation of the following plans and procedures:

- Air quality (dust/odour) Management Plan;
- Emergency Response Plans, Procedures and Equipment;
- Fire Management Plan;
- Hazardous Materials Management Plan;
- Noise Management Plan;
- Other matters that may emerge during the process, as indicated by the Operator;
- Report to the DWS on the results of the site audits of the facility and all activities;
- Storm Water Management Plan;
- Traffic Management Procedure;
- Training Plan, Schedule and Material; and
- Waste Management Plan.



7.3 The Authorities

The authorities that should be involved include the Department of Water and Sanitation (DWS) and the National Department of Forestry, Fisheries and the Environment (DFFE). The authorities may be required to perform the following roles:

- Review Monitoring and Audit reports, if required;
- Review whether there is compliance by the Operator with the terms of the EMPr and permit/license conditions. Whenever necessary, the authorities should assist the Operator in understanding and meeting the specified requirements; and
- The authorities may perform random controls to check compliance. In case of persistent non-compliance, the Operator will be required to provide an action plan with corrective measures, and have it approved by the authorities.

8 ENVIRONMENTAL MANAGEMENT SYSTEM

The purpose of this OEMPr is to ensure that the environment is properly considered during operations and that negative impacts are minimised or prevented, and positive impacts enhanced. At the same time the OEMPr should provide a logical extension of the EIA, specialist studies, or any other technical planning and assessment documentation, to ensure that recommendations are implemented, and that the project does not deviate from the environmental profile that formed the basis of the assessment.

8.1 Document Control

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

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

The responsibility for establishing a suitable document control system rests with the Project Manager.

8.2 Record Keeping

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

8.3 Auditing and Reporting Procedures

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

- Inspections;
- Accidents and emergencies;



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

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

8.4 Responding to Non-Compliances

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

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

Non-compliance with the EMPr or any other environmental legislation, specifications or standards shall be recorded by the EO in the non-conformance register. The Operator 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 and/or documented proof provided. The register should be utilised to measure overall environmental performance.

8.5 Environmental Incidences

For the purposes of this project, an environmental incident can be divided into three levels, i.e. major, medium and minor. All Major and Medium environmental incidents shall be recorded in the EO's non-conformance and incident register. Minor incidents shall be recorded by the Operator (operational phase) in their own incident register. Definitions and examples of environmental incidents are provided in Table 4.

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

Non-Conformance	Any deviation from work standards, practices, procedures, regulations, management system performance etc. that could either directly or indirectly lead to injury or illness, property damage, damage to the workplace environment, legal transgression or a combination of these.
Major Environmental Incident	<p>An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread, long-term, irreversible significant negative impact on the environment and/or has a high risk of legal liability.</p> <p>A major environmental incident usually results in a significant pollution and may entail risk of public danger. Major environmental incidents usually remain an irreversible impact even with the involvement of long-term external intervention i.e. expertise, best available technology, remedial actions, excessive financial cost etc. Major environmental incidents may be required to be reported to the authorities. The EO shall make the final decision as to whether a particular incident should be classified as a Major incident.</p> <p>An example of a Major environmental incident would be a significant spillage (e.g. 500 litres) of fuel into a watercourse.</p>



Medium Environmental Incident	<p>An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread or localised, short term, reversible significant negative impact on the environment and/or has a risk of legal liability.</p> <p>A medium environmental incident may be reported to the authorities, can result in significant pollution or may entail risk of public danger. The impact of medium environmental incidents should be reversible within a short to medium term with or without intervention. The EO shall make the final decision as to whether a particular incident should be classified as a Medium incident.</p> <p>An example of a Medium environmental incident would be a large spill of fuel (e.g. >50 litres) onto land.</p>
Minor Environmental Incident	<p>An incident or sequel of incidents, whether immediate or delayed, where the environmental impact is negligible immediately after occurrence and/or once-off intervention on the day of occurrence.</p> <p>An incident where there is unnecessary wastage of a natural resource is also classified as a minor environmental incident. An example would be leaking water pipes that result in the wastage of water.</p> <p>A minor environmental incident is not reportable to authorities. An example of a minor incident is day to day spills of fuel or oil onto the ground where the spill is less than five (5) litres.</p>

The Operator must immediately notify the DFFE of any occurrence or detection of any reportable incident. Reporting must adhere to the requirements of Section 30 of NEMA. Incidents which must be reported include the following:

- Any malfunction, breakdown or failure of equipment or techniques, accident or fugitive emissions which have caused, is causing or may cause significant pollution;
- Any non-compliance with the Environmental Authorisation and / or the OEMPr; and
- Any adverse environmental and / or health effects.

Within 14 days from the above-mentioned occurrence of or detection of any incident(s), the Operator must submit an action plan which must:

- Correct the impact resulting from the incident;
- Prevent the incident from causing any further impact; and
- Prevent the recurrence of a similar incident to the satisfaction of the Department.

Should the implementation of mitigation measures take longer than 14 days the Operator must submit a close-out report to the DFFE once all mitigation measures have been implemented.

9 REVIEW AND REVISION OF THE EMPr

It is important to note that this OEMPr is made legally binding on the Operator through the EA and the approval of the EMPr by the decision-making authority. It is 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);



- Secondary impacts occur as a result of the mitigation measures; and
- Instances where the implementation of the specified management, as a result of changes in circumstances, may become impractical or unreasonable to implement.

The Operator in consultation with the EO 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 EO to ensure that all personnel are performing according to the requirements of the document control procedure, and to initiate the revision of controlled documents, when required by changes in process or operations.

10 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

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

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

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

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

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

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

11 METHOD STATEMENTS

The OEMPr provides the overall management plan for operations on site. Specific, detailed method statements, procedures and plans are however required from the Operator, which detail measures to ensure environmental



compliance for site specific and operator specific conditions. These method statements, procedures and plans must be prepared before operations commence and include:

- Air Quality (dust/odour) Management Procedure;
- Spill Response Plan;
- Lime and Limestone Spill Response Procedure;
- Emergency Response Plan;
- Fire Management Plan;
- Hazardous Materials Management Plan;
- Landowners / Local Residents / I&AP and General Public Communication Plan;
- Noise Management Plan;
- Traffic Management Procedure;
- Training Plan;
- Weed and Invader Plant Management Plan;
- Waste Management Plan; and
- Storm Water Management Plan.



12 MANAGEMENT AND MITIGATION

TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
12.1 Pumping of acid water from underground and associated risks						
A	In the event of underground pump or pipe leakage: <ul style="list-style-type: none"> • Repair pumps. • Monitor effluent quality continuously. • Ensure discharge quality meets the required standard. 	Operation	Insufficient delivery of AMD to the HDS plant, resulting in non-optimum treatment plant operations, potentially affecting the quality of the effluent produced and discharged.	Operator	The operator is required to ensure continuous monitoring and implementation of systems to proactively address issues.	N/A
B	In the event of pipe burst above ground <ul style="list-style-type: none"> • Switch the plant to recycle mode. • Ensure drainage channels / plant drain networks are operating as designed. • Contain AMD on site. • Notify TCTA. • A Spill Response Plan must be developed and implemented. 	Operation	Uncontrolled AMD on the plant.	Operator		N/A
C	In the event of a break in AMD delivery pipes: <ul style="list-style-type: none"> • Switch the plant to recycle mode. • Contain AMD. • Effect repairs. • Re-commence with operations. • Dispose of contaminated soil and pipes at hazardous waste landfill site. 	Operation	Stormwater contamination.	Operator		N/A
12.2 Storage or stockpile of chemicals used in the HDS plant.						
A	In the event that a delivery truck is involved in an accident at entrance to the site. <ul style="list-style-type: none"> • Contain the spillage on site. • Contain any liquid (i.e. if it is raining). • Collect dry spillage in a replacement vehicle. • Pump any liquid to a tanker. 	Operation	Spillage of limestone, lime which would negatively affect any receiving environment via storm water.	Operator	The operator is required to ensure continuous monitoring and implementation of systems to proactively address issues.	N/A
B	In the event of spillage of raw material on the site. <ul style="list-style-type: none"> • Dampen down with water. • Ensure drainage channels / plant drain networks are operating as designed. 	Operation	Dust generation.	Operator		N/A
C	Ensure stockpiles are kept within their footprints and not placed in drainage channels / stormwater flow paths.	Operation	Storm water contamination.	Operator		N/A



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
12.3 Operations of the HDS plant and the associated risks.						
A	In the event of inefficient operation of the plant or plant breakdown <ul style="list-style-type: none"> Switch the plant to recycle mode. Effect repairs / implement improvements. Test effluent quality at SANS 17025 certified laboratory to ascertain acceptable effluent quality attained. Restart operations. 	Operation	<ul style="list-style-type: none"> Reduced effluent quality. Storm water contamination. 	Operator	The operator is required to ensure continuous monitoring and implementation of systems to proactively address issues.	N/A
B	In the event of break in sludge pipe: <ul style="list-style-type: none"> Switch the plant to recycle mode. Contain AMD. Contact Spill Clean-up Team to effect clean-up. Block storm water outlets. Effect repairs. Restart operations. Dispose of contaminated soil and pipes at hazardous waste landfill site. Demarcate site as a no-go area. Exclude all non-essential persons. Provide appropriate PPE. Assess potential health impacts and treat. 	Operation	<ul style="list-style-type: none"> Storm water contamination. Land and river/wetland contamination. Human health impacts. 	Operator		N/A
C	In the event of unacceptable quality of delivered chemicals <ul style="list-style-type: none"> Notify the Operator to manage the plant to ensure unacceptable material is not used. Effect repairs. Stop using the unacceptable material. Test effluent quality at SANS 17025 certified laboratory to ascertain acceptable effluent quality attained. Restart operations. 		HDS plant is not operating efficiently leading to deterioration in effluent quality.	Operator		N/A
D	Site Housekeeping <ul style="list-style-type: none"> Ensure drainage channels / plant drain networks are operating as designed. Ensure housekeeping in in order and use of litter bins. Contain AMD on site.	Operation	Storm water contamination.	Operator	Regular visual inspections.	AMD contained on site.
12.4 Discharge of treated water to the Blesbokspruit						
A	In the event of a break in the treated water pipe. <ul style="list-style-type: none"> Switch the plant to recycle mode. Effect repairs. Restart operations. 	Operation	<ul style="list-style-type: none"> Uncontrolled discharge of effluent to the environment. Erosion. 	Operator	The operator is required to ensure continuous monitoring and implementation of	N/A



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
	<ul style="list-style-type: none"> Reinstate area damaged by discharge. Switch the plant to recycle mode. Reduce erosive impact. Restart operations. Reinstate area damaged by discharge. Switch the plant to recycle mode. Assess flood damage. Pump water to areas less prone to flooding. Restart operations. Rehabilitate area damaged by discharge. 		<ul style="list-style-type: none"> Flooding. 			systems to proactively address issues.
B	<p>In the event that discharge point is not maintained leading to flooding:</p> <ul style="list-style-type: none"> Switch the plant to recycle mode. Assess flood damage. Pump water to areas less prone to flooding. Restart operations. Implement measures to prevent re-occurrence 	Operation	Erosion of wetland/ Blesbokspruit.	Operator		N/A
C	<p>In the event that discharge point is not maintained leading to erosion at wetland / Blesbokspruit</p> <ul style="list-style-type: none"> Switch the plant to recycle mode. Assess the damage. Stabilise discharge point. Restart operations. Reinstate area damaged by discharge. 	Operation	Backwater build up leading to flooding.	Operator		N/A
D	<p>In the event that treated water quality not to the authorised standard leading to negative impact on water quality due to release of effluent of unauthorised quality:</p> <ul style="list-style-type: none"> Assess effluent quality. Switch the plant to recycle mode if release of effluent is of unauthorised quality. Test effluent quality at SANS 17025 certified laboratory to ascertain problematic parameter. Remedy treatment measures. Continue operations. 	Operation	Negative impact on water quality due to release of effluent of unauthorised quality.	Operator		N/A
E	<p>In cases of release of effluent of unauthorised quality.</p> <ul style="list-style-type: none"> Assess effluent quality. Switch the plant to recycle mode. If effluent is of unauthorised quality. Test effluent quality at SANS 17025 certified laboratory to ascertain problematic parameter. Consult wetland specialist. Implement management and mitigation measures. 	Operation	Wetland/ Blesbokspruit deterioration due to release of effluent of unauthorised quality.	Operator		N/A



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
	<ul style="list-style-type: none"> Restart operations. 					
F	In the event of human health of livestock / animal impacts due to release of effluent of unauthorised quality: <ul style="list-style-type: none"> Switch the plant to recycle mode. Assess effluent quality. Test effluent quality at SANS 17025 certified laboratory to ascertain problematic parameter. Assess potential health impacts and treat. Implement remediation measures. Restart operations. 	Operation	Human health impacts due to release of effluent of unauthorised quality.	Operator		N/A
G	<ul style="list-style-type: none"> Install adequate warning signs (lettering and pictograms) indicating that the treated water should not be consumed. Install adequate warning signs (lettering and pictograms) prohibiting entry into the discharge area. 	Operation	Illness due to consumption of treated water or drownings due to entry into the discharge point.	Operator	Continuous visual inspections.	Warning signs erected.
H	<ul style="list-style-type: none"> Regular daily inspections of the quench water system to discover leaking valves should be undertaken. 	Operation	Pollution of natural water or soil resources and inefficient operation of plant.	Operator	Daily / weekly inspections required.	No major issues with respect to water and waste management.
I	<ul style="list-style-type: none"> Conduct regular inspections of the pipe wall including thickness tests and wear rates, whenever the thickeners are empty or on planned maintenance. Include regular planned maintenance. Replace valves if worn. 					
J	<ul style="list-style-type: none"> Conduct regular inspection of the condition of the air entrainment weirs in the sludge feed channels before the flow enters the pipe. Rebuild weirs as required. 					
12.5 Air and water monitoring						
A	Air: monitoring must take place as follows: <ul style="list-style-type: none"> Dust fallout monitoring must take place Should complaints be lodged regarding an odour nuisance, this should be assessed and investigated. Should it be found that it is possible that a nuisance exists, an odour assessment can be completed as further corrective action. 	Operation	Impacts on air quality	Operator	Air (monthly) Odour (as and when required)	Monitoring in line with stipulated frequencies and parameters. No complaints received regarding odour or air quality.
B	Water quantity monitoring must take place as follows: <ul style="list-style-type: none"> AMD pump rate (m³/h). Effluent discharge (m³/h). 	Operation	Impacts on water quantity	Operator	Continuous	Monitoring in line with stipulated frequencies and parameters in EA / WUL
C	Water quality monitoring must take place as follows: <ul style="list-style-type: none"> AMD. Effluent discharge. Storm water discharge (clean circuit). Surface and groundwater monitoring. 	Operation	Impacts on water quality	Operator	Daily (AMD and effluent)	Monitoring in line with stipulated frequencies and parameters in EA / WUL



TECHNICAL OR MANAGEMENT OPTIONS

Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
					During rainfall (Storm water discharge (clean circuit). As per requirements of EA (Surface and groundwater)	
12.6 Air Quality Management						
A	All silos must be managed carefully to avoid the release of fugitive dust.	Operation	<ul style="list-style-type: none"> • Potential on and offsite health and nuisance impacts. • Safety risks and road accidents because of reduced visibility. • Unacceptable smell for neighbours. 	Operator	The Operator shall preserve air quality levels to the extent that public health, safety and environmental protection are assured – ongoing monitoring.	Preserve air quality levels to the extent that public health, safety and environmental protection are assured.
B	Dust filters in silos must be inspected and cleaned as per the Operations and Maintenance (O&M) manual to ensure efficacy.					
C	The dust filters must be replaced as per the requirements of the O&M manual.					
D	The utilisation or handling of dust generating materials (e.g. lime) shall not be undertaken when environmental conditions may promote the release of fugitive dust. If wind persists and the transfer of lime or poly is essential all mitigation measures to prevent dust be applied.					
E	Open stockpiles of potential dust generating material (e.g. during maintenance or repair procedures) should be limited to the shortest time possible. Such stockpiles should be enclosed by wind-break enclosures of similar height to the stockpile.					
F	The Operator shall spray all dust generating surfaces with water, a dust suppressing agent or similar substance to prevent dust generation in the event that any significant amount of dust is generated on site. Potable, teated and contaminated water will not be used as a dust suppressing agent and only recycled and/or rain water is to be used, when available.					
G	All vehicles on site and along access routes must travel at speeds that will not create dust.					
H	All vehicles transporting material that can be blown off (e.g. soil and rubble) must be covered.					
I	Investigate and mitigate any odour sources that produce nuisance impacts or unacceptable smell. Should complaints be lodged regarding an odour nuisance, this should be assessed and investigated. Should it be found that it is possible that a nuisance exists, an odour assessment can be completed as further corrective action.					
J	The Operator is required to develop and implement a dust management procedure. This procedure must include sensitive receptors identified during					



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
	construction and provide for monitoring and management of PM10 and dust fall out and odour. Any new sensitive receptors which may arise during the course of operations must be updated in the procedure and monitoring adapted accordingly, where necessary.					
K	Develop a Lime, Limestone and Poly Spill Response Procedure which must also be communicated to and accepted by lime suppliers.					
L	Suspended (actual) dust levels must not exceed 600 mg/m ² /day. If exceedances occur, dust management procedures must be implemented at the source.	Operation	<ul style="list-style-type: none"> Potential on and offsite health and nuisance impacts. Safety risks and road accidents because of reduced visibility. 	Operator	Daily monitoring	Preserve air quality levels to the extent that public health, safety and environmental protection are assured.
M	<ul style="list-style-type: none"> Indicative dust fallout (i.e. suspended dust concentrations that will result in fallout) shall be monitored visually. Indicative dust fallout (e.g. suspended dust concentrations that will result in fallout) must be monitored and addressed proactively. Actual dust fallout shall be verified through monthly bucket sampling at sites where such dust is generated. The sample results, service provider's recommendations and Operator's response and mitigation measures (when required) must be submitted to TCTA on a monthly basis. Dust fallout results shall not exceed the below limits. Fall out (indicative and actual) is classified as follows: Slight: < 250 mg/m²/day. Moderate: 250 mg/m²/day < 500 mg/m²/day. Heavy: 500 mg/m²/day < 1200 mg/m²/day. Very heavy: >1200 mg/m²/day. The target, action and alert thresholds for dust fallout (indicative and actual) are as follows: Target: ≤ 300 mg/m²/day. Immediate action required: > 600 mg/m²/day. Authority alert threshold:>1200 mg/m²/day. 					
N	<ul style="list-style-type: none"> PM10 must be monitored on a monthly basis at sensitive receptors when pipeline repair or replacement construction is occurring within 500 m of the receptors. PM10 must be monitored during active works related to the above where PM10 levels should not exceed (GN 1210, National Ambient Air Quality Standards 2009). PM10 levels should not exceed the following levels. Daily PM10 ≤ 75 µg/m³. Annual PM10 ≤ 50 µg/m³. Annual PM10 ≤ 40 µg/m³. 	Operation	Air quality impacts on sensitive receptors	Operator	Monthly monitoring when pipeline repair or replacement construction is occurring within 500 m of the receptors.	Preserve air quality levels to the extent that public health, safety and environmental protection are assured.
O	The Operator must respond officially to all complaints on dust and air quality	Operation	Air quality and dust impacts on sensitive receptors	Operator	Ongoing	All complaints responded too.



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
12.7 Erosion Control						
A	Erosion control measures shall be implemented where operational activities impact upon the stability of the receiving environment.	Operation	<ul style="list-style-type: none"> Disturbance of soil stability or ground cover. Potential silt discharge into streams or wetland. Erosion damage. 	Operator	<ul style="list-style-type: none"> The Operator is required to monitor and maintain storm water infrastructure on a continuous basis throughout operation. Review storm water management initiatives, where applicable and revise accordingly. 	To avoid erosion or damage to erosion control devices.
B	Slopes > 1:1 must have additional anti-erosion mechanisms (berms, silt fences or geotextiles).					
C	No disturbance of soil may occur outside the servitude boundaries.					
12.8 Fire Management						
A	Basic firefighting equipment shall be kept and maintained at the AMD Treatment Plant treatment plant at all times and fire extinguishers must be available at all points of storage of flammable products.	Operation	<ul style="list-style-type: none"> Damage or destruction to infrastructure. Operational impacts due to fire damage and remediation. Injury and/or death of humans and animals. 	Operator (Environment and H&S Section)	Ongoing	Avoid fire incidents and reduce potential impacts in the event of a fire incident.
B	No open fires shall be permitted on or offsite. All authorised fires shall occur at designated fireplaces, which shall be suitably resourced to contain and suppress any potential runaway fire.					
C	Ensure that the necessary materials and equipment for dealing with oil, fuel and hazardous substance spills and leaks are available on site and fully functional at all times.					
D	Grass and other vegetation in the vicinity of infrastructure shall be cut at regular intervals to reduce fuel load and fire hazards.					
E	Storage of fuels and chemicals must be kept to a minimum					
F	No on site burning of any waste materials, vegetation, litter or refuse shall be permitted.					
G	<p>The Fire Management Plan should address the following:</p> <ul style="list-style-type: none"> Appointment of a Fire Officer, who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedures to be followed. The Fire Officer will be responsible for contacting emergency services for assistance. Annual review, updating and approval of the Fire Management Plan before onset of fire season. 					



TECHNICAL OR MANAGEMENT OPTIONS

Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
	<ul style="list-style-type: none"> Conduct fire and emergency drills every six months with one coinciding with the onset of the fire season. Inspection of basic firefighting equipment, including fire extinguishers, on a monthly basis, to ensure full functionality and address maintenance requirements. A register of the monthly inspections must be maintained. Any fires that occur shall be reported internally immediately and reported in turn to the relevant authority. All staff to undergo basic firefighting training. Staff training on fire prevention and safety in the event of a fire, as part of the site induction training. 					
12.9 Hazardous Material Management						
A	All staff are to be provided with the appropriate Personal Protective Equipment (PPE).	Operation	<ul style="list-style-type: none"> Potential contamination of soil and / or water resources. Visual and odour nuisance. Health and safety impacts of people. 	Operator	Ongoing	Minimise the impact of hazardous substance storage, handling and disposal on the receiving environment.
B	Ensure that the necessary materials and equipment for dealing with oil, fuel and hazardous substance spills, leaks and fires are available on site and up to date at all times.					
C	Signage containing clearly displayed emergency contact numbers must be provided					
D	The volume and contents of the tanks shall be displayed on legible, weatherproof signs.					
E	Only specifically trained personnel will be permitted to use and handle the hazardous substances.					
F	All chemicals and hazardous substances will be stored in specifically designed, lockable storage areas where reactive substances are classed and segregated. Storage will comply with the manufacturers Safety Data Sheet (SDS) and local and national legislative requirements.					
G	All hazardous substances shall be labelled according to the chemical hazard rating and adequate signage must be displayed indicating the appropriate management measures to be implemented in the event of a spill/fire.					
H	All chemical drums will be transported to a designated and lined bunded area when full, empty or when the contents of the drum are unusable or unknown. All drums will be appropriately disposed of at a registered hazardous waste landfill site. Proof of disposal must be kept on file.					
I	All hazardous substance storage areas have suitable firefighting and hazardous materials handling equipment available in close proximity.					
J	All hazardous substances stored on the site shall be recorded.					
K	All reactive hazardous substances to be labelled and stored separately.					



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
L	No burning, burying or dumping of any solid waste materials will be permitted on site.					
M	Substances used must be the least environmentally harmful chemical available for the undertaking of specific duties/requirements.					
N	Place required safety signage. These signs shall conform to the requirements of SANS 1186-1 and are to be prominently displayed in and around the storage area.					
O	The Hazardous Materials Management Plan should address the following: <ul style="list-style-type: none"> • Procedure to monitor all waste operations and ensure compliance with the OEMPr, the Environmental Authorisation and any other relevant waste management legislation. • Report any non-compliance with the Environmental Authorisation or conditions or provisions of the National Environmental Management: Waste Act (Act No. 59 of 2008) to the Department of Environmental Affairs. • Ensure all staff to be trained in the safe handling and spill management of all substances used on the site. This must include awareness of the dangers of burning chemicals and smoke inhalation. • Obtain all necessary approvals with respect to hazardous substances from the appropriate authorities and ensure compliance with standard fire safety regulations. • Assess and update, if necessary, the Hazardous Materials Management Plan on an annual basis. • Recordkeeping of procedures and protocols, including records of materials and incidents. 	Operation	<ul style="list-style-type: none"> • Potential contamination of soil and / or water resources. • Visual and odour nuisance. • Health and safety impacts of people. 	Operator (Environment and H&S Section)	Ongoing	Develop and implement Hazardous Materials Management Plan in line with requirements.
P	Sludge will be disposed of via a pipeline to the Sludge Disposal Facility (SDF) or at Grootvlei Shaft 4. Currently sludge is disposed in Shaft 4.	Operation	<ul style="list-style-type: none"> • Potential contamination of soil and / or water resources. • Visual and odour nuisance. • Health and safety impacts of people. 	Operator	Ongoing	Minimise the impact of hazardous substance storage, handling and disposal on the receiving environment.
12.10 General Waste Management						
A	Reduce disposal of recyclable or reusable materials to landfill sites. Such recyclable and reusable material should at least include: steel, aluminium, paper, plastic, wood and oil.	Operation	<ul style="list-style-type: none"> • Potential contamination of soil and / or water resources. • Visual and odour nuisance. 	Operator	The EO must report any non-compliance with the Environmental Authorisation or	<ul style="list-style-type: none"> • Develop a waste management plan to manage and control waste. • The Operator must monitor all waste operations and verifies compliance with the OEMPr, the Environmental
B	An approved recycling company shall be appointed to manage the respective collection and recycling and or reuse of waste materials. The site					



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
	must be kept clean and waste removed to the waste storage facility daily and at biweekly intervals.				conditions or provision of the National Environmental Management: Waste Act (Act No. 59 of 2008) to the Department of Environmental Affairs.	Authorisation and any other relevant waste management legislation.
C	Solid waste will be separated into recyclable and non-recyclable waste.					
D	Timber, metal, oil, paper, bricks, tyres, batteries and any other major recyclable wastes will be stored in safe, secure areas prior to disposal. Proof of disposal must be kept on file.					
E	General non-recyclable refuse will be collected in appropriate bins with secure lids to be disposed of at a registered landfill site or at the nearest transfer station with capacity to accept the waste generated. Proof of disposal must be kept on file.					
F	The Operator will provide weather- and vermin-proof bins, which shall be cleaned on a regular basis. The Operator must ensure that staff do not leave food lying around after breaks.					
G	The site and its surrounds must be kept neat and clean by removing all windblown or scattered litter emanating directly or indirectly from the facility operation on a daily basis. As a first step, the Operator will take all actions required to prevent the spreading of windblown litter.					
H	Not excluding the remainder of the site, the areas of particular importance are: the HDS treatment plant entrance and surrounding area, the office area, The laboratory area, the workshop and transport depot, all internal roads and both sides of the perimeter fence.					
I	No burning, burying or dumping of any solid waste materials will be permitted on site.					
12.11 Land Use						
A	Initiate incident reporting structures and procedures.	Operation	• Aggrieved landowners and public affected by the operation of the facility	Operator	Ongoing	Any complaints received from adjacent landowners are dealt with / rectified in a timely manner.
B	Communication from the adjacent landowners shall be recorded as follows: A) Record concern within the Communications Register; B) Notify TCTA; C) Rectify/mitigate concern and notify TCTA.					
C	Develop and implement a Landowners / Local Residents / I&AP and General Public Communication Plan.					
12.12 Noise Management						
A	• All operational and maintenance vehicles, plant and equipment must be properly maintained to avoid the creation of unnecessary additional noise.	Operation	• Hearing loss through exposure to extended and or high noise levels.	Operator	Ongoing	Reduce operations related noise affecting the plant and surrounding environment.
B	• Employees must be provided with adequate PPE.					



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
C	<ul style="list-style-type: none"> Maintenance activities are to be contained to reasonable hours during the day. 		<ul style="list-style-type: none"> Disruption of daily activities due to noise disturbances. Noise nuisance to sensitive receptors. 			
D	<ul style="list-style-type: none"> Respond to all noise related complaints received from sensitive receptors and implement mitigation measures. 					
E	<ul style="list-style-type: none"> All works that deviate from normal operating and maintenance related noise conditions shall be reported and actions initiated to mitigate and avoid recurrence of any such the incident. 					
F	<p>The Noise Management Plan must address the following:</p> <ul style="list-style-type: none"> Noise Management Procedure. Identify potentially sensitive noise receptors (e.g. close proximity to housing, etc.). The Noise Management Plan must always be adhered to to ensure that sensitive receptors are not impacted on. Where possible, sensitive noise receptors should be forewarned before noisy operations commence. Such operations include maintenance or repair activities within 500 m of a sensitive receptor. 					
12.13 Traffic Management						
A	Roads must be maintained in an acceptable condition for the safe travel of the public and employees.	Operation	<ul style="list-style-type: none"> Potential impact on existing public road conditions due to the use of operational vehicles. Dust generation as a result of vehicle movement. Increase in existing traffic volumes on local road network. Increase in safety risks due to the presence of additional vehicles on the local road network. 	Operator	Ongoing	<ul style="list-style-type: none"> Minimise the impacts and extent of operational traffic on the surrounding road network and environment, whilst maximising road user safety. Develop a traffic management plan. The management procedure will address onsite traffic regulations and set rules for traffic use of public roads. No complaints from the public regarding traffic management.
B	Access shall only be for activities essential for the continued safe operation and maintenance of the water treatment works.					
C	Access for the general public to the treatment plant and associated infrastructure shall be not be permitted.					
D	No new roads or tracks may be constructed without the relevant approvals in place.					
E	All vehicles must only use designated routes.					
F	Minimise disturbances to water resources, flora and fauna					
G	Dust management measures must be implemented.					
H	Any accidents or incidents must be recorded. Investigation into the causes must be carried out.					
I	Appropriate signage provided, where applicable.					
J	No environmental degradation due to storm water runoff from access roads.					
K	The width of the access roads shall be kept to a minimum					
12.14 Training						
A	<p>All employees must receive general scheme related work skills training required to enable them to work safely and effectively, including:</p> <ul style="list-style-type: none"> Health and safety; 	Operation	<ul style="list-style-type: none"> Risks to quality of workmanship, adverse impacts to private 	Operator	Ongoing	<ul style="list-style-type: none"> Registers of the proof that training was conducted must be kept.



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
	<ul style="list-style-type: none"> Emergency drills; Firefighting; and Disaster management. 		property and the health and safety of workers and the surrounding communities due to lack of skills and training.			Certificate should be kept in cases where the training was outsourced.
B	<ul style="list-style-type: none"> All personnel who work with hazardous waste must be trained to deal with potentially hazardous situations. Records of training and verification of competence must be kept. Provision of adequate training, including Basic Environmental Awareness Training and Spill and Emergency Management 					
C	<p>Provision of training, including training materials. These materials shall set out the training requirements which need to be conducted during operations and will include the following:</p> <ul style="list-style-type: none"> Acceptable behaviour with regard to flora and fauna. Management and minimising of waste, including waste separation. Maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants, cement, mortar, and other chemicals. Responsible handling of chemicals and spills. Environmental emergency procedures and incident reporting. General code of conduct towards I&APs. Attendance of staff at training. Records of training evaluation results. Results must reflect that training has been effective. 					
12.15 Control of Weeds						
A	The site and pipeline servitude must be maintained free of weeds and invader plants.	Operation	<ul style="list-style-type: none"> Proliferation of weeds. Weeds may provide fuel for fire and therefore damage to the pipeline. 	Operator	Ongoing	The development and implementation of a Weed and Invader Plant Management Plan.
B	All weeds and invader plants shall be controlled before the setting of seeds.					
C	The transportation of weeds must not result in the spread of weeds and invader plant species along public or private roads.					
D	Dye should be added to the herbicide to ensure that individual plants are not missed.					
E	An approved selective herbicide shall be sprayed on all Category 1 – 3 weeds and invader plants.					
F	The application of herbicide shall be in accordance to the requirements of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 Of 1947).					
G	Applied herbicides must not negatively impact any water bodies including the surrounding wetland.					



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
12.16 Water Management						
A	A storm water management plan (SWMP) must be developed to prevent erosion and the contamination of water.	Operation	<ul style="list-style-type: none"> Contamination of storm water running through the site. Pollution of natural water resources. Erosion of natural areas. 	Operator	Ongoing	<ul style="list-style-type: none"> Management of stormwater in line with SWMP. No issues with respect to water management.
B	Water to be released into the surrounding environment must be tested for water quality and treated where necessary before release.					
C	Water impacted upon by operational and maintenance related activities may not be released directly into a watercourse (apart from the treated water discharged via the treated water pipeline as per the plant design).					
D	Storm water must be directed towards stabilised areas which can dissipate the energy of the water flow.					
E	Prevention of water contaminated through storm water attenuation works discharging into any storm water drain, river or stream.					
F	Handling of hazardous substances within close proximity to water resources shall not be permitted.					
G	All operational related activities beyond the boundaries of the site must be excluded from wetlands, riparian ecosystems and all sensitive areas, except where repair and maintenance is required.					
H	The discharge point works must be regularly inspected for damage and repairs made immediately.					
I	During all works, no activity such as ablation, disturbance of natural habitat, storing of equipment or waste disposal may be permitted within any wetland, riparian habitat.					
J	Implementation of anti-erosion and storm water works in areas susceptible to erosion.					
K	No storm water should flow through site (unless in a dedicated storm water channel).					
L	No storm water should flow onto areas of low / poor stabilisation					
M	Water Monitoring: <ul style="list-style-type: none"> A certified SANS 17025 laboratory will be used to undertake the minimum range of tests. Minimum effluent parameters must be in line with the latest DWS directive issued. For other constituents the Department of Water and Sanitation Water Quality Guidelines should be used for comparison. Effluent water limit values shall apply at the last point where the discharge of effluent water enters into a water resource, dilution being disregarded when determining compliance with the effluent water limit values. Where discharge of effluent water does not directly enter a water 					



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
	<p>resource, the effluent water limit values shall apply at the last point where the effluent water leaves the premises of collection and treatment.</p> <ul style="list-style-type: none"> Surface and groundwater monitoring will be implemented as per the protocol for the Eastern Basin. 					
12.17 Emergency Plan						
A	<p>In the event of fire:</p> <ul style="list-style-type: none"> Remove personnel from the area. Inform the relevant emergency services. Treat injuries and evacuate injured persons. Cover, where possible, burning material with soil until the fire is extinguished. In the event a fire is extensive, await the fire brigade assistance. Leave the area to cool down for a few days prior to rehabilitation. Use fire extinguisher where small fires are to be extinguished. Inform all relevant authorities. Determine the cause of the fire and implement measures to prevent future occurrences thereof. Inspect facility, if safely accessible, to determine the potential risk of damage. All emergency personnel working in the affected areas are to be equipped with the required PPE. 	Operation	<ul style="list-style-type: none"> Injury to personnel or public. Destruction and / or contamination of natural resources. Damage to private property. Damage to the facility. Loss of operational time. 	Operator (H&S Section)	Ensure that emergency response plans are regularly updated, and all equipment is available and functional.	<ul style="list-style-type: none"> Employ an integrated based approach addressing all-hazard risk for mitigation, response, continuity of operations, recovery and preparedness planning for the facility. Training and refresher courses should be carried out regularly.
B	<p>In the event of chemical spillage:</p> <ul style="list-style-type: none"> Remove personnel from the area. Isolate the chemical spill area and contain the chemical spillage. Consult the relevant Material Safety Data Sheet (MSDS) and ensure compliance with the requirements. For liquid spills, absorb spill with appropriate absorbent from spill kit. Contaminated absorbent is to be containerised for disposal on an appropriately licensed landfill. For solid spills, brooms and scoops are to be used to collect spill. Prevent vehicles from accessing areas in which a spill has occurred. All vehicles affected by spills must be cleaned and decontaminated before leaving the site. Particular attention must be paid to cleaning and decontaminating the wheels to prevent contaminants from being tracked off the site. Decontaminate the area once spill is removed. All emergency personnel working in the affected areas are to be equipped with the required PPE. 					



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
C	In the event of overflow / unexpected release from HDS treatment plant <ul style="list-style-type: none"> Inspect to ensure that the 0.5-m dry freeboard is maintained. Inspect to determine the possible cause of effluent release. Inspect treated water and sludge system and ensure that untreated AMD and sludge are not leaking or overflowing and discharged to the Blesbokspruit or adjacent wetland. Prevent vehicles from accessing areas in which a spill has occurred. All vehicles affected by spills must be cleaned and decontaminated before leaving the site. Particular attention must be paid to cleaning and decontaminating the wheels to prevent contaminants from being tracked off the site 					
12.18 Operation of Facilities						
A	Implement the dust, air quality and noise management procedures.	Operation	Nuisance and / or incidents caused by operations (noise, waste, odour, dust, etc.) may negatively affect the surrounding community or natural resources.	Operator	The operator is required to ensure continuous monitoring and implementation of systems to proactively address issues.	Implementation of procedures.
B	The buildings and structures will all be maintained on an ongoing basis. This will include, but not be limited to the following: <ul style="list-style-type: none"> General housekeeping to ensure that all buildings are maintained and kept clean inside and outside as well as all areas surrounding the buildings. Upkeep and maintenance of landscaped areas, as it may apply. Ensuring clean and hygienic conditions in all ablution facilities as well as kitchen/dining areas. 	Operation	Inadequate maintenance of facilities and buildings.	Operator		No issues with respect to maintenance of facilities and buildings.
C	All internal roads will be maintained. This will include: <ul style="list-style-type: none"> Watering of unpaved road surfaces to prevent dust nuisances; Grading and filling of potholes; Resurfacing of roads with selected graded material; and Any other repair work required to ensure that all-weather access to the facility is provided in a safe and usable condition. 	Operation	Badly maintained access roads.	Operator		No issues with respect to Internal roads.
D	Lime: <ul style="list-style-type: none"> Lime will be delivered on a regular basis. During off-loading operations, fugitive lime dust shall be prevented and contained. Lime will be contained within suitable facilities to restrict environmental contamination. Follow Lime and Limestone Spill Response Procedure. 	Operation	Lime and lime and limestone handling procedures with associated dust and environmental contamination.	Operator		<ul style="list-style-type: none"> Record keeping must be strictly maintained. No issues with respect to contamination from lime.



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
E	<p>Access Control</p> <ul style="list-style-type: none"> Provide and maintain fences, gates, access control boom and signage. All fences, gates and locks will be kept in good order and any damage thereto will be repaired. Access to the site must be strictly controlled to prevent unauthorised entry. 	Operation	<ul style="list-style-type: none"> Inadequate access control to treatment works with associated safety and security risks. Access by unauthorised persons. 	Operator		No issues related to unauthorized access.
F	<p>General housekeeping:</p> <ul style="list-style-type: none"> The Operator is to practice good housekeeping. This should facilitate efficient and timeous running of operations. Over and above practising accepted methods in accordance with SANS 10120, this should include measures to preserve the environment inside and immediately adjacent to the work area. Records of such actions taken to ensure the maintenance and management of housekeeping must be recorded. The site must be kept clean and tidy at all times to ensure no vermin is attracted to it. 	Operation	Poor housekeeping / visual impacts.	Operator		Site kept clean and tidy at all times.
G	<p>Vehicles:</p> <ul style="list-style-type: none"> Roads must be maintained free of spills and contaminants at all times. 	Operation	Dirty vehicles causing pollution and maintenance issues.	Operator		Roads maintained free of spills and contaminants at all times. No mud from consolidating in the water collection system.
H	<ul style="list-style-type: none"> Ensure regular cleaning of channels and settling ponds to prevent mud from consolidating in the water collection system. 	Operation	Mud consolidating in water collection system	Operator		Drainage channels well maintained.
I	All pollution monitoring boreholes will be maintained and protected for routine monitoring of subsurface water quality.	Operation	Inadequate pollution monitoring can exacerbate groundwater pollution.	Operator		No issues with respect to maintenance of monitoring boreholes.
J	<p>Drainage:</p> <ul style="list-style-type: none"> Undue contact between AMD / treated water or sludge and storm water will be prevented, so as to minimise the volume of contaminated runoff and effluent generated on the treatment plant. Two drainage systems will therefore be operated on site; one for clean storm water and uncontaminated runoff, and the other for polluted runoff from operational activities. All water that has been in contact with AMD effluent will be considered to be contaminated. Such water will be contained within the treatment plant area and re-entered into the AMD treatment process. Storm water channels will be kept in good condition and free from any blockages to adequately perform its intended function. Where required, temporary berms and storm water drainage channels will be provided to ensure the safe operation of the plant. Channels will be lined or provided with erosion protection as required. 	Operation	<ul style="list-style-type: none"> Inadequate maintenance of Site drainage, including stormwater, contaminated runoff and leachate control. Erosion caused by inadequate storm water drainage channels. Contaminated runoff can cause water pollution and siltation accumulation. 	Operator		<ul style="list-style-type: none"> Storm water channels in good condition. Volume of contaminated runoff and effluent is minimized. Record keeping must be strictly maintained.



TECHNICAL OR MANAGEMENT OPTIONS						
Item No.	Management / Mitigation	Phase	Risk / Impact	Responsible Party	Monitoring Party (Frequency)	Target / Performance Indicator
	<ul style="list-style-type: none">Silt accumulating in the storm water drains will be removed at regular intervals.					
K	In the event of splashing sludge: <ul style="list-style-type: none">Cover the reactors or adjust the stirrers.	Operation	Splashing of sludge from the reactors.	Operator		Limited splashing of sludge from the reactors.



13 **APPENDICES**



Appendix A: CV of EAP who prepared the EMPr



CURRICULUM VITAE

Name:	John Paul von Mayer
Nationality:	South African
Date of Birth:	24 September 1984
Profession:	Environmental Scientist
Professional Qualification/ Training:	BSc Honours Environmental Science; University of the Witwatersrand, 2007
	BSc Environmental Science; University of the Witwatersrand, 2006
	Certificate in Environmental Law, Rhodes University, 2011
Professional Membership/ Registrations:	Registered Professional Natural Scientist (SACNSP- #400336/11) EAPASA Registered Environmental Assessment Practitioner (2019/1247)
Current Employer:	Environmental Impact Management Services (Pty) Ltd.

KEY EXPERIENCE

- An environmental scientist with over 10 years of experience, including:
- Experience with identification and assessment of environmental impacts.
- Experience in environmental compliance and monitoring.
- Knowledge of environmental legislation and policies, planning process and regulatory frameworks.
- Knowledge and experience of public participation process.
- Strong competencies in the assessment of renewable energy.
- Project management.

CAREER SUMMARY

Period: November 2016 - Present:	Organisation: EIMS	Position: Senior Environmental Assessment Practitioner
Key Projects/Assignments	<u>Senior EAP:</u> Responsible for managing various projects. Main responsibilities include: <ul style="list-style-type: none">• Compilation of EIA reports• Environmental audits and compliance reporting• Compilation of Environmental Management Plans Currently involved in a number of ongoing projects, EIAs, etc. Selected Project Experience:	



	<ul style="list-style-type: none"> • Update of Environmental Management Plans for three of Harmony's Freestate Gold Mining Operations. • Eloff Phase 3 Coal Mine EIA. • Vlakvarkfontein Coal Mine Extension EIA and WULA. • Droogvallei Coal Mine Water Use Licence Application. • Environmental Compliance Audits for various Eskom power stations. 	
Period: June 2008 – June 2012 and October 2014 – November 2016	Organization: Savannah Environmental	Position: Senior Environmental Assessment Practitioner
Key Projects/Assignments	<p>Project Manager and Environmental Assessment Practitioner for the following:</p> <ul style="list-style-type: none"> • Environmental Impact Assessment for the Hopefield Wind Energy Facility, Western Cape Province • Environmental Impact Assessment for a Wind Energy Facility near Cookhouse, Eastern Cape Province • Basic Assessment for Cookhouse II Wind Energy Facility expansion project, Eastern Cape Province • Provision of Environmental Consulting Services for the Implementation and Compliance Monitoring of the Cookhouse Wind Energy Facility • Environmental Post Construction Audits for Wind Monitoring Masts near Cookhouse and Oyster Bay • Environmental Impact Assessment and Management Plan for Happy Valley Wind Energy Facility near Humansdorp, Eastern Cape Province • Environmental Impact Assessment and Management Plan for Deep River Wind Energy Facility near Humansdorp, Eastern Cape Province • Environmental Impact Assessment and Management Plan for 200km of Eskom Transmission Lines in Limpopo Province: Mokopane Integration Project • Environmental Impact Assessment and Management Plan for Tsitsikamma Community Wind Energy Facility in the Eastern Cape Province • Integrated Environmental Impact Assessment and Management Plan for Tshivhaso Coal Fired power Plant near Lephallale • Environmental Audits and Compliance Monitoring for Eskom Duvha Mine Water Recovery Project (client: Eskom) • Legal Review and Licenses Audit for Eskom Generation, Duvha Power Station. • Annual Environmental Compliance, Equator Principles, IFC Performance Standards and World Bank EHS Guidelines Auditing for the construction of the 138MW Amakhala Emoyeni Project 1 Wind Energy Facility near Bedford, Eastern Cape Province. 	



June 2012 – October 2014: Senior Environmental Scientist;	Organization: Mills and Otten	Position: Environmental Scientist
Key Projects/Assignments	Environmental Scientist at Mills and Otten. Worked on the following projects: <ul style="list-style-type: none">• Phase 1 and Phase 2 contamination assessments for BP, BP RM, Engen and Total SA at various filling stations and fuel installations throughout the country.• Remediation monitoring and Remediation Action Plans for various filling stations in Johannesburg for BP RM and Total SA.• Various Waste and Water Use License Applications	

DECLARATION

I confirm that the above information contained in the CV is an accurate description of my experience and qualifications and that, at the time of signature.

Signature of Staff Member

12/04/2022
Date