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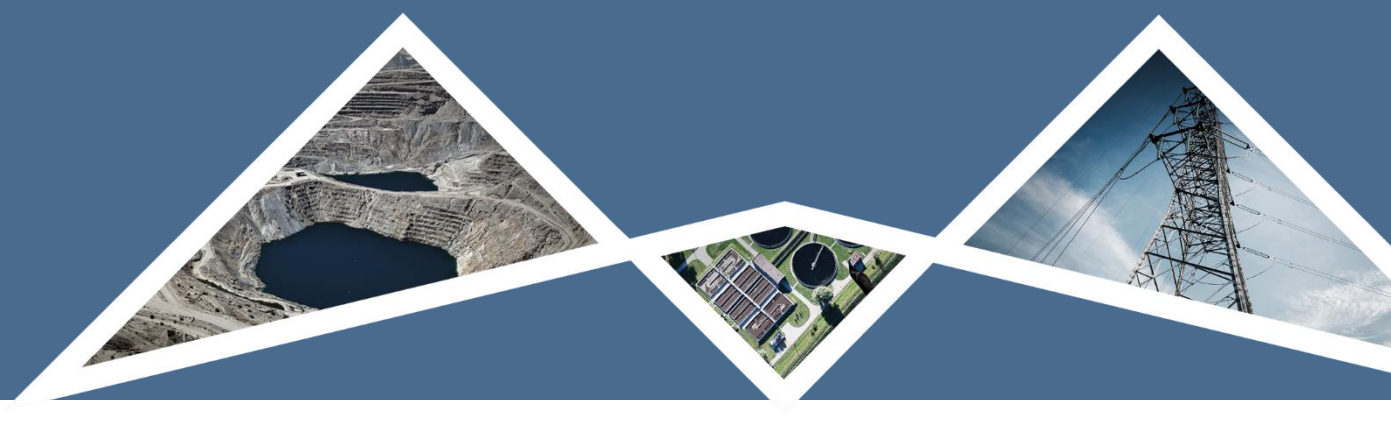
ENVIRONMENTAL MANAGEMENT PROGRAMME

GLENCORE KROONDAL MINE

NW30/5/1/2/3/2/1/251 EM
NW30/5/1/2/3/2/1/254 EM
NW30/5/1/2/3/2/1/260 EM
NW30/5/1/2/3/2/1/273 EM

April 2025



EIMS REFERENCE: 1637

DOCUMENT TITLE: Updated and Consolidated EMPr for Kroondal Operations

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REVISION AND AMENDMENTS

REVISION DATE:	REV #	DESCRIPTION
2025/07/24	ORIGINAL DOCUMENT	Updated and Consolidated EMPr

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1 INTRODUCTION

Glencore Kroondal Mine is owned by Glencore Alloys, a subsidiary of Glencore Operations South Africa (Pty) Ltd. Historically, mining at Kroondal have included both opencast and underground methods. At present, only underground mining and surface plant operations are ongoing, all opencast activities have ceased. The previously mined opencast areas have undergone concurrent rehabilitation, with further efforts planned for comprehensive final rehabilitation during the closure phase. The mine has been operating from various Environmental Management Programme (EMP) reports in addition to the original EMPR compiled in 2003, and these include:

- CHEMC Environmental CC, 2009. Xstrata Alloys' Environmental Management Programme Reports Update.
- Environmental and Energy Services. 2011. EMPR for the Kroondal PGM plant.
- Environmental and Energy Services. 2014. Ventilation shaft EMP addendum Kroondal chrome mine.
- 2017 Amendment to include removal and/or processing of tailings dump and PGM from chrome plant underflow, nickel ore, copper ore, cobalt ore, iron ore and silver ore (excluding PGMs and Minerals mined with PGMs found in the UG2 and Merensky Reefs), addition of TSF, WRD and mining area (known as the options area).
- CES Environmental and Social Advisory Services. 2021. TSF Re-Design and WRF Expansion Including Samancor MRA Exchange, Basic Assessment Report.
- 2022 Amendment to include the change in size and location of previously approved TSF waste rock facility and PCD, Pipeline for Transportation of water from PCD, construction of a mine residue facility (co-disposal facility, 5ML process water tank and desilting facility, and adding a mining area obtained from SAMANCOR.

The typical infrastructure associated with the mine includes the following:

- Transport, power and water supply networks;
- Telephone lines;
- An explosives magazine;
- Beneficiation plant (crushing, screening circuit, HMS, spiral and stockpile sections);
- Stockpile areas for product;
- Tailings Storage Facility;
- Waste Rock Facility;
- Water management infrastructure including storm water management infrastructure, canals, a process dam (capacity 222 kilolitres), an Erickson dam (capacity 1089 kilolitres);
- Silt trap (capacity 800 kilolitres) and the main catchment dam (capacity 20000 kilolitres);
- Monitoring boreholes;
- Water meters;
- Buildings including main office buildings, workshops (engineering, store complex and yard), service department (office, change house and lamp room complex), a salvage yard;
- Garages, toilets, security offices, a lapa, weigh bridge offices and a weighing bridge;

- Fences;
- A diesel storage area (adjacent to the workshop);
- A contractor's hostel;
- A sewage plant;
- Workers housing;
- 2 Inclines shafts and a number of ventilation shafts.

DMRE issued an environmental authorisation in support of the Platinum Group Minerals (PGM) project in 2017. The activities, approved in terms of the said EMPR which have not been constructed include the following:

- Processing of old tailings and the underflow from the current chrome plant in order to recover Platinum Group Metals and other associated minerals from the tailings as well as the current mining operations.
- Tailings Storage Facility (TSF).
- Waste Rock Dump (WRD).
- Lined storm water dam (Pollution Control Dam (PCD)).

Glencore then received an additional authorisation from DMRE in 2022 when exchanging mining rights with Samancor:

- Processing of old tailings and the underflow from the current chrome plant in order to recover Platinum Group Metals and other associated minerals from the tailings as of the current and other mining operations.
- Changes in size and location of previously approved TSF, Waste Rock Facility and PCD.
- Pipeline for transportation of water from the PCD.
- Construction of a Mine Residue Facility (MRF), also referred to in this report as a Co-disposal Facility (CDF).
- 5ML process water tank and desilting facility.
- Adding a mining area obtained from Samancor held in respect of the following reference number NW30/5/1/2/2/260MR. This is an underground mining area and no surface infrastructure will be erected on this area.

The current underground mining is taking place in close proximity to the Clover Alloys RCM mining rights areas and therefore in 2025 Glencore acquired a portion of RCM's mining right and surface right area with associated mining infrastructure to reduce underground travel time by approximately 50%. The acquisition included a portion of Portion 11 (new subdivided Portion 62) of the farm Rietfontein 338 JQ and mining right (MR336) and this acquisition will increase production and ensure the long-term survival of the business.

The proposed new developments on Portion 62 of the farm Rietfontein 338 JQ include (but are not limited to):

- A parking area for permanent employees
- A parking area for visitors and contractors
- Employee drop-off/pick-up zone
- Salvage yard
- Sewage plant

- Shaft Laydown Area / Explosives Delivery Bay
- Surface laydown area
- Meeting venue hall (Lekgotla Hall)
- Access and escape roads
- Two water storage dams
- Compressor house
- One 11kV Powerline connection to an existing 11kV Powerline
- Administration Offices
- Change houses
- Engineering workshop
- Stores
- Temporary laydown area (historic LanXess Chrome Mining village area)

Table 1 indicates the farm portions that fall within the proposed project including details on the project location as well as the distance from the proposed project area to the nearest towns.

Table 1: Locality details

Properties	Surface infrastructure on Portions 87, 278, 175 and 162 of the Farm Kroondal 304JQ – this is on Glencore's Mining Right Area (MRA). The conveyor will cross Portion 133. Additional infrastructure will be located on a portion of Portion 62 of the farm Rietfontein 338 JQ (previously Clover Alloys RCM mining right area). Underground mining on Portions 25, 52, 83, 84, 85, 99, 129 and 157 of the farm Kroondal 304 JQ (Samancor Areas) – no surface activities proposed on these portions. A S11 cession was executed on the 12th of April 2021 to cede this mining right area from Samancor to Glencore. Mineral Area 22 (Portion of MA 1); Mineral area 23 (Portion of mineral area no 3); Mineral area 24 (Portion of mineral are no 5); and Mineral Area 25 (Portion of mineral area 7) all of the Farm Kroondal 304 JQ; Remainder of Portion 2, Remainder of Portion 4 and Portion 5 of the Farm Klipfontein 300JQ; the Farm Waterval 303JQ; Portion 53, 145, 132, 122, 170, 172, 167 and remaining extent of portions 76, 86, 91 and 92 all of the Farm Kroondal 304JQ; Portions 24, 26, 45, 46, 47, 50, 51; Portions of Portions 13, 41, 43, 44; Mineral areas 2, 4, 6, 8, 9 ,10; Portion 91 and Remaining Extent of the farm Kroondal 304 JQ; Portion of portion 91; Portion of the Remaining Extent of portion 92; Portion of Portion 102 (a portion of portion 92); Portion of Portion 93; Portion of the Remaining Extent of portion 94; The Remaining Extent of mineral area 11 (a portion of portion 95); The Remaining Extent of Mineral area 12 (a Portion of Portion 97); The Remaining Extent of the Mineral area 13 (a portion of portion 98); The Remaining Extent of Mineral area 14 (a portion of portion 96) all of the Farm Kroondal 304 JQ.
Magisterial District	Bojanala District Municipality
Distance and direction from nearest towns	The Glencore Kroondal Operations are situated ~10 km south- west of Rustenburg, within the administrative boundaries of the Rustenburg Local Municipality in the Bojanala District Municipality, North-West Province.

The locality of the Kroondal operations along with various authorised infrastructure is depicted in Figure 1 to Figure 4.

Figure 1: Regional Locality Map

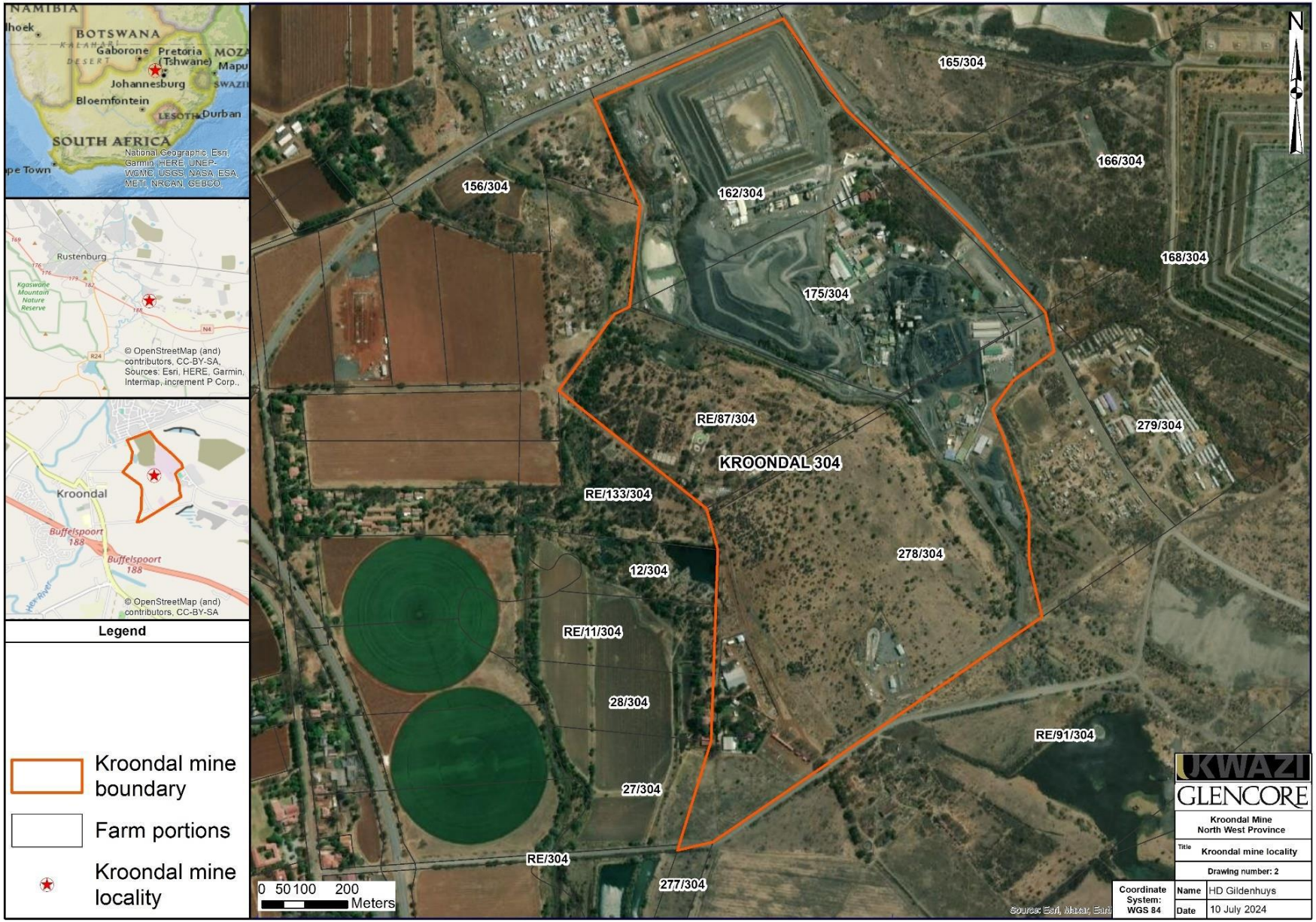

Figure 2: Kroondal Mine Locality Map

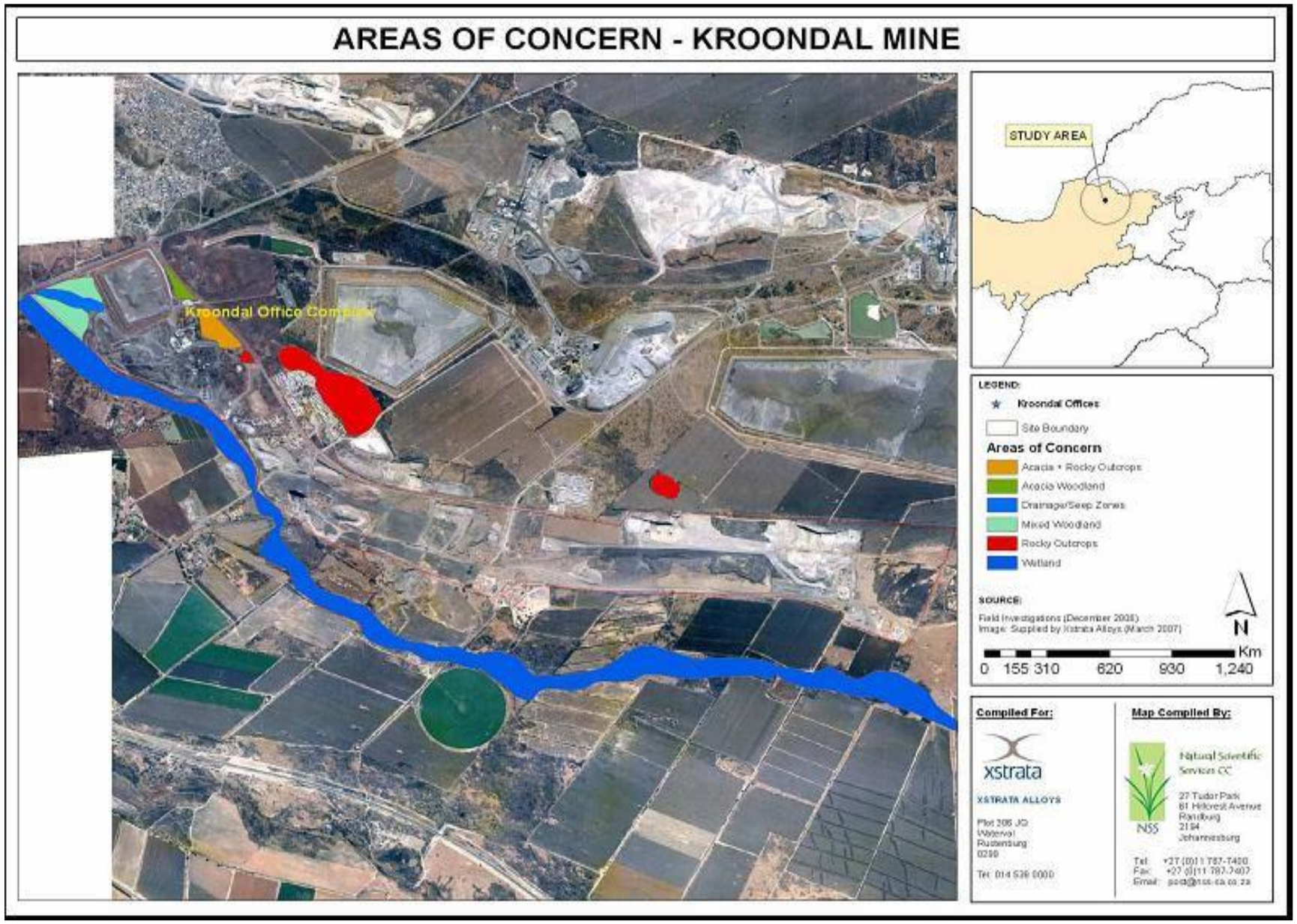

Figure 3: Kroondal Operations Sensitivity map (2009)

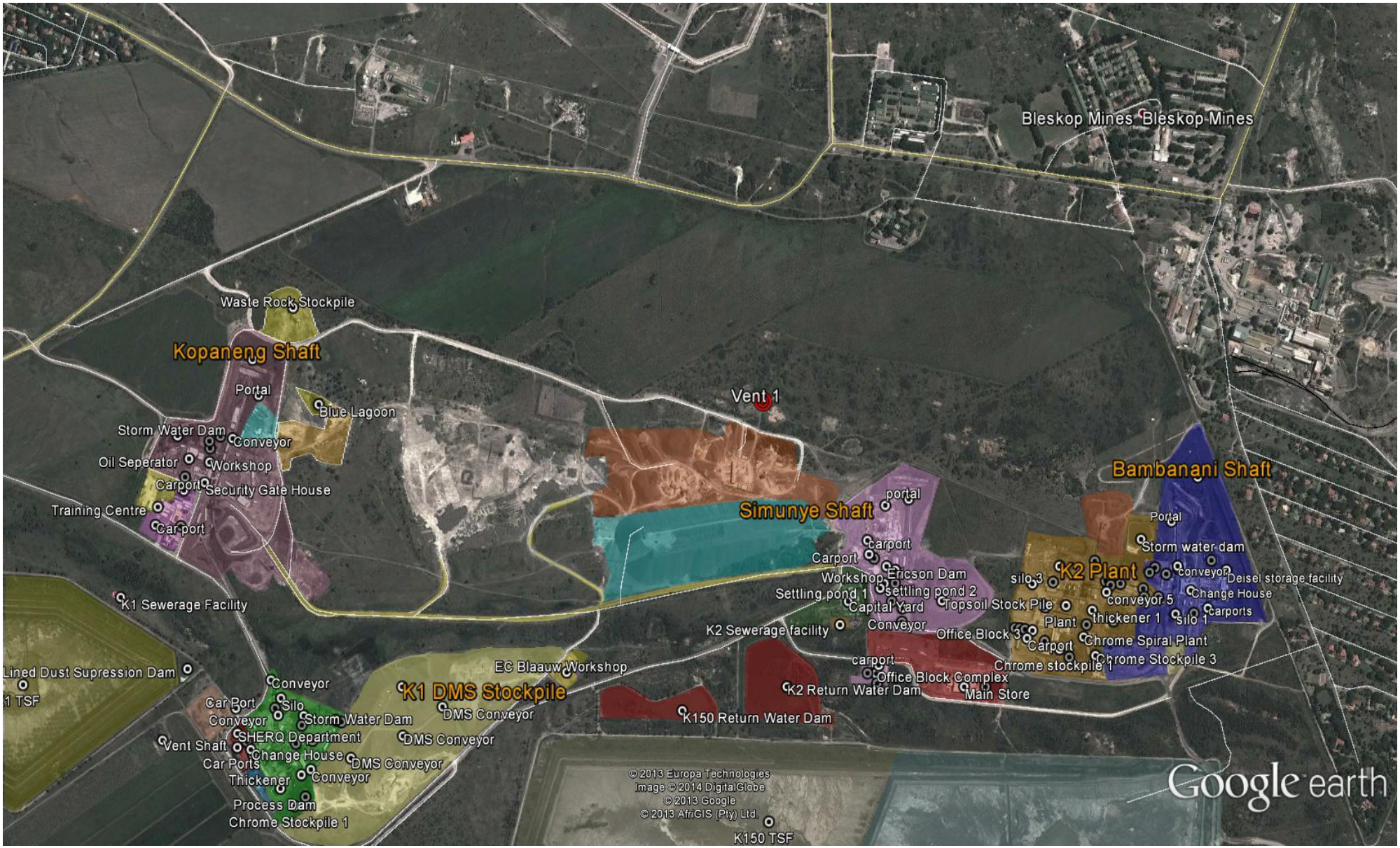

Figure 4: Google picture indicating the development around the proposed ventilation shaft-vent 1 (2014)

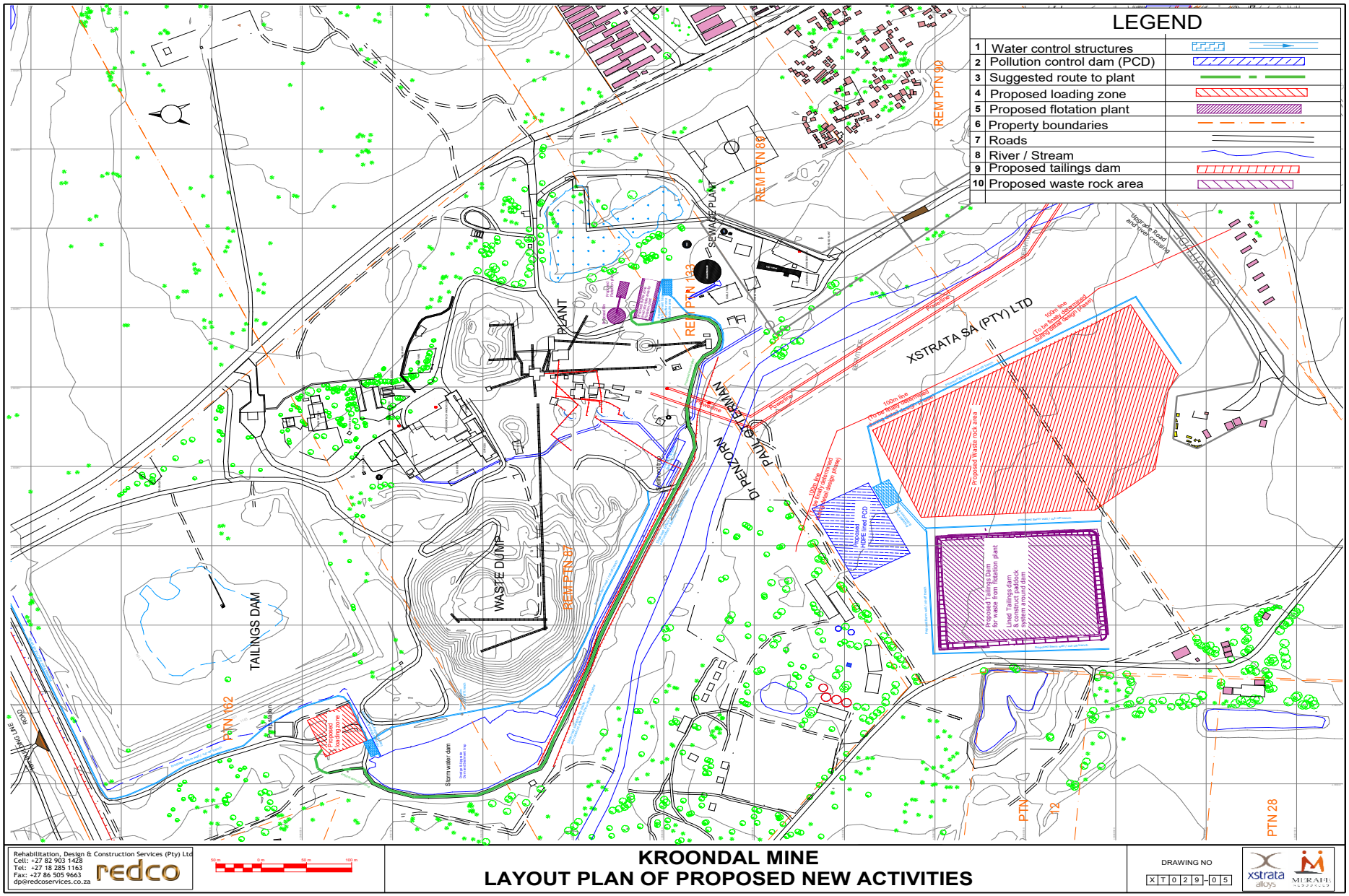

Figure 5: Surface layout with proposed infrastructure (2017).

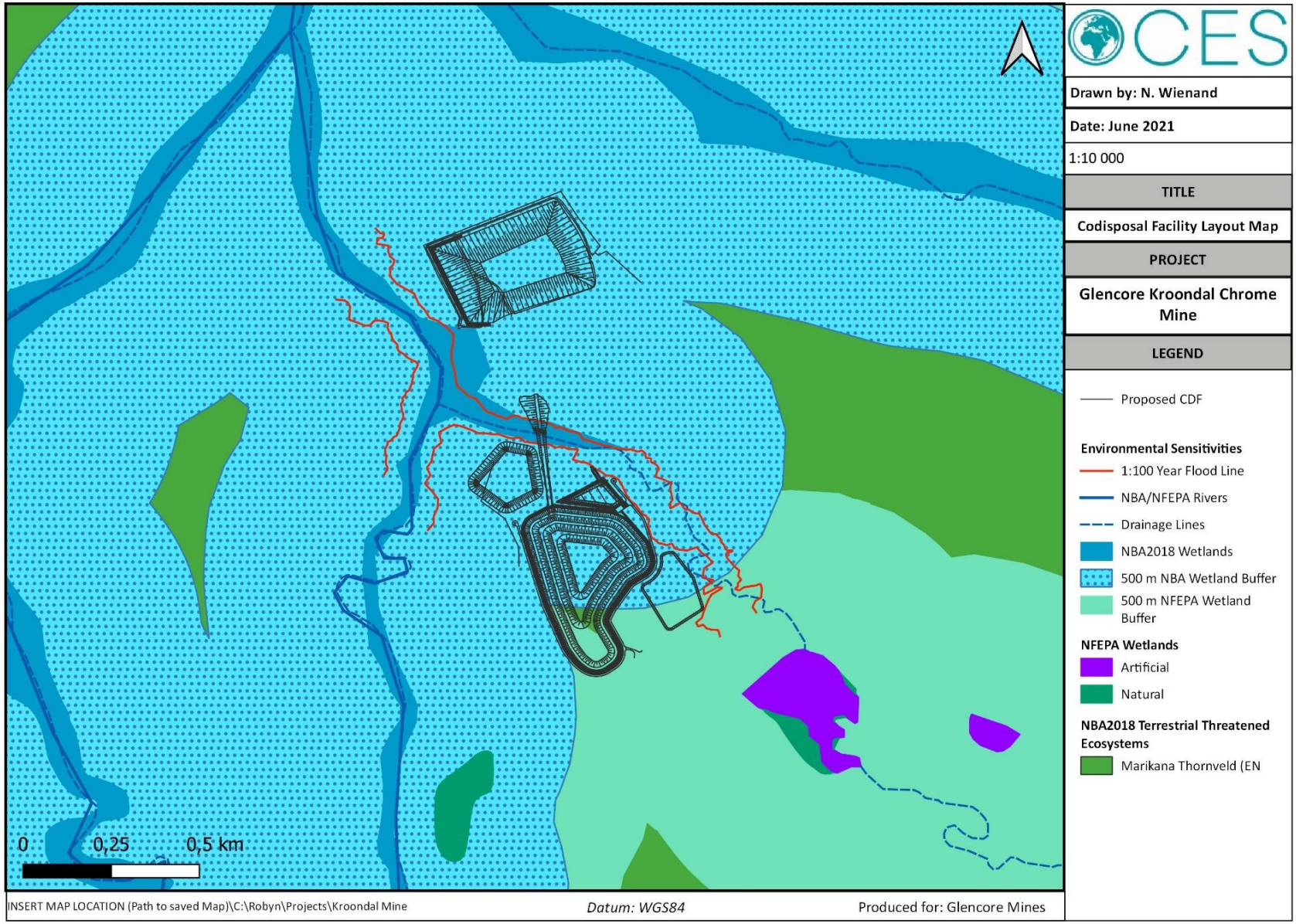

Figure 6: Kroondal Operations Sensitivity map (2021 – Co-disposal facility)

Figure 7: Existing Kroondal mine layout (2022 EMP)

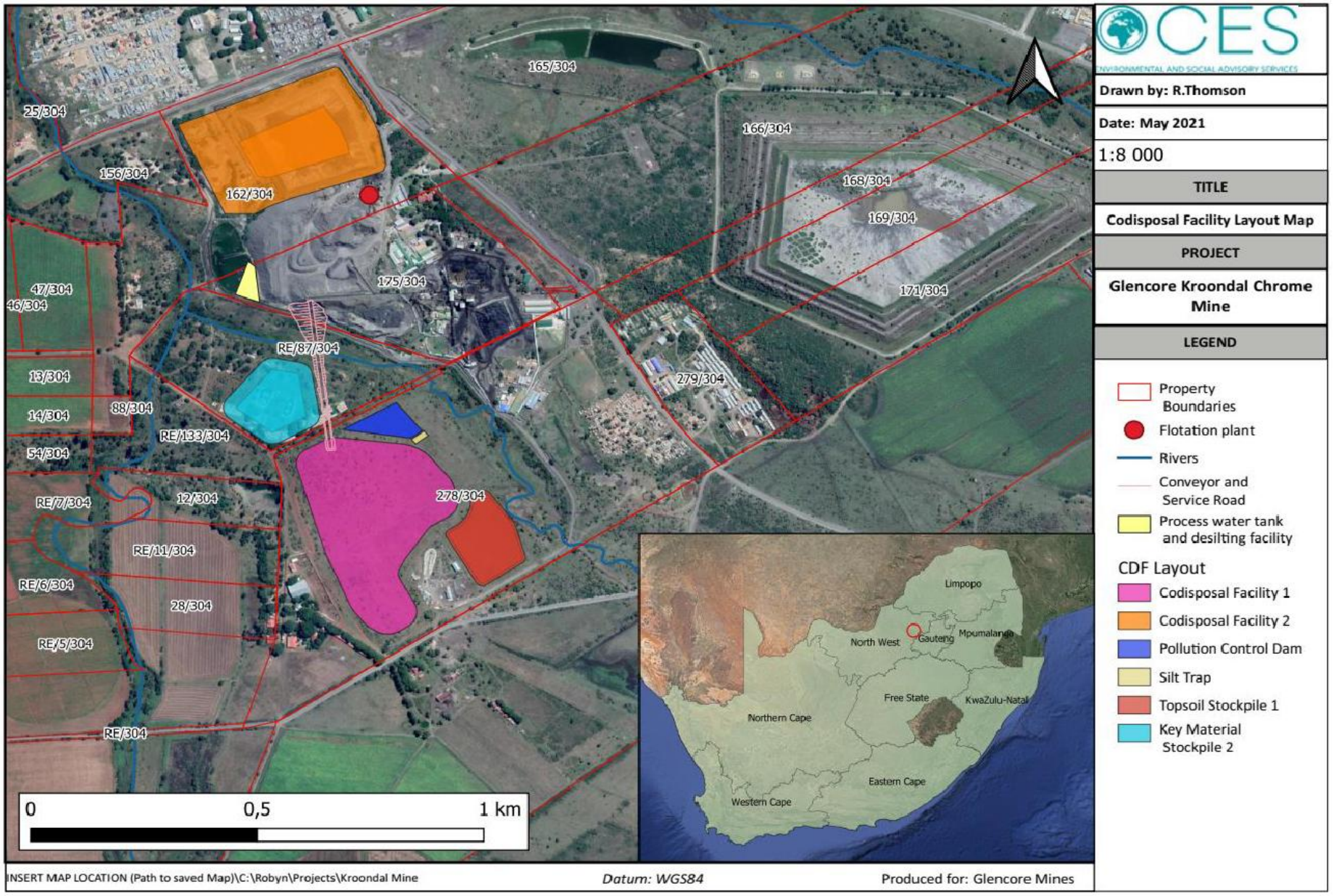

Figure 8: Glencore Kroondal infrastructure (2022)

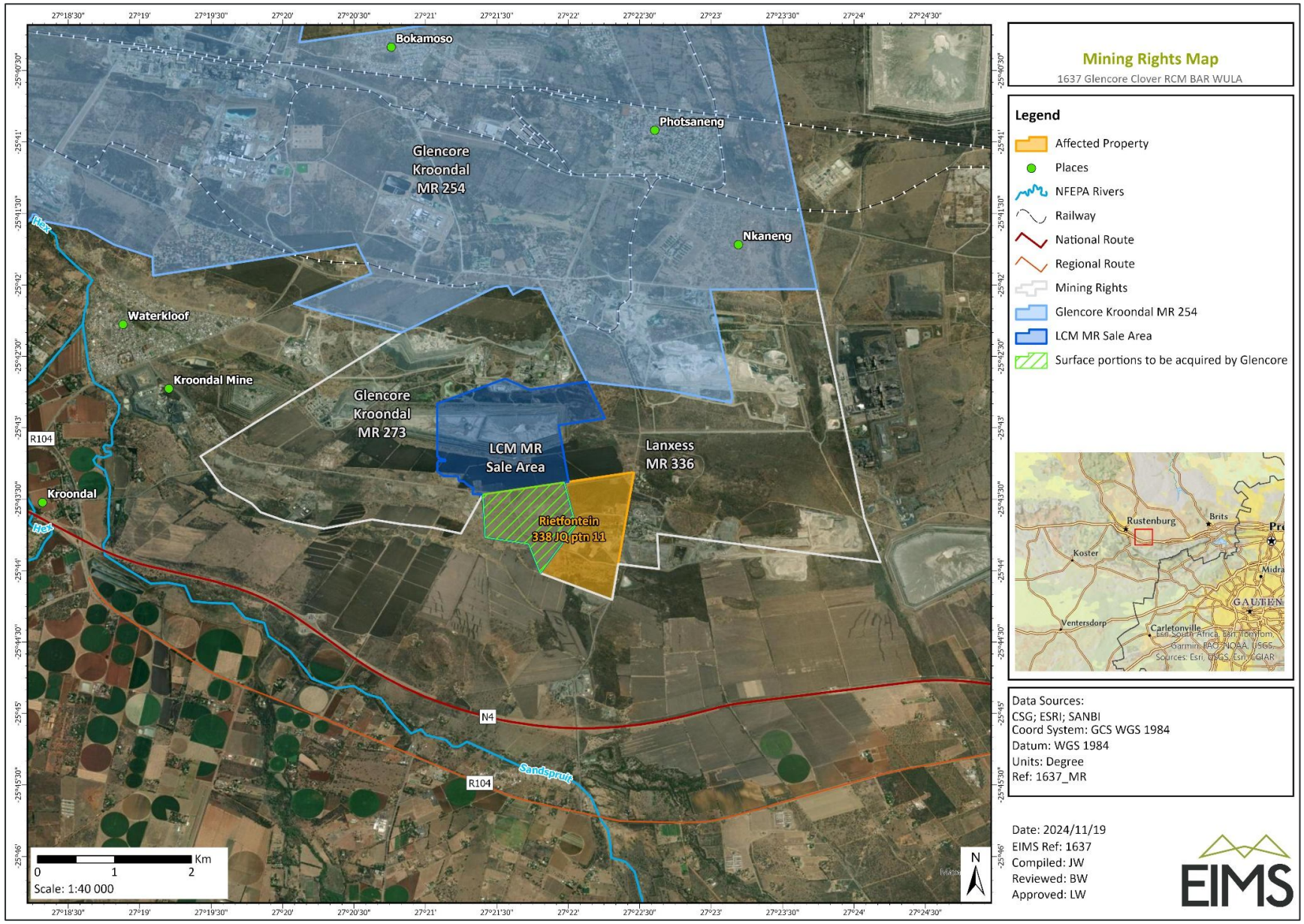

Figure 9: Mining Rights and Exchange Areas Map (2025).

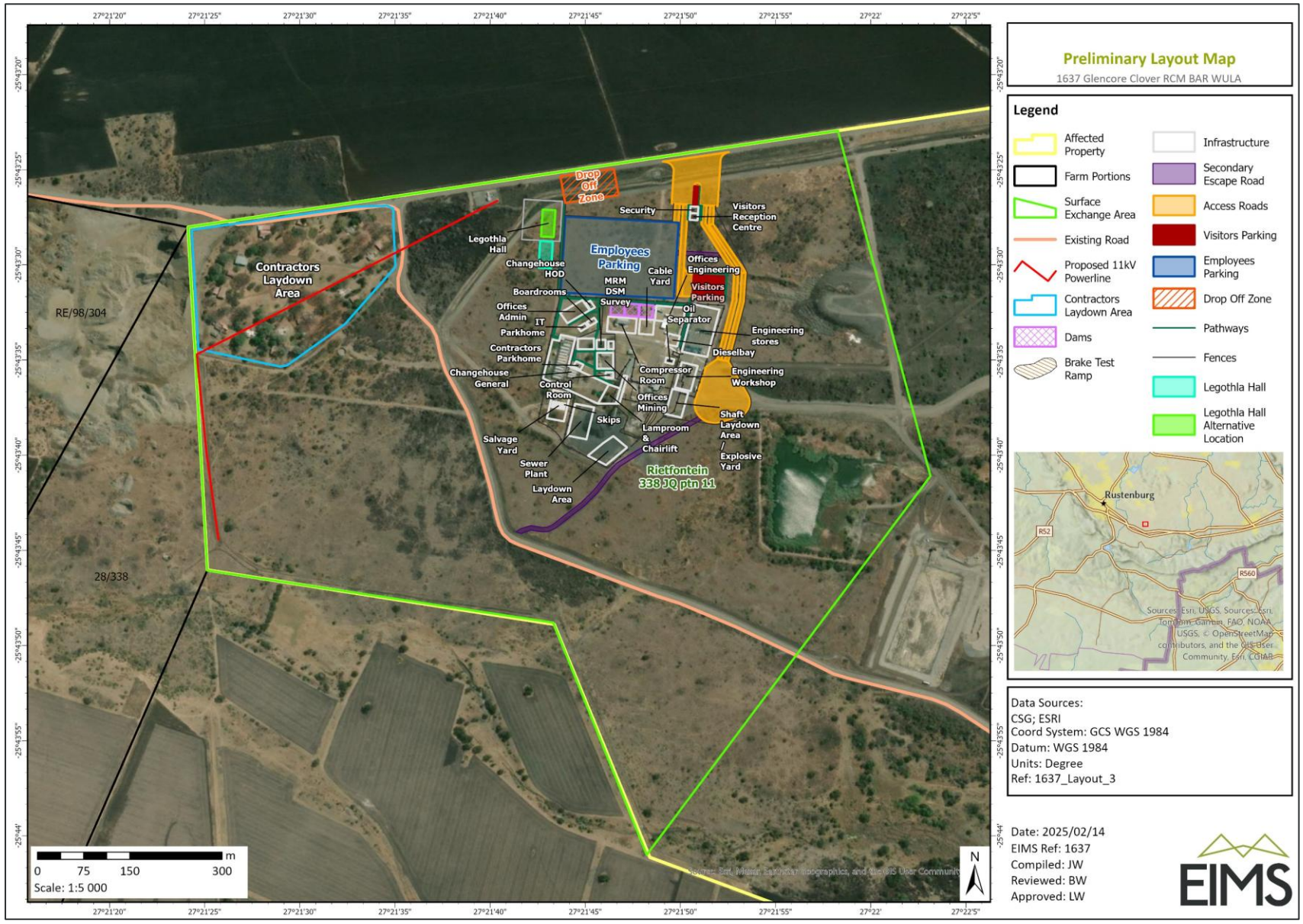

Figure 10: Surface infrastructure on portion 62 of the farm Kroondal (2025).

2 SCOPE OF THIS DOCUMENT

An EMPr is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of construction, operation and decommissioning of a project are prevented, and that the positive benefits of the projects are enhanced. This EMPr has been compiled as a guideline, in accordance with the Environmental Impact Assessment Regulations (GN R982 of 2014 as amended) for the requirements of an EMPr, to establish the mitigation and management measures that need to be implemented to avoid, reduce, and minimise potential environmental impacts arising out of any of the phases applicable to the project.

It should be noted, however, that an EMPr is a working document that should be updated on a regular basis, as and when necessary as outlined in Section 6.4 of this document and in line with Regulation 35 of the Environmental Impact Assessment Regulations, 2014. The EMPr thus supports an on-going proactive mitigation approach and duty of care to the environment. The EMPr shall allow for risk minimization and will ensure legal compliance. This EMPr will also 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.

This latest EMPr is a consolidation of Kroondal Mine's historic EMPrs and includes the latest 2025 proposed infrastructure on Portion 62 of the Farm Rietfontein 338 JQ.

3 DOCUMENT STRUCTURE

This EMPr has been developed according to the requirements of Appendix 4 of the NEMA EIA Regulations and the structure is presented in Table 2 below.

Table 2: EMPr structure

Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(a):	Details of – I. The EAP who prepared the EMPr; and II. The expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 4
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 7
Appendix 4(1)(1)(c):	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 1
Appendix 4(1)(1)(d):	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified though the environmental impact assessment process for all phases of the development including – I. Planning and design; II. Pre-construction activities; III. Construction activities; IV. Rehabilitation of the environment after construction and where applicable post closure; and V. Where relevant, operation activities;	Section 8
Appendix 4(1)(1)(f):	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 – 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 9
Appendix 4(1)(1)(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 10
Appendix 4(1)(1)(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 10
Appendix 4(1)(1)(i):	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section **Error! Reference source not found.**

Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(j):	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 9
Appendix 4(1)(1)(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 10
Appendix 4(1)(1)(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 10
Appendix 4(1)(1)(m):	An environmental awareness plan describing the manner in which – I. The Applicant intends to inform his or her Employees of any environmental risk which may result from their work; and II. Risks must be dealt with to avoid pollution or the degradation of the environment; and	Section 6
Appendix 4(1)(1)(n):	Any specific information that may be required by the competent authority.	N/A

4 DETAILS OF THE EAP

EIMS has been appointed by Glencore as the Independent Environmental Assessment Practitioner (EAP) and to assist in preparing and submitting an updated and consolidated EMP for its Kroondal Operations in conjunction with an application for Environmental Authorisation and Water Use Licence for their latest surface and mining right acquisition from Clover Alloys RCM (i.e. a portion of Portion 11 of the farm Rietfontein 338 JQ which has been subdivided into a new portion namely Portion 62). The details of the EAP are as follows:

- Name: Brian Whitfield
- Tel: 011 789 7170
- Fax: 011 787 3059
- E-mail: brian@eims.co.za

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

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

4.1 EAP QUALIFICATIONS AND EXPERIENCE

Brian Whitfield is a Principal Consultant at EIMS and has over 20 years of experience as an EAP. He holds a BSc (Botany and Zoology) and a BSc Honours degree in Botany from the University of the Witwatersrand. Brian is a registered Professional Natural Scientist with the South African Council for Natural Scientific Professions (400447/13) and a registered EAP (2022/4496) with the Environmental Assessment Practitioners Association of South Africa (EAPASA). Brian's broad range of experience includes managing and/or undertaking projects in various sectors, including Energy, Mining, Oil and Gas, Water and Infrastructure. He is conversant with the South African environmental legislation as well as sustainability auditing, including Equator Principles, IFC Performance Standards and World Bank EHS guidelines. Brian's other experience includes Site Assessments, Water-use licensing, Environmental Monitoring and Auditing, Due Diligence Assessments, Competent Persons Reporting, Environmental Management Plans and Strategic Environmental Assessments.

5 ROLES AND RESPONSIBILITIES

Glencore will be responsible for ensuring overall compliance with the provisions of the EMPr. Implementation is the key to the success of the EMPr. 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.

5.1 THE PROJECT PROPONENT

Glencore is the principal party (Proponent) of the project. The legal accountability for correct implementation of the relevant requirements of the EMPr falls upon Glencore and must therefore be built into all contractor's contractual agreements. The Proponent's role typically includes:

- Provide for all necessary supervision during the execution of the mining activities including appointment of key personnel to act on his/her behalf during the different phases of the project phase (e.g. mine manager). The key personnel will be tasked with ensuring that the various contractors comply with the necessary provisions of the various authorisations and EMPr;
- Ensure that the principal appoints a competent Environmental Superintendent and/or Environmental Coordinator that will be responsible for among others, ensuring compliance (on a daily basis onsite) with the EMPr conditions.
- Notify the relevant competent authority of changes in the development resulting in significant environmental impacts and initiate applications for amendments or new licencing where necessary (prior to commencement with such activities);
- Monitor and record environmental performance during mining operations;
- Ensure compliance with regulations;
- To ensure that implementation is conducted in an environmentally acceptable manner;
- To comply with special conditions as stipulated by surrounding landowners during the negotiation process (if any); and
- To inform and educate all Employees about the environmental risks associated with the different activities that should be avoided during the mining process and lessen significant impacts to the environment.

Therefore, ultimately, the Proponent is responsible for the development and implementation of the EMPr and, where relevant, ensuring that the conditions in the EMPr are complied with.

5.2 THE MINE MANAGER

During the development, it is envisaged that there may be several contractors and sub-contractors undertaking various activities on the mine. The Mine Manager would oversee all contractors and sub-contractors from a project management point of view. The roles of the Mine Manager typically include the following:

- The Mine Manager acts on behalf of Glencore regarding the administration of contracts to sub-contractors, etc.;
- Provides and/or approves scheduling, aspects of co-ordination and estimating;
- Ensures implementation of the project plan within cost, time and quality constraints;
- Ensures that implementation of EMPr is executed as planned; and
- Keeps Glencore informed of progress made during the life cycle of the mine.

5.3 THE MINE ENVIRONMENTAL OFFICER

Glencore shall appoint environmental personnel (Environmental Superintendent and/or Environmental Coordinator) whom are responsible for the on-site implementation of the EMPr. The appointees ensures that all Employees working on the mine abide by the requirements of the EMPr.

The environmental personnel's roles will include:

- Preparing activity based Environmental Method Statements where applicable and where required by the EMPr;
- Establishing and maintaining an environmental incident register;
- Taking required corrective action within specified time frame in respect of non-conformances and environmental incidents;
- Assist in finding environmentally acceptable solutions to problems;
- Attendance at HSE meetings, toolbox talks and induction programmes (where relevant);
- Inspect the site as required to ensure adherence to the management actions of the EMPr on a daily basis;
- Recommendations for review and update of the EMPr;
- Liaison between the Glencore, the authorities and other key stakeholders on high importance environmental concerns;
- Review the site induction training to ensure environmental issues receive adequate attention and important site-specific issues are included;
- Maintain a record of all non-conformances and incidents to ensure that measures are put in place to remedy such;
- Maintain a public consultation register in which all complaints are recorded, as well as action taken;
- Verification that all environmental monitoring programmes (sampling, measuring, recording etc. when specified) are carried out according to protocols and schedules; and
- Ensure adequate and compliant waste management.

It is important to note that where opportunity for interpretation occurs within the conditions of this EMPr, the interpretation of the environmental personnel will take preference.

5.4 THE INDEPENDENT AUDITOR

An independent auditor shall be appointed as per the requirements of the NEMA Section 34 which states that:

> (1) The holder of an environmental authorisation must, for the period during which the environmental authorisation, EMPr, and the closure plan in the case of a closure activity, remain valid-
>
> > (a) ensure that the compliance with the conditions of the environmental authorisation, the EMPr, and the closure plan in the case of a closure activity, is audited; and
> >
> > (b) submit an environmental audit report to the relevant competent authority.
>
> (2) The environmental audit report contemplated in sub-regulation (1) must-
>
> > (a) be prepared by an independent person with the relevant environmental auditing expertise;
> >
> > (b) provide verifiable findings, in a structured and systematic manner, on-
> >
> > > (i) the level of performance against and compliance of an organisation or project with the provisions of the requisite environmental authorisation, EMPr and the closure plan in the case of a closure activity; and

(ii) the ability of the measures contained in the EMPr and closure plan to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;

(c) contain the information set out in Appendix 7; and

(d) be conducted and submitted to the competent authority at intervals as indicated in the environmental authorisation.

With regards to the above legislated requirement, the independent audits shall be undertaken biennially until mine closure.

5.5 THE AUTHORITIES

The authorities that should be involved include the Department of Mineral Resources and Energy (DMRE) and the Department of Water and Sanitation (DWS). The authorities may be required to perform the following roles:

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

6 ENVIRONMENTAL MANAGEMENT SYSTEM

The purpose of this EMPr is to ensure that the environment is properly considered during the design, construction, operations, decommissioning and closure phases, and that negative impacts are minimised or prevented, and positive impacts enhanced. At the same time, the EMPr should provide a logical extension of the EIAs, 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 assessments.

6.1 RECORD KEEPING

Glencore, or the Mine Manager (if assigned) is responsible for the identification, storage, protection, retrieval, retention, and disposal of records as part of the EMPr. Records must be legible, identifiable, and traceable.

6.2 RESPONDING TO NON-COMPLIANCES

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

- Inspections of the mine and activities across the mine;
- Audits of the mine and relevant documentation as well as specific activities; and
- Reporting on a monthly basis by the environmental personnel.

Non-compliance with the EMPr or any other environmental legislation, specifications or standards shall be recorded by the environmental personnel in the non-conformance register. This register shall be maintained by the environmental personnel and will be sent to Glencore and the Mine Manager on a regular basis, and Glencore shall ensure that the responsible party takes the necessary corrective actions. Non-conformances may only be closed out in the register by the environmental personnel upon confirmation that adequate corrective action has been taken and/or documented proof provided. The register should be utilised to measure overall environmental performance.

6.3 ENVIRONMENTAL INCIDENTS

Glencore's procedure for HSEC & HR Incident Management Procedure: Environmental Incidents Classification forms part of the mine's Environmental Management System. The purpose of the procedure is to accelerate the proper reporting and classification of environmental incidents and Non-Conformances (NCs) and thus assign priority to all serious environmental occurrences. The procedure ensures that the environmental incident and NC assessment criteria and reporting method used are uniform and implemented across all segments and business units within Glencore operations.

Incidents are classified according to different levels defined as follows:

- **Category 1**: Near source and confined. Negligible, and reversible environmental impact to Ecosystems, habitat, or species. (<1 week to Remediate; and/or estimated Remediation budget of ≤$50,000).
- **Category 2**: Near source. Limited, but reversible, environmental impact to Ecosystems, habitat, or species (<3 months to Remediate; and/or estimated Remediation budget of >US$50,000 – US$500,000).
- **Category 3**: On/Off-site. Moderate, but reversible, Environmental impact to Ecosystems, habitat or species (<2 years to Remediate; and/or estimated Remediation budget of >US$500,000 – US$5,000,000).
- **Category 4**: On/Off-site. Widespread, but reversible, environmental impact to Ecosystems, habitat or species (2 to 10 years to Remediate; and/or estimated Remediation budget of >US$5,000,000 – US$25,000,000)
- **Category 5**: Unconfined and widespread. Catastrophic environmental impact to Ecosystems, habitat or species (Irreversible, or >10 years to Remediate; and/or estimated Remediation budget of >US$25,000,000)

The classification of an Environmental Incident as Cat 3 to Cat 5 must always be made in consultation with the department HSEC Lead and Group's HSEC&HR team to ensure consistency. However, the final decision to classify Environmental Incidents as Cat 4 or 5 is taken by the Glencore Board HSEC Committee pursuant to the process set out in the main body of the procedure.

6.3.1 WATER RELATED INCIDENTS

The National Water Act, Act 36 of 1998 and the respective Water Use Licences of the mine operations require that incidents that cause or might cause water pollution must be reported to the Department of Water and Sanitation (DWS) by the quickest means within 24 hours and within 14 days a detailed report needs to be submitted.

It is not always possible to assess within 24 hours what the final incident level would be, as the duration of the spill and water quality results might not be available during this period and therefore it is not always possible to finally assess the impact, correctly classify the incident and determine if it needs to be reported to the DWS. Therefore, to ensure compliance with the requirements the following protocol will be applied:

- The delegated person in the Environmental Department at the mine will within 24 hours report all occurrences that causes a discharge into a watercourse, or an actively flowing conduit leading to a water course and is envisaged to continue for more than 24 hours, to the DWS by the fastest means (telephonically and via e-mail).
- The telephonic and e-mail report should be worded as such:
    - Notification of a potential reportable environmental incident.
    - Briefly describe the occurrence and the steps taken.
    - The final statement in the initial reporting should be the following: “If no formal incident investigation report has been submitted to you within 14 days of this occurrence report, then the incident has been assessed and classified as not reportable but will still be internally investigated, reported and recorded for record purposes”.

This will allow Glencore to properly assess each incident, classify it correctly and also comply with the 24-hour legislative deadline.

6.3.2 OTHER INCIDENTS

The National Environmental Management Act 107 of 1998 (NEMA) requires reporting of emergency environmental incidents leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed. The reporting requirement as stipulated in NEMA 1998 Section 30(1) and Section 30(5) must be followed.

6.4 REVIEW AND REVISION OF THE EMPr

It is important to note that this EMPr is made legally binding on Glencore through 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 mining activities evolve. 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 because 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.

6.5 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.

Glencore 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.

Glencore shall ensure that adequate environmental training takes place. All employees shall have been given an induction inclusive of high-level environmental awareness aspects. Where possible, the presentation needs to be conducted in the language of the employees.

All employees will undergo an induction course when they are employed which will inform them of the environmental issues / risks and requirements prior to work commencing. An annual refresher will be done thereafter, with toolbox talks being undertaken at least monthly. The following aspects of environmental training should be included within the induction course:

- Sustainability;
- Environmental goals and manner of achieving these;
- SCCs (Species of Conservation Concern) likely to be encountered;
- Rehabilitation;
- Waste management / minimisation (including recycling);
- Saving water;
- Dealing with soil contamination and spillages; and
- Solutions to environmental risks.

The environmental personnelshall regularly check to ensure that adequate environmental training takes place. All employees shall be given an induction presentation on environmental awareness. The environmental training should, as a minimum, include the following:

- The importance of conformance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- The importance of not littering;
- The need to use water sparingly;
- Details of, and encouragement to, minimise the production of waste and re-use, recover and recycle waste where possible;
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered;
- Details regarding SCCs, including protected/endangered species, and the procedures to be followed should these be encountered during prospecting.

6.6 EMERGENCY RESPONSE PLAN

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

- Treat consequence if a risk eventuates, when the risk becomes an issue;
- Combine reducing the probability and treating the consequence;
- Offset environmental losses by investing in other assets;
- Make provision to manage residual impacts or issues that arise because of shortcomings in risk identification and rating, avoidance and mitigation or because a rare event has occurred.

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

Typical types of emergencies include, but not limited to, the following:

- Uncontrollable large surface fires.
- Natural disasters such as floods.
- Tailings Dam and Return Water Dam failure.
- Bulk water containment failure.
- Petrochemical / chemical spill.
- Discharge / release of tailings.
- Uncontrolled releases of dirty water and raw sewage from facilities.
- Gas leak and explosions.
- Industrial action.
- Power failures.
- Surface water or groundwater contamination.

6.7 SPILL RESPONSE PROCEDURE

Glencore must ensure that all employees, staff, and labourers are informed and instructed regarding implementation of spill prevention measures and spill response procedures. In the event of a spill, the following general requirements shall apply, and the detailed spill procedure must cater for these requirements;

- Immediately reporting of spills by all Employees and/or visitors to the relevant supervisor and environmental personnel (this requirement must be included in induction training);
- Take immediate action to contain or stop the spill where it is safe to do so;
- Contain the spill and prevent its further spread (e.g. earth berm or oil absorbent materials for spill to land or by deploying booms and/or absorbent material for a spill to water);
- Dispose of any contaminated soil or materials according to appropriate waste disposal procedure. Note: Waste from spills of hazardous materials shall be disposed of as hazardous waste at a suitably licensed waste disposal facility;
- The Contractor’s environmental personnel shall record details of the spill in their respective incident registers;

- Incident to be classified according to the mine's procedure for Incident and Non-Conformance Classification and Reporting;
- Photographic evidence shall be obtained of the spill clean-up.

In the case of large spills, the services of a specialist spill response agency shall be required, who shall advise on appropriate clean-up procedures and follow-up monitoring (if required). The incident procedures as defined in Section 6.8 shall also apply.

Glencore must also, as per Section 30 of the NEMA, notify the Director-General (DWS, DFFE and DMRE), South African Police Services, Provincial Environmental Authority, the Local Municipality, and any persons whose health may be affected of the nature of an incident including:

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

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

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

- Ensure adequate storm water runoff measures;
- Contain potential pollutants and contaminants (where possible) at source;
- Handling of potential pollutants and contaminants (where possible) must be conducted in bunded areas and on impermeable substrates;
- Ensure the timeous clean-up of any spills;
- Implement a waste management system for all waste streams present on site;
- Investigate any I&AP claims of pollution or contamination as a result of the project activities; and
- Rehabilitate the site in line with the requirements of the rehabilitation / decommissioning plan.

7 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

The relevant mitigation measures to remedy the impacts caused by the mining operation are presented in Table 3 overleaf.

Table 3: Measures to rehabilitate the environment affected by the undertaking of any listed activity

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Clearing of vegetation for construction of infrastructure (including roads and conveyor through wetlands), causing direct habitat destruction / fragmentation of terrestrial and wetland habitats	Construction	• The removal of the isolated indigenous trees and shrubs should only occur on the construction footprint area of the development and not over the larger area. Where possible, vegetation should be retained in between infrastructural elements associated with the project; • Conduct flora species search and rescue efforts before ground clearing begins in order to reduce negative impacts on species of concern; • Remove and relocate any plants of botanical or ecological significance as indicated by the ecologist or Mine Environmental Control Officer (ECO); • Construction should preferably take place in winter to reduce disturbance to breeding fauna and flowering flora; • Vegetation to be removed as it becomes necessary – do not clear the entire footprint simultaneously; • Clearly demarcate the entire development footprint prior to initial site clearance and prevent construction personnel from leaving the demarcated area; • Monitoring should be implemented during the construction activities to ensure that minimal impact is caused to the flora of the area; • The Mine ECO should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The Mine ECO should enforce any measures that he/she deem necessary. Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation; • Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction. • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. Poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.	National Environmental Management Act (Act 107 of 1998) National Environmental Management Biodiversity Act (act 10 of 2004) Conservation of Agricultural Resources Act (Act 43 of 1983) Northwest Nature Conservation Ordinance (1983)	Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		Use existing facilities (e.g., access roads, parking lots, graded areas) to the extent possible to minimize the amount of new		
Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Construction	• Cover disturbed soils as completely as possible, using vegetation or other materials; • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Sediment trapping, erosion and storm water control should be addressed by a hydrological engineer in a detailed storm water management plan; • All aspects related to dust and air quality should be addressed by an air quality specialist in a specialist report; • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas; • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth; • Gravel roads must be well drained to limit soil erosion;	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout construction phase
Vegetation clearing / vehicle movement resulting in spreading and establishment of alien invasive species	Construction	• Control involves killing the alien invasive plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. The control of these species should even begin prior to the construction phase considering that small populations of the AIS occur around the sites; • Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to site or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase; • Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish; • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds; • Institute an eradication/control programme for early	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented; • A detailed plan should be developed for control of noxious weeds and invasive plants that could colonize the area because of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the way weeds spread, and methods for treating infestations.		
Habitat degradation due to dust from vegetation clearing / vehicle movement	Construction	• Daily dampening of dust areas or other dust suppression methods such as dust-aside or more environmentally friendly methods. • Re-vegetation of impacted areas is to be conducted on an on-going basis. • Place dust generating activities where maximum protection can be obtained from natural features. • Locating dust generating activities where prevailing winds will blow dust away from users. • Minimize the need to transport and handle materials by placing adequate storage facilities close to processing areas. • Minimize the re-handling of material which obviously has cost benefits as well. • Exposed material should be protected from the wind by keeping it within voids or protecting them by topographical features where possible. • Reduce the drop heights wherever practicable. • Protect activities from wind by erecting a screen or using a natural barrier. • All roads on site should be dampened or treated with a binding agent. • The general vehicle speed should be restricted as there is a direct relationship between the speed and vehicle entrained emissions. • Monitoring, modelling and emission measurements should be regarded as complementary components in any integrated approach to exposure assessment or determining compliance against air quality criteria.	National Environmental Management Act (Act 107 of 1998) National Dust Control Regulations (GN R827 of 2013)	Throughout construction phase
Spillages of harmful substances	Construction	• Ensure that mining related waste or spillage and effluent do not affect the sensitive habitat boundaries and associated buffer zones.	National Environmental Management Waste Act (Act 59 of 2008)	Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		• This risk of spillages of reagents and hydrocarbons on the soil during transportation can be reduced with proper maintenance of vehicles. This would include a rigorous and proactive maintenance program • This risk can be further reduced through an adequate program of training of drivers and crews. This would include defensive driver training, basic vehicle maintenance, and emergency control of spills. For the vehicle crews to be adequately able to control any spills at an early stage, the vehicles must be properly equipped with spill containment equipment (booms, sandbags, spades, absorbent pads, etc.). Responsibility for training lies with the transport contractor. Adequate training, maintenance, and equipment of transport crews should be included as a requirement for transport contracts. • All employees will be trained in cleaning up of a spillage. The necessary spill kits containing the correct equipment to clean up spills will be made available at strategic points in the plant area	Hazardous Substances Act (Act 15 of 1973)	
Road mortalities of fauna / impact of human activities on site from heavy machinery and vehicle movement on site; Construction of infrastructure, roads etc. on site	Construction	• More fauna is normally killed the faster vehicles travel. A speed limit should be enforced as determined by the mine environmental manager. It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences). • Travelling at night should be avoided or limited as much as possible. No travelling at night should be allowed without approval by site manager; • Lights should be positioned 5m from the roads or paved areas.	National Environmental Management Act (Act 107 of 1998) National Environmental Management Biodiversity Act (act 10 of 2004)	Throughout construction phase
Impediment of flow patterns due to clearing of vegetation for conveyor construction through wetlands and water courses	Construction	• Unless authorised by this licence, access and haul roads must not encroach into the extent of the watercourse(s) • No structures to be placed within the 1:100-year flood line and/or the delineated riparian areas unless authorised in this licence • Appropriate design and mitigation measures must be developed and implemented to minimise impacts on the natural flow regime of the watercourse i.e., through placement of structures/supports and to minimise turbulent flow in the watercourse • The diversion and impeding structures may not restrict river	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)	Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		flows by reducing the overall river width or obstructing river flow. Any watercourse crossing must minimise its impacts on the watercourse and must be assessed and documented as such and be available for review • The indiscriminate use of machinery within the in-stream and riparian habitat will lead to compaction of soils and vegetation and must therefore be strictly controlled • The clear incision of the banks of the Sandspruit indicates that this feature is highly erodible. The installation of energy dissipating structures, such as gabion wingwalls, to protect the banks of the drainage line where the conveyor crossing is proposed is required as recommended by the submitted reports • Perform scheduled maintenance to be prepared for storms. Ensure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures. • Work in rivers, streams and riparian zones should preferably be done during the low flow season; • The construction camp must be located outside the extent of the watercourse(s) and must be recovered and removed within one (1) month after construction has been completed • During the construction phase vehicles must not be allowed to indiscriminately drive through any wetland areas. • Indigenous riparian vegetation, including dead trees, outside the limits of disturbance indicated in the site plans must not be removed from the area		
Soil compaction due to heavy machinery and vehicle movement on site	Construction	• Soil should be handled when dry during removal and placement to reduce the risk of compaction; • Vegetation (grass and small shrubs) should not be cleared from the site prior to mining activities or construction (except if vegetation requires relocation as determined through an ecology assessment). This material is to be stripped together with topsoil as it will supplement the organic and possibly seed content of the topsoil stockpile depending on the time of soil stripping (whether plants are in seed or not); and • During construction, sensitive soils with high risk of compaction (e.g., clayey soils) must be avoided by construction vehicles and	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • Rip and/or scarify all compacted areas. Do not rip and/or scarify areas under wet conditions, as the soil will not loosen. Compacted soil can also be decompacted by "Rotary Decompactors" to effectively aerate soils for vegetation establishment.		
Soil erosion and sedimentation due to topsoil & subsoil stripping, exposure of soils to wind and rain during construction causing erosion and sedimentation in wetlands	Construction	• When possible, topsoil stripping and excavation activities should be scheduled for the low rainfall season (winter); • Cover disturbed soils as completely as possible, using vegetation or other materials; • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Sediment trapping, erosion and storm water control should be addressed by a hydrological engineer in a detailed storm water management plan; • All aspects related to dust and air quality should be addressed by an air quality specialist in a specialist report; • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas; • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth; Gravel roads must be well drained to limit soil erosion;	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983) National Water Act (Act 36 of 1998)	Throughout construction phase
Soil destruction and sterilization due to topsoil & subsoil stripping	Construction	• The most desired approach during all the mining phases is to continually rehabilitate the soils to the best possible state – considering the current technology and knowledge available as well as the financial means to conduct such rehabilitation. The rehabilitation of soils to pre-mining conditions is basically impossible though. • Refer to mitigation measures needed during the operational phase that are like the mitigation measures for impacts during the construction phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout construction and operation phases
Loss of land capability due to topsoil & subsoil stripping	Construction	No specific mitigation can be applied during the construction phase itself to prevent loss of land capability considering that the land use will change to industrial. This, however, does not prevent the mine from ensuring that disturbance and clearing should be	National Environmental Management Act (Act 107 of 1998)	Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		confined to the footprint areas of the mine and not over the larger area. This can be done in the following ways: • Corridors should be secured around the mining footprint areas to ensure the current land use (grazing) can continue in a functional way during mining. • Clearly demarcate the entire development footprint prior to initial site clearance and prevent construction personnel from leaving the demarcated area. This could be done through the fencing off the entire development footprint and institute strict access control to the portions of the owner-controlled property that are to remain undisturbed as soon as possible after initial site clearance. The fence should preferably be impermeable (for example a solid wall) to discourage invertebrates and small animals from entering the site. [Normally solid perimeter walls are not recommended to facilitate the movement of invertebrates, but in this case restriction of their movement into the area will be advantageous.] • All development activities should be restricted to specific recommended areas and strict buffer zones should be applied around the sensitive areas. The Environment Control Officer (ECO) should demarcate and control these areas. Unnecessary bulldozing through the veld should be avoided.	Conservation of Agricultural Resources Act (Act 43 of 1983)	
Construction of the co-disposal facility 1 • Removal of vegetation and excavation of soil material; • Ground-breaking and earthworks relating to foundations and trenches for stormwater separations; and • Mixing and casting of concrete for construction purposes; and • Soil disturbance as part of ground preparation. • Loss of catchment yield resulting from the separation of clean and dirty water areas;	Construction	• Clean water runoff captured should be redirected towards the adjacent watercourse; and • The watercourse must be protected against erosion arising from the discharge of stormwater. In this regard, energy dissipating structures should be installed to prevent erosion. Water should also be distributed in a diffuse manner to prevent canalisation.	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983) National Water Act (Act 36 of 1998)	Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
• Increased flood peaks as a result of formalisation and concentration of surface runoff in clean water diversion structures; • Exposure of soils, leading to increased runoff, loss of soil through erosion and subsequent loss of wetland recharge soils; • Soil compaction and crusting, leading to increased runoff and reduced infiltration rate and subsequent reduction subsurface flows in the vadose zone; and • Impacts on the hillslope processes supporting the watercourse downstream				
<u>Construction of stockpile areas</u> • Ground preparation leading to disturbance of soils • Loss of surface area for overland flow reporting to the adjacent watercourse	Construction	• Exposed soils to be protected by suitable covering; • Vegetate the stockpiles to minimise soil loss; and • Erosion control measure should be put in place;	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout construction phase
<u>Construction of the conveyor and service road</u> • Topsoil removal as part of excavation and stripping. • Exposure of soils, leading to increased runoff, loss of soil through erosion and stream incision of the wetlands, and subsequent loss of wetland recharge soils; Soil compaction and crusting, leading to increased runoff and reduced; and infiltration rate and subsequent reduction subsurface flows in the vadose zone.	Construction	• Exposed soils to be protected by suitable covering; • Duration of impacts must be minimised;	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
<u>Construction of pollution control dam and stormwater management</u> • Topsoil stripping as part of the site preparation • Excavation and Construction of clean and dirty water separation systems / stormwater management systems around the downgradient • Disturbance of soil leading to soil erosion	Construction	• Exposed soils to be protected by suitable covering; and • Duration of impacts must be minimised;	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983) National Water Act (Act 36 of 1998)	Throughout construction phase
<u>Construction of co disposal facility 2</u> • Excavation and stripping of soils. • Containment of the runoff reporting to the wetland	Construction	• Ensure that the runoff volumes reporting to the adjacent ephemeral drainage line are minimised following the principles of the mitigation hierarchy.	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983) National Water Act (Act 36 of 1998)	Throughout construction phase
Transport and general construction activities resulting in gaseous and particulate emissions; fugitive dust	Construction	• Maintenance of vehicles and wet suppression or chemical treatment on unpaved road surfaces.	National Environmental Management: Air Quality Act (Act 39 of 2004) National Dust Control Regulations (GN R827 of 2013)	Throughout construction phase
Clearing of groundcover and levelling of area	Construction	• Wet suppression where feasible. Minimise extent of disturbed areas. Reduction of frequency of disturbance. Early re-vegetation Stabilisation (chemical, rock cladding or vegetative) of disturbed soil.		Throughout construction phase
Materials handling	Construction	• Wet suppression where feasible on materials handling activities and reducing drop height.		Throughout construction phase
Wind erosion from open areas	Construction	• Wet suppression where feasible. Minimise extent of disturbed areas. Reduction of frequency of disturbance. Early re-vegetation Stabilisation (chemical, rock cladding or vegetative) of disturbed soil.		Throughout construction phase
Effect on R1 Waterkloof community of Daytime Construction	Construction	• Ensure good public relations and communications. The mine should appoint a mine contact where any noise complaints could be registered. Noise complaints should be logged and further investigated by an environmental officer. • A representative should inform receptors R1 Waterkloof community of any noisy related construction activities to be	National Noise Control Regulations (GN R154 of 1992) SANS Noise Standards (SANS 10103:2008)	Throughout construction phase
Effect on R4 – R6 Community and mine office area of Daytime	Construction			Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Construction		conducted that is not behind a berm or screen (i.e. direct line of sight), highlighting the times and dates that construction activities are to occur and the extent of noise to be generated. • No night-time work should be conducted without the berm or barrier fully obscuring the receptors to the Waste Rock Dump activities		
Damage / Destruction to Heritage Sites from digging foundations and trenches into sensitive deposits that are not visible at the surface.	Construction	• To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.	National Heritage Resources Act (Act 25 of 1999)	Throughout construction phase
Preparation and earthworks for topsoil, co-disposal facility no. 1 area, PCD and conveyor system route. This involves mostly topsoil stripping and depositing in the two topsoil stockpile locations. Exposure of earth at the activity sites (stark contrast with existing landscape character) and the generation of dust that results in a minor alteration the visual quality and sense of place of areas immediately around the project site. These activities will be visible in foreground and middle ground views from some residential areas, farms and public roads. Night lighting during this phase.	Construction	• Topsoil stockpiles should be shaped and vegetated (hydroseeded) immediately in order to blend with the existing natural veld areas. Dust suppression techniques must be implemented along the haul roads.	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)	Throughout construction phase
Contamination to ground- and surface water systems from oil, grease and diesel spillages from construction vehicles resulting in contamination to groundwater systems	Construction	• Road compaction and service facilities for mine vehicles with spillage sumps.	National Water Act (Act 36 of 1998) National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)	Throughout construction phase
On-site sanitation resulting in contamination to groundwater systems	Construction	• Monitoring systems to detect leaking as well as visual observations of facility conditions	National Water Act (Act 36 of 1998) National Environmental	Throughout construction phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Management Waste Act (Act 59 of 2008)	
Storage of chemicals and building materials during construction of waste facilities resulting in contamination to groundwater systems	Construction	• Monitoring systems to detect leaking as well as visual observations of facility conditions	National Water Act (Act 36 of 1998) National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)	Throughout construction phase
Habitat destruction / fragmentation of fauna habitats due to storage of tailings and disposal of Waste rock on CDF, laydown areas of stockpiles	Operation	• Clearly demarcate the entire development footprint to prevent personnel from leaving the demarcated area; • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. Poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist. • Use existing facilities (e.g., access roads, parking lots, graded areas) to the extent possible to minimize the amount of new disturbance. • Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the sensitive habitats such as ravines and moist grassland pockets during construction. • Operational activities must remain within defined areas and the road servitudes. No disturbance will occur outside these areas	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout operation phase
Soil erosion and sedimentation due to Increased hardened surfaces around infrastructure and exposed areas around laydown areas of CDFs and stockpiles	Operation	• Rehabilitation: revegetate or stabilise all disturbed areas as soon as possible. Indigenous trees can be planted in the buffer zone of the proposed development to enhance the aesthetic value of the site and stabilize soil conditions; • The vegetative (grass) cover on the soil stockpiles (berms) must be continually monitored to maintain a high basal cover. Such maintenance will limit soil erosion by both the mediums of water (runoff) and wind (dust); • Conservation of topsoil should be prioritized on site and done as follows: o Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify;	Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		○ Stockpile topsoil separately from subsoil; ○ Stockpile in an area that is protected from storm water runoff and wind; ○ Topsoil stockpile1 should not exceed 2.0 m in height and should be protected by a mulch cover where possible; ○ Topsoil stockpile 2 can be deposited higher but not exceeding 10m to reduce slope length and minimize erosion. ○ Maintain topsoil stockpiles in a weed free condition; ○ Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it; ○ Stockpile topsoil for the minimum time period possible i.e., strip just before the relevant activity commences and replace as soon as it is completed.		
Spreading and establishment of alien invasive species due to Heavy machinery and vehicle movement on site	Operation	• Control involves killing the alien invasive plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase; • Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish; • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds; • Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented; • A detailed plan should be developed for control of noxious weeds and invasive plants that could colonize the area because of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the way weeds spread, and methods for treating infestations.	Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout operation phase
Habitat degradation due to dust as a result of heavy machinery and vehicle movement on site	Operation	• Daily dampening of dust areas or other dust suppression methods such as dust-aside or more environmentally friendly methods. • Re-vegetation of impacted areas is to be conducted on an on-going basis.	National Environmental Management Act (Act 107 of 1998) National Dust Control	Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		• Place dust generating activities where maximum protection can be obtained from natural features. • Locating dust generating activities where prevailing winds will blow dust away from users. • Minimize the need to transport and handle materials by placing adequate storage facilities close to processing areas. • Minimize the re-handling of material which obviously has cost benefits as well. • Exposed material should be protected from the wind by keeping it within voids or protecting them by topographical features where possible. • Reduce the drop heights wherever practicable. • Protect activities from wind by erecting a screen or using a natural barrier. • All roads on site should be dampened or treated with a binding agent. • The general vehicle speed should be restricted as there is a direct relationship between the speed and vehicle entrained emissions. • Monitoring, modelling and emission measurements should be regarded as complementary components in any integrated approach to exposure assessment or determining compliance against air quality criteria.	Regulations (GN R827 of 2013)	
Spillages of harmful substances as a result of heavy machinery and vehicle movement on site	Operation	• Ensure that mining related waste or spillage and effluent do not affect the sensitive habitat boundaries and associated buffer zones. • This risk of spillages of reagents and hydrocarbons on the soil during transportation can be reduced with proper maintenance of vehicles. This would include a rigorous and proactive maintenance program • This risk can be further reduced through an adequate program of training of drivers and crews. This would include defensive driver training, basic vehicle maintenance, and emergency control of spills. For the vehicle crews to be adequately able to control any spills at an early stage, the vehicles must be properly equipped with spill containment equipment (booms, sandbags, spades, absorbent pads, etc.). Responsibility for training lies with the transport contractor. Adequate training, maintenance, and equipment of transport crews should be	National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)	Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		included as a requirement for transport contracts. • All employees will be trained in cleaning up of a spillage. The necessary spill kits containing the correct equipment to clean up spills will be made available at strategic points in the plant area		
Road mortalities of fauna / impact of human activities on site as a result of heavy machinery and vehicle movement on site; workers accommodated on site causing poaching, wood collection, fires etc.	Operation	• Cover disturbed soils as completely as possible, using vegetation or other materials; • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Sediment trapping, erosion and storm water control should be addressed by a hydrological engineer in a detailed storm water management plan; • All aspects related to dust and air quality should be addressed by an air quality specialist in a specialist report; • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas; • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth; • Gravel roads must be well drained to limit soil erosion;	National Environmental Management Act (Act 107 of 1998) National Environmental Management Biodiversity Act (act 10 of 2004)	Throughout operation phase
Soil compaction caused by heavy machinery and vehicle movement on site, laydown areas of CDFs and stockpiles	Operation	• During operation, sensitive soils with high risk of compaction (e.g., clayey soils) must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. Vehicles should also stick to haul roads when depositing of waste rock on CDFs and topsoil are done. • Rip and/or scarify all compacted areas on a continuous basis. Do not rip and/or scarify areas under wet conditions, as the soil will not loosen. Compacted soil can also be decompacted by "Rotary Decompactors" to effectively aerate soils for vegetation establishment. • Refer to mitigation measures needed during the construction phase that are like the mitigation measures for impacts during the operational phase.	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout operation phase
Soil erosion and sedimentation in wetland / water courses due to		• Rehabilitation: revegetate or stabilise all disturbed areas as soon as possible. Indigenous trees can be planted in the	National Environmental Management Act (Act 107 of	Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
increased hardened surfaces around infrastructure, laydown areas of CDFs and stockpiles, road and conveyor crossings		buffer zone of the proposed development to enhance the aesthetic value of the site and stabilize soil conditions; • The vegetative (grass) cover on the soil stockpiles (berms) must be continually monitored to maintain a high basal cover. Such maintenance will limit soil erosion by both the mediums of water (runoff) and wind (dust); • Conservation of topsoil should be prioritized on site and done as follows: o Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify; o Stockpile topsoil separately from subsoil; o Stockpile in an area that is protected from storm water runoff and wind; o Topsoil stockpile1 should not exceed 2.0 m in height and should be protected by a mulch cover where possible; o Topsoil stockpile 2 can be deposited higher but not exceeding 10m to reduce slope length and minimize erosion. o Maintain topsoil stockpiles in a weed free condition; o Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it; o Stockpile topsoil for the minimum time period possible i.e., strip just before the relevant activity commences and replace as soon as it is completed. • Refer to mitigation measures needed during the operational phase that are like the mitigation measures for impacts during the construction phase.	1998) National Water Act (Act 36 of 1998)	
Soil destruction and sterilization due to topsoil & subsoil stripping	Operation	No specific mitigation can be applied during the construction phase of the mine to prevent soil destruction, although an important measure should be the correct handling and stockpiling of topsoil.	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout operation phase
Loss of land capability due to topsoil & subsoil stripping	Operation	• The most desired approach during all the mining phases is to continually rehabilitate the soils to the best possible state – considering the current technology and knowledge available as well as the financial means to conduct such rehabilitation. The rehabilitation of soils to pre-mining conditions is basically	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural	Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		impossible though. Refer to section 11 of this document for a detailed discussion on the rehabilitation of topsoil after stripping. • Refer to mitigation measures needed during the operational phase that are like the mitigation measures for impacts during the construction phase • Refer to mitigation measures needed during the operational phase that are like the mitigation measures for impacts during the construction phase • Only a small area of the land should be used for mining at a time. Rehabilitation should take place on a continuous basis where after the land would become partially available again as grazing.	Resources Act (Act 43 of 1983)	
Construction of the co-disposal facilities • Diversion of runoff into the clean and dirty water system; • Discharge of clean water into the surrounding watercourse systems; and • Potential of malfunctioning of the dirty water system. • Increased flood peaks into the watercourse resulting from formalisation and concentration of surface runoff; and • Potential for erosion as a result of the formation of preferential flow paths, leading to loss of soil material and disruption of hillslope processes;	Operation	• The stormwater outlet should be include energy dissipating structures to slow down the velocity of water inflow into the watercourse; and *After construction of the outlet, the area surrounding the outlet should be re-seeded with indigenous vegetation associated with watercourses of the region.	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)	Throughout operation phase
Operation of topsoil stockpile areas • Soil disturbance by construction vehicle. • Soil Compaction resulting construction vehicles leading to increased overland flow; • Alteration of natural hydrological regime; and • Loosening of soil particles resulting in loss of soil through	Operation	• Exposed soils to be protected by suitable covering; • Vegetate the stockpiles to minimise soil loss; • Erosion control measure should be put in place; and • Duration of impacts must be minimised.	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)	Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
erosion.				
Operation of the conveyor and service road • Loosening of soil within the wetland • Increased overland flow as a result of compaction caused by vehicular movement; and • Potential for erosion, leading to sedimentation of the downgradient wetlands.	Operation	• Dirty water areas should be kept as small as possible and should be done progressively to ensure that adequate surface runoff reaches the wetland systems; • The stormwater outlet should be include energy dissipating structures to slow down the velocity of water inflow into the watercourse; and • After construction of the outlet, the area surrounding the outlet should be re-seeded with indigenous vegetation associated with watercourses of the region.	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)	Throughout operation phase
Operation and maintenance of the pollution control dam and stormwater management system • Diversion of runoff into the clean and dirty water system; • Discharge of clean water into the surrounding watercourse systems; and • Potential of malfunctioning of the dirty water system. resulting from stormwater containment, leading to: • Increased flood peaks as a result of formalisation and concentration of surface runoff; • Potential for erosion, leading to sedimentation of the downgradient wetlands; • Reduction in volume of water entering the wetlands, leading to loss of recharge of the downgradient wetlands; • Altered vegetation communities due to moisture stress. • Potential for erosion as a result of the formation of preferential flow paths, leading to loss of soil material and disruption of	Operation	• Dirty water areas should be kept as small as possible and should be done progressively to ensure that adequate surface runoff reaches the wetland systems; • The stormwater outlet should be include energy dissipating structures to slow down the velocity of water inflow into the watercourse; and • After construction of the outlet, the area surrounding the outlet should be re-seeded with indigenous vegetation associated with watercourses of the region.	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)	Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
hillslope processes; • Loss of catchment yield				
<u>Operation of co disposal facility 2</u> • Diversion of runoff away from the wetland downgradient • Loss of recharge which may likely lead to impact you the functionality of the wetland	Operation	• Ensure that the runoff volumes reporting to the adjacent wetland is not altered.	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)	Throughout operation phase
Vehicle activity on paved and unpaved roads could result in gaseous and particulate emissions; fugitive dust	Operation	• Maintenance of vehicles and wet suppression or chemical treatment on unpaved road surfaces.	National Environmental Management: Air Quality Act (Act 39 of 2004) National Dust Control Regulations (GN R827 of 2013)	Throughout operation phase
Materials handling	Operation	Wet suppression where feasible on materials handling activities and reducing drop height. Enclosure or wet suppression on crushing activities.		Throughout operation phase
Wind erosion	Operation	Wet suppression where feasible. Stabilisation (chemical, rock cladding or vegetative) of tailings facility.		Throughout operation phase
<u>Effects on the R4 – R6</u> Community and mine office Area during daytime operations include water pumps, material deposition and vehicular noise (in particular reverse warning)	Operation	• An Environmental Noise Measurement Programme (Monitoring Programme) needs to be implemented. • Onsite noise measurements are conducted by the occupational health team to help identify any fault or loud equipment that may require enclosures or maintenance. It should be conducted at a frequency determined by the project team or risk assessment team. • Ensure good public relations and communications. The mine should appoint a mine contact where any noise complaints could be registered. Noise complaints should be logged and further investigated by an environmental officer.	National Noise Control Regulations (GN R154 of 1992) SANS Noise Standards (SANS 10103:2008)	Throughout operation phase
<u>Effects on the R4 – R6</u> Community and mine office Area during daytime operations include water pumps, material deposition and vehicular noise (in particular reverse warning)	Operation	• Pumps should not generate a noise level higher than 85dBA. • Pumps should be in an enclosure if within direct line of sight of receptors R2 – R6. • If a pump is to be located at the dam or tailings facility (and not at the mine) than the preferred locality is between the two footprints to ensure maximum distance between receptors and pump(s).	National Noise Control Regulations (GN R154 of 1992) SANS Noise Standards (SANS 10103:2008)	Throughout operation phase
<u>Effects on the R1 Waterkloof</u> Community of Night-time operations include water pumps, material deposition and vehicular noise (in particular reverse	Operation	A berm or acoustical barrier is proposed to be constructed and in relation to receptors R1. The berm should be implemented on the footprint of the waste rock facility. If this option is not technically feasible (i.e. not enough area for a berm), then the slope of the of the Waste Rock Dump must	National Noise Control Regulations (GN R154 of 1992) SANS Noise Standards (SANS 10103:2008)	Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
warning)		act as a screen in relation to receptors R1. The following specifications should be noted: • The berms should be solid (aggregate, brick etc. no foliage e.g. trees); • The height should be a minimum of two (2) meter higher than the highest noise source (e.g. equipment exhaust) from the noise area to the receptors visual; • Berms or the selected acoustical barrier should sufficiently enclose all sides of the mining area when facing a receptor with no gaps, entrances or apertures facing I&AP's. • Any area where a tip is to be implemented should not be higher than a berm (and in relation to a receptor). • Daytime operations should be implemented with minimal work conducted during night-times (anytime past 20:00). • Contractors should install acoustical mufflers on the exhaust outlets of all heavy vehicles working on Waste Rock Dump footprint area close to receptors R1. • If Waste Rock Dumps are to be sloped, it should be done with the slope gradient facing away from receptor R1. • Reverse alarms on the Waste Rock Dump (from articulated haul trucks etc.) has the potential to cause a noise nuisance. Reversing on the Waste Rock Dump should be designed to ensure minimal use of reverse alarms. • The mine should consider reverse alarms that do not generate a high noise nuisance due to its tonality. Although heavy vehicle reverse alarms are exempt from noise legalization (GN R154) and needs to meet occupational health and safety standards, certain reverse alarms are less intrusive (less tonal more broadband character etc.).		
<u>Damage / Destruction to Heritage</u> Sites from digging foundations and trenches into sensitive deposits that are not visible at the surface.	Operation	• To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.	National Heritage Resources Act (Act 25 of 1999)	Throughout operation phase
Co-disposal of tailings and waste rock material from the mine to the Facility No. 1 via the conveyor system. Spread and compaction, using earthmoving machinery to form the required profile of the facility. Dust generated on the	Operation	• Apply effective dust suppression techniques, limit nighttime work and maintain good-housekeeping activities.	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning:	Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
conveyor system and by moving trucks that are visible from surrounding residential areas and public roads will result in the altering of the cumulative negative visual quality of the area. These activities which will also generate dust and will be intrusive in foreground views and visible in the middle ground and background from residential areas and farmsteads and sections of public roads. Night lighting during this phase.			Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)	
Growth of the Co-disposal facility as the mining progresses. Physical presence of the Co-disposal facility that alters the cumulative negative visual quality of the area. These activities which will also generate dust that will be intrusive in foreground views and visible in the middle ground and background from residential areas and farmsteads and sections of public roads.	Operation	• Apply effective dust suppression techniques, limit nighttime work and maintain good-housekeeping activities.	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)	Throughout operation phase
Night lighting of disposal activities and security lighting. Light pollution resulting in the alteration of the baseline visual quality and sense of place of the project site and its environs. Lights will be visible from nearby residential areas and public roads.	Operation	• Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the infrastructure. Light public movement areas (pathways and roads) with low level 'bollard' type lights and avoid post top lighting. Avoid high pole top security lighting. Use security lighting at the periphery of the site that is activated by movement and are not permanently switched on.	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)	Throughout operation phase
Mine Dewatering resulting in the reduction in groundwater resource availability	Operation	• Water volumes abstracted are low. Update mine water balance. Monitor abstraction rates. Grout (seal) water intersections	National Water Act (Act 36 of 1998)	Throughout operation phase
Abstraction from aquifer for mine	Operation	• Groundwater management plan. Mine water use minimisation.		Throughout operation phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
water supply		Mine water balance management and monitoring		
Seepage from CDF1 into vehicle decline shaft	Operation	• Currently minor seepage encountered on decline walls (believed to be grouted). Employ monitoring borehole between CDF1 and Decline shaft which can be pumped if required. CDF1 is a moist to dry structure (less seepage). Continual monitoring and review.	National Water Act (Act 36 of 1998) National Environmental Management Waste Act (Act 59 of 2008)	Throughout operation phase
Seepage from CDF1 into quarry	Operation	• The quarry could be utilised for seepage capture purposes if property rights are transferred to the mine. Alternatively, the quarry would need to be backfilled or seepage capture boreholes would need to be drilled between the quarry and CDF1 to minimize seepage. Continual quality monitoring (part of monitoring network) and review.		Throughout operation phase
Nitrate seepage from existing and new waste facilities (TSF, WRD and catchment dam) north to settlements and west towards the Sandspruit and to the groundwater system.	Operation	• Multiple barrier design and operation (toe seepage trenches, seepage capture boreholes). Continuous groundwater quality monitoring (additional monitoring boreholes). Co-disposal facilities are moist to dry structures (less seepage). Update and optimise monitoring protocol.	Hazardous Substances Act (Act 15 of 1973)	Throughout operation phase
TDS Mass seepage towards the Sandspruit and settlements from existing and new waste facilities along surface drainages and groundwater pathways.	Operation	• Same as above. Multiple barrier design and operation. Continuous groundwater quality monitoring.		Throughout operation phase
Sulphate, Ammonium and Chrome seepage from existing and new waste facilities to the groundwater system.	Operation	• Long term monitoring data (2006 - 2019) does not show major exceedance percentages above SANS for these parameters and therefore they are currently not an area of concern. Continuous groundwater quality monitoring for these parameters still required.		Throughout operation phase
Increased seepage from new and existing waste facilities towards the Sandspruit during flooding events due to increased runoff.	Operation	• Water quality monitoring from the Sandspruit and seepage capturing from non-perennial drainages. Diversion canals and re-enforcement of storage facilities. Continuous maintenance and monitoring.		Throughout operation phase
Soil erosion and sedimentation from demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site *Note that full rehabilitation of the opencast will be at final closure of the*	Decommissioning	• Cover disturbed soils as completely as possible, using vegetation or other materials; • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Sediment trapping, erosion and storm water control should be addressed by a hydrological engineer in a detailed storm	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout decommissioning phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
mine.		water management plan; • All aspects related to dust and air quality should be addressed by an air quality specialist in a specialist report; • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas; • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth; • Gravel roads must be well drained to limit soil erosion;		
Spreading and establishment of alien invasive species from demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Decommissioning	• Control involves killing the alien invasive plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. The control of these species should even begin prior to the construction phase considering that small populations of the AIS occur around the sites; • Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to site or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase; • Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish; • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds; • Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented; • A detailed plan should be developed for control of noxious weeds and invasive plants that could colonize the area because of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the way weeds spread, and methods for treating infestations.	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout decommissioning phase
Habitat degradation due to dust due to demolition of mining infrastructure / Cessation of mining	Decommissioning	• Daily dampening of dust areas or other dust suppression methods such as dust-aside or more environmentally friendly methods.	National Environmental Management Act (Act 107 of 1998)	Throughout decommissioning phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
/ rehabilitation of mining site / vehicle movement on site		• Re-vegetation of impacted areas is to be conducted on an on-going basis. • Place dust generating activities where maximum protection can be obtained from natural features. • Locating dust generating activities where prevailing winds will blow dust away from users. • Minimize the need to transport and handle materials by placing adequate storage facilities close to processing areas. • Minimize the re-handling of material which obviously has cost benefits as well. • Exposed material should be protected from the wind by keeping it within voids or protecting them by topographical features where possible. • Reduce the drop heights wherever practicable. • Protect activities from wind by erecting a screen or using a natural barrier. • All roads on site should be dampened or treated with a binding agent. • The general vehicle speed should be restricted as there is a direct relationship between the speed and vehicle entrained emissions. • Monitoring, modelling and emission measurements should be regarded as complementary components in any integrated approach to exposure assessment or determining compliance against air quality criteria.	National Dust Control Regulations (GN R827 of 2013)	
Spillages of harmful substances due to Heavy machinery and vehicle movement on site	Decommissioning	• Ensure that mining related waste or spillage and effluent do not affect the sensitive habitat boundaries and associated buffer zones. • This risk of spillages of reagents and hydrocarbons on the soil during transportation can be reduced with proper maintenance of vehicles. This would include a rigorous and proactive maintenance program • This risk can be further reduced through an adequate program of training of drivers and crews. This would include defensive driver training, basic vehicle maintenance, and emergency control of spills. For the vehicle crews to be adequately able to control any spills at an early stage, the vehicles must be properly equipped with spill containment equipment (booms, sandbags, spades, absorbent pads, etc.). Responsibility for	National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)	Throughout decommissioning phase

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		training lies with the transport contractor. Adequate training, maintenance, and equipment of transport crews should be included as a requirement for transport contracts. • All employees will be trained in cleaning up of a spillage. The necessary spill kits containing the correct equipment to clean up spills will be made available at strategic points in the plant area		
Road mortalities of fauna / impact of human activities on site due to Heavy machinery and vehicle movement on site	Decommissioning	• More fauna is normally killed the faster vehicles travel. A speed limit should be enforced as determined by the mine environmental manager. It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences). • Travelling at night should be avoided or limited as much as possible. No travelling at night should be allowed without approval by site manager; • Lights should be positioned 5m from the roads or paved areas.	National Environmental Management Act (Act 107 of 1998) National Environmental Management Biodiversity Act (act 10 of 2004)	Throughout decommissioning phase
Soil erosion and sedimentation due to demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Decommissioning	• Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout decommissioning phase
Soil compaction Heavy machinery and vehicle movement on site	Decommissioning	• Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	Throughout decommissioning phase
Dust generated during rehabilitation activities	Decommissioning	• Wet suppression where feasible	National Environmental Management: Air Quality Act (Act 39 of 2004) National Dust Control Regulations (GN R827 of 2013)	Throughout decommissioning phase
Demolition of the structure	Decommissioning	• Wet suppression where feasible		Throughout decommissioning phase
Tailpipe emissions from the vehicles used during the closure phase resulting in gaseous and particulate emissions; fugitive dust	Decommissioning	• Maintenance of vehicles and wet suppression on unpaved road surfaces.		Throughout decommissioning phase
Effect on R1 Waterkloof community of Daytime Construction	Decommissioning	• Ensure good public relations and communications. The mine should appoint a mine contact where any noise complaints could be registered. Noise complaints should be logged and further investigated by an environmental officer.	National Noise Control Regulations (GN R154 of 1992) SANS Noise Standards (SANS	Throughout decommissioning phase
Effect on R4 – R6	Decommissioning			Throughout

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Community and mine office area of Daytime Construction		• A representative should inform receptors R1 Waterkloof community of any noisy related construction activities to be conducted that is not behind a berm or screen (i.e. direct line of sight), highlighting the times and dates that construction activities are to occur and the extent of noise to be generated. • No night-time work should be conducted without the berm or barrier fully obscuring the receptors to the Waste Rock Dump activities	10103:2008)	decommissioning phase
Cutting back of slopes on Co-disposal facility no. 1 and movement of this material to Facility no. 2 at the existing TSF site. Removal of topsoil from the stockpile to rehabilitate CDF no. 1. Improvement of the visual quality and sense of place of the project area visible from nearby residences areas and public roads.	Decommissioning	• Apply effective dust suppression techniques and no work to occur at night. Plant a row of evergreen trees along the road between Waterkloof and the existing TSF during the start-up phase such that they will gain maturity over the life of the project.	Apply effective dust suppression techniques and no work to occur at night. Plant a row of evergreen trees along the road between Waterkloof and the existing TSF during the start up phase such that they will gain maturity over the life of the project.	Throughout decommissioning phase
Final shaping of CDFs and maintenance of rehabilitated areas The final shaping (dust creation) and rehabilitation process that improves the visual quality of the area relative to the operational phase. These activities will be visible from nearby residential and homestead areas as well as public roads.	Decommissioning	• Apply effective dust suppression techniques and no work to occur at night. Plant a row of evergreen trees along the road between Waterkloof and the existing TSF during the start-up phase such that they will gain maturity over the life of the project.	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)	Throughout decommissioning phase
TDS & Nitrate leaching from new mine residue facilities..	Decommissioning	• Rehab mine residue facilities (phytoremediation). Source term and pathways is not significant. Nitrate decays with time. Majority of TDS consists of Ca, Mg, HCO3 and CO3	National Water Act (Act 36 of 1998) National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)	Throughout decommissioning phase
Mine re-watering and decanting	Decommissioning	• Mine water quality not deleterious. Seal shafts.		Throughout decommissioning phase
Soil erosion and sedimentation due to exposed surfaces /	Post closure	• Plant vegetation species for rehabilitation that will effectively bind the loose material and which can absorb run-off from	National Environmental Management Act (Act 107 of	Until such time that vegetation cover is self-sustaining.

ACTIVITIES	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
unrehabilitated areas on site post closure / poor monitoring during LoM *Note that full rehabilitation of the opencast will be at final closure of the mine.*		the mining areas. • Rehabilitate all the land where infrastructure has been demolished. • Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. • Protect rehabilitation areas until the area is self-sustaining. • Diversion trenches and storm water measures must be maintained • Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • The mining areas will be shaped to make it safe. • All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till closure of the mine is approved. • Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens.	1998) Conservation of Agricultural Resources Act (Act 43 of 1983)	
Spreading and establishment of alien invasive species due to exposed surfaces / poor monitoring of revegetation on site	Post closure			
Wind erosion from open areas	Post closure	• Vegetation of open areas.	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)	
Rehabilitation of all exposed areas and growth of grasses and vegetation (management and maintenance) resulting in the improvement of the visual quality and sense of place of the project area over the operational phase, visible from nearby residences as well as public roads.	Post closure	• Effective management of rehabilitated areas such that the grassed (hydroseeded) areas and tree screen are established and permanently sustainable		

8 IMPACT MANAGEMENT OUTCOMES

The impact management outcomes defined in Table 4, indicate the standard of impact management required for the aspects of the Glencore Kroondal operations.

Table 4: Impact management outcomes

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
Planning activities including: **• Site design and layout** **• Baseline information** **• PGM plant and** **• Tailings facilities**	Delay of mining onset	Eradication of protected trees / flora through permit application	Planning	• Apply and obtain permits from environmental authorities.	Impact avoided
		Obtaining of IWUL for crossings (wetland soils) and mining layout on sensitive soils	Planning		
	Existing ambient (air quality) baseline	PM10 and PM2.5	Planning	• Control by implementing best engineering practices	Impact reduced due to design considerations management measures and rehabilitation standards
	Loss of land capability	Topsoil & subsoil stripping	Construction	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Spreading and establishment of alien invasive species	Vegetation clearing / vehicle movement	Construction	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Habitat degradation due to dust	Vegetation clearing / vehicle movement	Construction	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing areas, protection of exposed material, speed limits and a monitoring program.	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Spillages of harmful substances	Heavy machinery and vehicle movement on site	Construction	• Control through appropriate storage of harmful substances, handling of hazardous material and waste, maintenance of vehicles and staff training.	Impact reduced by implementing best-practice management measures
	Road mortalities of fauna / impact of human activities on site	Heavy machinery and vehicle movement on site; Construction of infrastructure, roads etc. on site	Construction	• Control through speed limit and avoiding travelling at night, and lights should be positioned 5m from the roads or paved areas.	Impact reduced by implementing best-practice management measures

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Impediment of flow patterns	Clearing of vegetation for conveyor construction through wetlands and water courses	Construction	• Control through a Water Use Authorisation, no unnecessary activities within the 1 in 100 year flood line, working during the dry season, scheduled maintenance to ensure functioning of structures. • Prevention through appropriate design to minimise impacts on the natural flow	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Construction of the disposal facility 1 • Removal of vegetation and excavation of soil material. • Ground-breaking and earthworks relating to foundations and trenches for	• Loss of catchment yield resulting from the separation of clean and dirty water areas. • Increased flood peaks as a result of formalisation and concentration of surface runoff in clean water diversion structures. • Exposure of soils, leading to increased runoff, loss of soil through erosion and	Construction	• Control through capture of clean water runoff and protection (energy dissipation structures) of watercourse erosion arising from the discharge of stormwater.	Impact reduced by implementing best-practice management measures and rehabilitation standards
Site establishment activities including: • **Vegetation clearance and excavations** • **Topsoil stripping & stockpiling** • **Site compaction** • **Spreading and establishment of alien invasive species** • **Fuel storage** • **Vehicle movement including Waste management**	Habitat destruction / fragmentation of fauna habitats	Clearing of vegetation for construction of infrastructure (including roads and conveyor through wetlands), causing direct habitat destruction / fragmentation of terrestrial and wetland habitats	Construction	• Avoidance of sensitive ecological areas • Control through removal of vegetation only in the construction footprint areas, and remedy by rehabilitation of disturbed areas	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Soil compaction	Heavy machinery and vehicle movement on site	Construction	• Avoidance of sensitive ecological areas • Control through removal of vegetation only when it is dry, at the onset of construction and within the construction footprint areas, and remedy by rehabilitation of disturbed areas	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Soil erosion and sedimentation	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Construction	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced by implementing best-practice management measures and rehabilitation standards

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Soil destruction and sterilization • stormwater separations; and • Mixing and casting of concrete for construction purposes; and • Soil disturbance as part of ground preparation.	Topsoil & subsoil stripping subsequent loss of wetland recharge soils. • Soil compaction and crusting, leading to increased runoff and reduced infiltration rate and subsequent reduction subsurface flows in the vadose zone; and • Impacts on the hillslope processes supporting the watercourse downstream	Construction	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced by implementing best-practice
	Construction of stockpile areas • Ground preparation leading to disturbance of soils	Loss of surface area for overland flow reporting to the adjacent watercourse	Construction	• Control through the protection of exposed soils, rehabilitation and erosion prevention	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Construction of the conveyor and service road • Topsoil removal as part of excavation and stripping.	• Exposure of soils, leading to increased runoff, loss of soil through erosion and stream incision of the wetlands, and subsequent loss of wetland recharge soils; *Soil compaction and crusting, leading to increased runoff and reduced; and infiltration rate and subsequent reduction subsurface flows in the vadose zone.	Construction	• Control through the protection of exposed soils, rehabilitation and erosion prevention	Impact reduced by implementing best-practice management measures and rehabilitation standards

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Construction of pollution control dam and stormwater management infrastructure • Topsoil stripping as part of the site preparation • Excavation and Construction of clean and dirty water separation systems / stormwater management systems around the downgradient	• Disturbance of soil leading to soil erosion	Construction	• Control through the protection of exposed soils, rehabilitation and erosion prevention	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Construction of co disposal facility 2 • Excavation and stripping of soils.	• Containment of the runoff reporting to the wetland	Construction	• Control of runoff into the adjacent drainage line is minimised.	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Transport and general construction activities	Gaseous and particulate emissions; fugitive dust	Construction	• Control through adequate vehicle maintenance as well as dust suppression.	Impact reduced by implementing best-practice management measures
	Clearing of groundcover and levelling of area	PM10 and PM2.5	Construction	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing areas, protection of exposed material, speed limits and a monitoring programme.	Impact reduced by implementing a monitoring programme to tailor management measures
	Materials handling	PM10 and PM2.5	Construction		
	Wind erosion from open areas	PM10 and PM2.5	Construction		
	Daytime construction	R1 Waterkloof community	Construction	• Control through management of public relations, addressing complaints, restricting construction to	Impact reduced by implementing best-

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	noise			work times	practice management measures
	Daytime construction noise	R4 – R6 Community and mine office area	Construction		
	Damage / Destruction to Heritage Sites	Digging foundations and trenches into sensitive deposits that are not visible at the surface.	Construction	• Control through monitoring of potential heritage features	Impact reduced by implementing best-practice management measures
	Preparation and earthworks for topsoil, co-disposal facility no. 1 area, PCD and conveyor system route. This involves mostly topsoil stripping and depositing in the two topsoil stockpile locations.	Exposure of earth at the activity sites (stark contrast with existing landscape character) and the generation of dust that results in a minor alteration the visual quality and sense of place of areas immediately around the project site. These activities will be visible in foreground and middle ground views from some residential areas, farms and public roads. Night lighting during this phase.	Construction	• Control through rehabilitation and revegetation, dust suppression	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Contamination to ground- and surface water systems from oil, grease and diesel spillages from construction vehicles.	Contamination to groundwater systems	Construction	• Control through road compaction and service facilities for mine vehicles with spillage sumps.	Impact reduced by implementing best-practice management measures and rehabilitation standards
	On-site sanitation.	Contamination to groundwater systems	Construction	• Control through monitoring systems to detect leaking as well as visual observations of facility conditions	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Storage of chemicals and building materials during construction of waste facilities.	Contamination to groundwater systems	Construction	• Control through monitoring systems to detect leaking as well as visual observations of facility conditions	Impact reduced by implementing best-practice management measures and rehabilitation standards

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Expectations regarding the creation of new opportunities / jobs	Risks to the project related to the community's perception about the given project in terms of job opportunities and the social acceptability of the project.	Construction	• Control through ongoing Stakeholder Engagement	Impact reduced by implementing best-practice management measures
Operation activities including: • **Transporting of rock material** • **Material crushing** • **Vehicle movement including** • **Waste generation and management** • **PGM Plant** • **Tailings facilities**	Habitat destruction / fragmentation of fauna habitats	Storage of tailings and disposal of Waste rock on CDF, laydown areas of stockpiles	Operation	• Avoidance of sensitive ecological areas • Control through removal of vegetation only in the construction footprint areas, and remedy by rehabilitation of disturbed areas	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Soil compaction	Heavy machinery and vehicle movement on site	Construction	• Avoidance of sensitive ecological areas • Control through removal of vegetation only when it is dry, at the onset of construction and within the construction footprint areas, and remedy by rehabilitation of disturbed areas	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Soil erosion and sedimentation	Increased hardened surfaces around infrastructure and exposed areas around laydown areas of CDFs and stockpiles	Operation	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Soil destruction and sterilization	Topsoil & subsoil stripping	Construction	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Loss of land capability	Topsoil & subsoil stripping	Construction	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Spreading and establishment of alien invasive species	Heavy machinery and vehicle movement on site	Operation	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Habitat degradation due to dust	Heavy machinery and vehicle movement on site	Operation	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing areas, protection of exposed material, speed limits and a monitoring	Impact reduced by implementing best-practice management measures and rehabilitation standards

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				programme.	
	Spillages of harmful substances	Heavy machinery and vehicle movement on site	Operation	• Control through appropriate storage of harmful substances, handling of hazardous material and waste, maintenance of vehicles and staff training.	Impact reduced by implementing best-practice management measures and training programmes
	Road mortalities of fauna / impact of human activities on site	Heavy machinery and vehicle movement on site; workers accommodated on site causing poaching, wood collection, fires etc.	Operation	• Control through speed limit and avoiding travelling at night, and lights should be positioned 5m from the roads or paved areas.	Impact reduced by implementing best-practice management measures
	Construction of the disposal facility 1 • Diversion of runoff into the clean and dirty water system; • Discharge of clean water into the surrounding watercourse systems; and • Potential of malfunctioning of the dirty water system.	• Increased flood peaks into the watercourse resulting from formalisation and concentration of surface runoff; and • Potential for erosion as a result of the formation of preferential flow paths, leading to loss of soil material and disruption of hillslope processes;	Operation	• Control through rehabilitation as well as the installation of energy dissipating structures in the stormwater outlet	Impact reduced due to design considerations

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Operation of stockpile area • Soil disturbance by construction vehicle.	• Soil Compaction resulting construction vehicles leading to increased overland flow; • Alteration of natural hydrological regime; and • Loosening of soil particles resulting in loss of soil through erosion.	Operation	• Control through the protection of exposed soils, rehabilitation and erosion prevention	Impact reduced by implementing best-practice management measures and rehabilitation standards
	Operation of the conveyor and service road • Loosening of soil within the wetland	• Increased overland flow as a result of compaction caused by vehicular movement; and • Potential for erosion, leading to sedimentation of the downgradient wetlands.	Operation	• Control through rehabilitation and installation of energy dissipating structures in the stormwater outlet as well as minimising the dirty water areas on site.	Impact reduced due to design considerations

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Operation and maintenance of the pollution control dam, stormwater management system and plant area • Diversion of runoff into the clean and dirty water system; • Discharge of clean water into the surrounding watercourse systems; and • Potential of malfunctioning of the dirty water system.	• Loss of catchment yield resulting from stormwater containment, leading to: • Increased flood peaks as a result of formalisation and concentration of surface runoff; • Potential for erosion, leading to sedimentation of the downgradient wetlands; • Reduction in volume of water entering the wetlands, leading to loss of recharge of the downgradient wetlands; • Altered vegetation communities due to moisture stress. • Potential for erosion as a result of the formation of preferential flow paths, leading to loss of soil material and disruption of hillslope processes;	Operation	• Control through rehabilitation and installation of energy dissipating structures in the stormwater outlet as well as minimising the dirty water areas on site.	Impact reduced due to design considerations
	Operation of co disposal facility 2 • Diversion of runoff away from the wetland downgradient	• Loss of recharge which may likely lead to impact you the functionality of the wetland	Operation	• Control through prevention of water runoff into adjacent wetlands.	Impact reduced due to design considerations

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Vehicle activity on paved and unpaved roads	Gaseous and particulate emissions; fugitive dust	Operation	• Control through adequate vehicle maintenance as well as dust suppression.	Impact reduced by implementing best-practice management measures
	Materials handling	PM10 and PM2.5	Operation	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing areas, protection of exposed material, speed limits and a monitoring programme.	Impact reduced by implementing best-practice management measures
	Wind erosion	PM10 and PM2.5	Operation		
	Daytime construction noise	R1 Waterkloof community	Construction	• Control through the implementation of a noise monitoring programme management of public relations, addressing complaints	Impact reduced by implementing best-practice management measures
	Daytime construction noise	R4 – R6 Community and m ine office area	Construction	• Control through maintaining operational noise below 85dBA	Impact reduced by implementing best-practice management measures
	Night-time operations	R1 Waterkloof community	Operation	• Prevention and control through the installation of an acoustical barrier, no night time work.	Impact reduced due to design considerations and by implementing best-practice management measures
	Damage / Destruction to Heritage Sites	Digging foundations and trenches into sensitive deposits that are not visible at the surface.	Operation	• Control through monitoring of potential heritage features	Impact reduced by implementing best-practice management measures

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Co-disposal of tailings and waste rock material from the mine to the Facility No. 1 via the conveyor system. Spread and compaction, using earthmoving machinery to form the required profile of the facility.	Dust generated on the conveyor system and by moving trucks that are visible from surrounding residential areas and public roads will result in the altering of the cumulative negative visual quality of the area. These activities which will also generate dust and will be intrusive in foreground views and visible in the middle ground and background from residential areas and farmsteads and sections of public roads. Night lighting during this phase.	Operation	• Control through dust suppression, limiting night work and maintaining good housekeeping	Impact reduced by implementing best-practice management measures
	Growth of the Co-disposal facility as the mining progresses.	Physical presence of the Co- disposal facility that alters the cumulative negative visual quality of the area. These activities which will also generate dust that will be intrusive in foreground views and visible in the middle ground and background from residential areas and farmsteads and sections of public roads.	Operation	• Control through dust suppression, limiting night work and maintaining good housekeeping	Impact reduced by implementing best-practice management measures
	Night lighting of disposal activities and security lighting.	Light pollution resulting in the alteration of the baseline visual quality and sense of place of the project site and its environs. Lights will be visible from nearby residential areas and public roads.	Operation	• Control through using light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the infrastructure. Light public movement areas (pathways and roads) with low level 'bollard' type lights and avoid post top lighting. Avoid high pole top security lighting. Use security lighting at the periphery of the site that is activated by movement and are not permanently switched on.	Impact reduced due to design considerations and by implementing best-practice management measures

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Mine Dewatering	Reduction in groundwater resource availability	Operation	• Control through keeping water abstraction volumes low. Update mine water balance. Monitor abstraction rates. Grout (seal) water intersections	Impact reduced by implementing best-practice management measures
	Abstraction from aquifer for mine water supply	Abstraction from aquifer for mine water supply	Operation	• Control through groundwater management plan. Mine water use minimisation. Mine water balance management and monitoring	Impact reduced by implementing best-practice management measures
	Seepage from CDF1 into vehicle decline shaft	Seepage from CDF1 into vehicle decline shaft	Operation	• Control through monitoring borehole between CDF1 and Decline shaft which can be pumped if required. CDF1 is a moist to dry structure (less seepage). Continual monitoring and review.	Impact reduced by implementing best-practice management measures
	Seepage from CDF1 into quarry	Seepage from CDF1 into quarry	Operation	• Control through using the quarry for seepage capture purposes if property rights are transferred to the mine. Alternatively, the quarry would need to be backfilled or seepage capture boreholes would need to be drilled between the quarry and CDF1 to minimize seepage. Continual quality monitoring (part of monitoring network) and review.	Impact reduced due to design considerations and by implementing best-practice management measures
	Nitrate seepage from existing and new waste facilities (TSF, WRD and catchment dam) north to settlements and west towards the Sandspruit and to the groundwater system.	Nitrate seepage from existing and new waste facilities (TSF, WRD and catchment dam) north to settlements and west towards the Sandspruit and to the groundwater system.	Operation	• Control through multiple barrier design and operation (toe seepage trenches, seepage capture boreholes). Continuous groundwater quality monitoring (additional monitoring boreholes). Co-disposal facilities are moist to dry structures (less seepage). Update and optimise monitoring protocol.	Impact reduced due to design considerations and by implementing best-practice management measures
	TDS Mass seepage towards the Sandspruit and settlements from existing and new waste facilities along surface drainages and groundwater pathways.	TDS Mass seepage towards the Sandspruit and settlements from existing and new waste facilities along surface drainages and groundwater pathways.	Operation	• Same as above. Multiple barrier design and operation. Continuous groundwater quality monitoring.	Impact reduced due to design considerations and by implementing best-practice management measures

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Sulphate, Ammonium and Chrome seepage from existing and new waste facilities to the groundwater system.	Sulphate, Ammonium and Chrome seepage from existing and new waste facilities to the groundwater system.	Operation	• Control through monitoring.	Impact reduced due to implementing best-practice management measures
	Increased seepage from new and existing waste facilities towards the Sandspruit during flooding events due to increased runoff.	Increased seepage from new and existing waste facilities towards the Sandspruit during flooding events due to increased runoff.	Operation	• Control through water quality monitoring from the Sandspruit and seepage capturing from non-perennial drainages. Diversion canals and re-enforcement of storage facilities. Continuous maintenance and monitoring.	Impact reduced due to design considerations and by implementing best-practice management measures
	Direct employment opportunities and skills development	The creation of employment opportunities and skills development opportunities during the construction phase for the local economy	Operation	• Employ local labour	Benefit to local community
	Economic multiplier effects	Opportunities for local businesses to provide services and goods.	Operation	• Utilise local businesses	Benefit to local community
Decommissioning activities including: **• Rehabilitation** **•Demolition and removal of building rubble** **• Vehicle movement for rubble haulage and for site profiling** **Note: Currently the final land use is agricultural grazing based on the baseline conditions. However, considering the relatively low agricultural capacity the Closure Report recommends light**	Improvement of habitat through revegetation / succession over time and improvement of eroded soils and compaction	Rehabilitation of mining site	Closure and Decommissioning	• Control through rehabilitation including revegetation and stabilising all disturbed areas as soon as possible	Impact reduced due to implementing best-practice management measures and rehabilitation standards
	Soil compaction	Heavy machinery and vehicle movement on site	Closure and Decommissioning	• Avoidance of sensitive ecological areas • Control through removal of vegetation only when it is dry, at the onset of construction and within the construction footprint areas, and remedy by rehabilitation of disturbed areas	Impact reduced due to implementing best-practice management measures and rehabilitation standards
	Soil erosion and sedimentation	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Closure and Decommissioning	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced due to implementing best-practice management measures and rehabilitation standards

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
industrial as final land use.	Spreading and establishment of alien invasive species	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Closure and Decommissioning	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Impact reduced due to implementing best-practice management measures and rehabilitation standards
	Habitat degradation due to dust	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site / vehicle movement on site	Closure and Decommissioning	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing areas, protection of exposed material, speed limits and a monitoring programme.	Impact reduced due to implementing best-practice management measures and rehabilitation standards
	Spillages of harmful substances	Heavy machinery and vehicle movement on site	Closure and Decommissioning	• Control through appropriate storage of harmful substances, handling of hazardous material and waste, maintenance of vehicles and staff training.	Impact reduced due to implementing best-practice management measures
	Road mortalities of fauna / impact of human activities on site	Heavy machinery and vehicle movement on site	Closure and Decommissioning	• Control through speed limit and avoiding travelling at night, and lights should be positioned 5m from the roads or paved areas.	Impact reduced due to design considerations and by implementing best-practice management measures
	Dust generated during rehabilitation activities	PM10 and PM2.5	Closure and Decommissioning	• Control through wet suppression	Impact reduced due to implementing best-practice management measures
	Demolition of the structure	PM10 and PM2.5	Closure and Decommissioning	• Control through wet suppression	Impact reduced due to implementing best-practice management measures
	Tailpipe emissions from the vehicles used during the closure phase	Gaseous and particulate emissions; fugitive dust	Closure and Decommissioning	• Control through maintenance of vehicles and wet suppression	Impact reduced due to implementing best-practice management measures
	Daytime Construction noise	R1 Waterkloof community	Closure and Decommissioning	• Control through management of public relations, addressing complaints, restricting construction to work times	Impact reduced due to implementing best-practice management measures
	Daytime Construction noise	R4 – R6 Community and mine office area	Closure and Decommissioning		

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Cutting back of slopes on Co-disposal facility no. 1 and movement of this material to Facility no. 2 at the existing TSF site. Removal of topsoil from the stockpile to rehabilitate CDF no. 1.	Improvement of the visual quality and sense of place of the project area visible from nearby residences areas and public roads.	Closure and Decommissioning	• Control through dust suppression, limiting night work and maintaining good housekeeping as well as planting a vegetation screen.	Impact reduced due to implementing best-practice management measures and rehabilitation standards
	Final shaping of CDFs and maintenance of rehabilitated areas	The final shaping (dust creation) and rehabilitation process that improves the visual quality of the area relative to the operational phase. These activities will be visible from nearby residential and homestead areas as well as public roads.	Closure and Decommissioning	• Control through rehabilitation including revegetation and stabilising all disturbed areas as soon as possible	Impact reduced due to implementing best-practice management measures and rehabilitation standards
	TDS & Nitrate leaching from new mine residue facilities.	TDS & Nitrate leaching from new mine residue facilities.	Closure and Decommissioning	• Control through rehabilitation of mine residue facilities (phytoremediation). Source term and pathways is not significant. Nitrate decays with time. Majority of TDS consists of Ca, Mg, HCO_3 and CO_3	Impact reduced due to implementing best-practice management measures
	Mine re-watering and decanting	Mine re-watering and decanting	Closure and Decommissioning	• Control water quality monitoring and seal shafts.	Impact reduced due to implementing best-practice management measures
	Job Losses	Impacts associated with loss of jobs of skilled and unskilled labour.	Closure and Decommissioning	• Control through ongoing stakeholder engagement	Impact reduced due to implementing best-practice management measures
Post closure activities including: **• Monitoring**	Improvement of habitat through revegetation / succession over time	Natural Successional processes	Post Closure	• Control through rehabilitation including revegetation and stabilising all disturbed areas, monitoring of the site to ensure success of rehabilitation	Impact reduced due to implementing best-practice management measures and rehabilitation standards
	Soil erosion and sedimentation	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Post Closure		

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	Spreading and establishment of alien invasive species	Exposed surfaces / poor monitoring of revegetation on site	Post Closure		
	Wind erosion from open areas	PM10 and PM2.5	Post Closure		
	Rehabilitation of all exposed areas and growth of grasses and vegetation (management and maintenance)	Improvement of the visual quality and sense of place of the project area over the operational phase, visible from nearby residences as well as public roads.	Post Closure	Control through the management of rehabilitated areas such that the grassed (hydroseeded) areas and tree screen are established and permanently sustainable	Impact reduced due to implementing best-practice management measures and rehabilitation standards

9 IMPACT MANAGEMENT ACTIONS

Table 5 provides a description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in section 5 above will be achieved.

Table 5: Impact management actions

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
9.1.1 PLANNING PHASE				
Planning activities including: **• Site design and layout** **• Baseline information**	Delay of mining onset	• Apply and obtain permits from environmental authorities.	Planning Phase	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998) Northwest Nature Conservation Ordinance (1983)
	Existing ambient (air quality) baseline	• Control by implementing best engineering practices		
Construction Phase				
Site establishment activities including: **• Vegetation clearance and excavations** **• Topsoil stripping & stockpiling** **• Site compaction** **• Spreading and establishment of alien invasive species** **• Fuel storage** **• Vehicle movement including** **• Waste management** **• PGM plant**	Habitat destruction / fragmentation of fauna habitats	• Avoidance of sensitive ecological areas • Control through removal of vegetation only in the construction footprint areas, and remedy by rehabilitation of disturbed areas	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) National Environmental Management Biodiversity Act (act 10 of 2004) Conservation of Agricultural Resources Act (Act 43 of 1983) Northwest Nature Conservation Ordinance (1983)
	Soil compaction	• Avoidance of sensitive ecological areas • Control through removal of vegetation only when it is dry, at the onset of construction and within the construction footprint areas, and remedy by rehabilitation of disturbed areas	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Soil erosion and sedimentation	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Soil destruction and sterilization	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout Construction Phase	National Environmental Management Act (Act 107 of

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
				1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Loss of land capability	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Spreading and establishment of alien invasive species	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Habitat degradation due to dust	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing areas, protection of exposed material, speed limits and a monitoring programme.	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) National Dust Control Regulations (GN R827 of 2013)
	Spillages of harmful substances	• Control through appropriate storage of harmful substances, handling of hazardous material and waste, maintenance of vehicles and staff training.	Throughout Construction Phase	National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)
	Road mortalities of fauna / impact of human activities on site	• Control through speed limit and avoiding travelling at night, and lights should be positioned 5m from the roads or paved areas.	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) National Environmental Management Biodiversity Act (act 10 of 2004)
	Impediment of flow patterns	• Control through a Water Use Authorisation, no unnecessary activities within the 1 in 100 year	Throughout Construction Phase	National Environmental Management Act (Act 107 of

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		flood line, working during the dry season, scheduled maintenance to ensure functioning of structures. • Prevention through appropriate design to minimise impacts on the natural flow		1998) National Water Act (Act 36 of 1998)
	Construction of the disposal facility 1 • Removal of vegetation and excavation of soil material; • Ground-breaking and earthworks relating to foundations and trenches for stormwater separations; and • Mixing and casting of concrete for construction purposes; and • Soil disturbance as part of ground preparation.	• Control through capture of clean water runoff and protection (energy dissipation structures) of watercourse erosion arising from the discharge of stormwater.	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)
	Construction of stockpile areas • Ground preparation leading to disturbance of soils	• Control through the protection of exposed soils, rehabilitation and erosion prevention	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Construction of the conveyor and service road • Topsoil removal as part of excavation and stripping.	• Control through the protection of exposed soils, rehabilitation and erosion prevention	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Construction of pollution control dam and stormwater management • Topsoil stripping as part of the site preparation • Excavation and Construction of clean and dirty water separation systems / stormwater management systems • Disturbance of soil leading to soil erosion	• Control through the protection of exposed soils, rehabilitation and erosion prevention	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Construction of co disposal facility 2 • Excavation and stripping of soils.	• Control of runoff into the adjacent drainage line is minimised.	Throughout Construction Phase	National Environmental Management Act (Act 107 of

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
				1998) Conservation of Agricultural Resources Act (Act 43 of 1983) National Water Act (Act 36 of 1998)
	Transport and general construction activities	• Control through adequate vehicle maintenance as well as dust suppression.	Throughout Construction Phase	National Environmental Management: Air Quality Act (Act 39 of 2004) National Dust Control Regulations (GN R827 of 2013)
	Clearing of groundcover and levelling of area	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing areas, protection of exposed material, speed limits and a monitoring programme.	Throughout Construction Phase	
	Materials handling		Throughout Construction Phase	
	Wind erosion from open areas		Throughout Construction Phase	
	Daytime construction noise	• Control through management of public relations, addressing complaints, restricting construction to work times	Throughout Construction Phase	National Noise Control Regulations (GN R154 of 1992) SANS Noise Standards (SANS 10103:2008)
	Daytime construction noise		Throughout Construction Phase	
	Damage / Destruction to Heritage Sites	• Control through monitoring of potential heritage features	Throughout Construction Phase	National Heritage Resources Act (Act 25 of 1999)
	Preparation and earthworks for topsoil, co- disposal facility no. 1 area, PCD and conveyor system route. This involves mostly topsoil stripping and depositing in the two topsoil stockpile locations.	• Control through rehabilitation and revegetation, dust suppression	Throughout Construction Phase	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)
	Contamination to ground- and surface water systems from oil, grease and diesel spillages from	• Control through road compaction and service facilities for mine vehicles with spillage sumps.	Throughout Construction Phase	National Water Act (Act 36 of 1998) National Environmental

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	construction vehicles.			Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)
	On-site sanitation.	• Control through monitoring systems to detect leaking as well as visual observations of facility conditions	Throughout Construction Phase	National Water Act (Act 36 of 1998) National Environmental Management Waste Act (Act 59 of 2008)
	Storage of chemicals and building materials during construction of waste facilities.	• Control through monitoring systems to detect leaking as well as visual observations of facility conditions	Throughout Construction Phase	National Water Act (Act 36 of 1998) National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)
	Expectations regarding the creation of new opportunities / jobs	• Control through ongoing Stakeholder Engagement	Throughout Construction Phase	N/a
Preparation of the site where plant, stockpile, storm water structures around the old tailings dams and loading areas will be constructed	Visual impact/Impact on sense of place	• Use vegetation, soil berms and other structures to "hide" mining infrastructure responsible for the impact • Remove structures which are not needed for the efficient operation of the Mine. • Place light fixtures to reduce glare and use LED technology where possible. • Continue to consult with neighbours to determine which structures needs attention.	Construction phase	National Environmental Management Waste Act (Act 59 of 2008)
	Impact on water resources	• All process water and return water from tailings dams should be contained and reused. All other 'dirty' water generated on site should be used preferentially to 'clean' make up water. • Water systems, such as drains, canals etc. will be designed to prevent pollution and minimise erosion or sedimentation • Linear infrastructure (roads and pipelines) will be inspected on a regular basis to check that the associated water management infrastructure is	Throughout construction phase	National Water Act (Act 36 of 1998) National Environmental Management Waste Act (Act 59 of 2008)

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		effective in controlling erosion. • All surface water management infrastructure constructed from soil (berms, canals and bunds) will be inspected on a regular basis, with more frequent inspections during periods of high rainfall and after major rainfall events. • Energy dissipaters will be constructed at points where there are concentrated discharges of water to the environment that can cause significant erosion. Where necessary, energy dissipaters will be placed within water channels to slow the speed of water to less than 1 m/s (wherever possible). •		
		• Energy dissipaters, such as rock packs and logs, will be placed in footpaths where there are signs of erosion. The footpaths will be inspected on a regular basis, with more frequent inspections during periods of high rainfall and after major rainfall events. • Clean water diversions and dirty water collection facilities will be established before land clearing and construction commences, to prevent clean rainfall runoff becoming contaminated by construction activities. The measures envisioned are simple soil berms to prevent clean runoff entering dirty areas and others to divert dirty water to settlement paddocks. • Dirty water drains will be sized to manage the 'dirty' water generated by a 1:50 year storm arising on contaminated areas (plant, shaft, pits, tailings dam, waste rock dumps, stockpiles, stores, workshops etc.). Dirty water will be directed into sumps or retention ponds, from where it can be returned to the process water circuit. The storage facilities will have a minimum freeboard of 0.8m above full supply level. • Dirty water systems will prevent water containing waste from entering water resources. The dirty water drains will be constructed of concrete or have an impermeable liner to ensure impermeability.	Throughout Construction and operation	

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		• Clean water diversion canals will be sized to divert runoff from upstream catchments around all contaminated areas. The clean runoff will be released into the natural watercourses downstream or the dirty area. Ideally, the release will be into the same catchment from which the water was diverted. • Clean water diversion canals will be sized to safely divert the 1:50 year flood event. • Construction material for clean water diversions will be at least compacted earth for areas with level gradients. These will be grassed to limit erosion. In steeper areas, the canals will be constructed from concrete, inert rock or other suitable material to act as erosion control and energy dissipaters. • The width and height of the drains will be determined to ensure compatibility with identified hydraulic requirements of the drain. • The Mine will keep water systems clear of obstructions, so drains will be inspected regularly. Unless problems are encountered during these inspections, the drains will be cleaned and maintained as necessary. • The water levels in the dirty water storage facilities will be kept low by recycling into process water circuit. This ensures the facility has enough capacity in the event of another severe rainfall event. • Pipelines that cross any watercourse and / or drainage line will allow the 1:50 year flood to safely pass without any risk of flooding or damming. • Existing and proposed mine residue deposits and water storage facilities will be designed and constructed under the supervision of appropriately qualified professional engineers. All mine deposits and water storage facilities will be maintained in a stable state and comply with relevant legislation.		
		• All drainage facilities will be checked regularly during the rainy season and any undue erosion or siltation, especially at discharge points, will be noted and repaired. The mine will identify the cause of	Throughout construction, operation and decommissioning.	

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		such undue erosion or siltation, and suitable remedial measures will be implemented. ▪ The mine will develop a monitoring program that defines a) the objectives of the monitoring exercise; b) the water quality compliance criteria, guidelines or targets to be used as a basis for assessing quality and fitness for use; c) the sampling points to be used; d) the collection method for samples; e) sample storage/preservation procedures; f) constituents to be analysed for; g) quality control procedures for analyses; h) reporting and data storage format.		
9.1.2 OPERATION PHASE				
Operation activities including: **• Transporting of rock material** **• Material crushing** **• Vehicle movement including** **• Waste generation and management**	Habitat destruction / fragmentation of fauna habitats	• Avoidance of sensitive ecological areas • Control through removal of vegetation only in the construction footprint areas, and remedy by rehabilitation of disturbed areas	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Soil compaction	• Avoidance of sensitive ecological areas • Control through removal of vegetation only when it is dry, at the onset of construction and within the construction footprint areas, and remedy by rehabilitation of disturbed areas	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Soil erosion and sedimentation	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Soil destruction and sterilization	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Loss of land capability	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout Operation Phase	National Environmental Management Act (Act 107 of

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
				1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Spreading and establishment of alien invasive species	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Habitat degradation due to dust	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing areas, protection of exposed material, speed limits and a monitoring programme.	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) National Dust Control Regulations (GN R827 of 2013) National Environmental Management Biodiversity Act (act 10 of 2004)
	Spillages of harmful substances	• Control through appropriate storage of harmful substances, handling of hazardous material and waste, maintenance of vehicles and staff training.	Throughout Operation Phase	National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)
	Road mortalities of fauna / impact of human activities on site	• Control through speed limit and avoiding travelling at night, and lights should be positioned 5m from the roads or paved areas.	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) National Environmental Management Biodiversity Act (act 10 of 2004)
	Construction of the disposal facility 1 • Diversion of runoff into the clean and dirty water system; • Discharge of clean water into the surrounding watercourse systems; and • Potential of malfunctioning of the	• Control through rehabilitation as well as the installation of energy dissipating structures in the stormwater outlet	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	dirty water system.			
	Operation of stockpile area • Soil disturbance by construction vehicle.	• Control through the protection of exposed soils, rehabilitation and erosion prevention	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Operation of the conveyor and service road • Loosening of soil within the wetland	• Control through rehabilitation and installation of energy dissipating structures in the stormwater outlet as well as minimising the dirty water areas on site.	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)
	Operation and maintenance of the pollution control dam and stormwater management system • Diversion of runoff into the clean and dirty water system; • Discharge of clean water into the surrounding watercourse systems; and • Potential of malfunctioning of the dirty water system.	• Control through rehabilitation and installation of energy dissipating structures in the stormwater outlet as well as minimising the dirty water areas on site.	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)
	Operation of co disposal facility 2 • Diversion of runoff away from the wetland downgradient	• Control through prevention of water runoff into adjacent wetlands.	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) National Water Act (Act 36 of 1998)
	Vehicle activity on paved and unpaved roads	• Control through adequate vehicle maintenance as well as dust suppression.	Throughout Operation Phase	National Environmental Management: Air Quality Act (Act 39 of 2004) National Dust Control Regulations (GN R827 of 2013)
	Materials handling	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing	Throughout Operation Phase	National Environmental Management: Air Quality Act (Act 39 of 2004) National Dust Control Regulations (GN R827 of 2013)
	Wind erosion		Throughout Operation Phase	

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		areas, protection of exposed material, speed limits and a monitoring programme.		
	Daytime construction noise	• Control through the implementation of a noise monitoring programme management of public relations, addressing complaints	Throughout Operation Phase	National Noise Control Regulations (GN R154 of 1992) SANS Noise Standards (SANS 10103:2008)
	Daytime construction noise	• Control through maintaining operational noise below 85dBA	Throughout Operation Phase	
	Night-time operations	• Prevention and control through the installation of an acoustical barrier, no night time work.	Throughout Operation Phase	
	Damage / Destruction to Heritage Sites	• Control through monitoring of potential heritage features	Throughout Operation Phase	National Heritage Resources Act (Act 25 of 1999)
	Co-disposal of tailings and waste rock material from the mine to the Facility No. 1 via the conveyor system. Spread and compaction, using earthmoving machinery to form the required profile of the facility.	• Control through dust suppression, limiting night work and maintaining good housekeeping	Throughout Operation Phase	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)
	Growth of the Co-disposal facility as the mining progresses.	• Control through dust suppression, limiting night work and maintaining good housekeeping	Throughout Operation Phase	
	Night lighting of disposal activities and security lighting.	• Control through using light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the infrastructure. Light public movement areas (pathways and roads) with low level 'bollard' type lights and avoid post top lighting. Avoid high pole top security lighting. Use security lighting at the periphery of the site that is activated by movement and are not permanently switched on.	Throughout Operation Phase	
	Mine Dewatering	• Control through keeping water abstraction volumes low. Update mine water balance. Monitor abstraction rates. Grout (seal) water intersections	Throughout Operation Phase	National Water Act (Act 36 of 1998)
	Abstraction from aquifer for mine water supply	• Control through groundwater management plan. Mine water use minimisation. Mine water balance management and monitoring	Throughout Operation Phase	
	Seepage from CDF1 into vehicle decline shaft	• Control through monitoring borehole between CDF1 and Decline shaft which can be pumped if required. CDF1 is a moist to dry structure (less	Throughout Operation Phase	National Water Act (Act 36 of 1998)

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		seepage). Continual monitoring and review.		National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)
	Seepage from CDF1 into quarry	• Control through using the quarry for seepage capture purposes if property rights are transferred to the mine. Alternatively, the quarry would need to be backfilled, or seepage capture boreholes would need to be drilled between the quarry and CDF1 to minimize seepage. Continual quality monitoring (part of monitoring network) and review.	Throughout Operation Phase	
	Nitrate seepage from existing and new waste facilities (TSF, WRD and catchment dam) north to settlements and west towards the Sandspruit and to the groundwater system.	• Control through multiple barrier design and operation (toe seepage trenches, seepage capture boreholes). Continuous groundwater quality monitoring (additional monitoring boreholes). Co-disposal facilities are moist to dry structures (less seepage). Update and optimise monitoring protocol.	Throughout Operation Phase	
	TDS Mass seepage towards the Sandspruit and settlements from existing and new waste facilities along surface drainages and groundwater pathways.	• Same as above. Multiple barrier design and operation. Continuous groundwater quality monitoring.	Throughout Operation Phase	
	Sulphate, Ammonium and Chrome seepage from existing and new waste facilities to the groundwater system.	• Control through monitoring.	Throughout Operation Phase	
	Increased seepage from new and existing waste facilities towards the Sandspruit during flooding events due to increased runoff.	• Control through water quality monitoring from the Sandspruit and seepage capturing from non-perennial drainages. Diversion canals and re-enforcement of storage facilities. Continuous maintenance and monitoring.	Throughout Operation Phase	
	Direct employment opportunities and skills development	• Employ local labour	Throughout Operation Phase	**N/a**
	Economic multiplier effects	• Utilise local businesses	Throughout Operation Phase	**N/a**
Operation of PGM plant and stockpile area	Impact on water resources	• Unused roads will be rehabilitated after construction while high traffic roads (access road) will be surfaced. Other roads still used by the Mine will be maintained and any new roads will have proper engineered designs to prevent erosion. This may include contour banks, erosion control	Throughout operational phase	National Water Act (Act 36 of 1998) National Environmental Management Waste Act (Act 59 of 2008)

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		measures such as stone walls across gullies and dongas and proper storm water diversion measures. As access roads will stretch along steep topography, road surfaces need to be properly maintained, and any runoff channelled from the surfaces via properly sized and designed culverts, to minimise erosion. • Road crossings will be sized to meet the National Drainage Manual requirements. • Embankments at watercourse crossings, within the flooding zone, will be protected against erosion. • Where culverts are used at crossings, the culverts will have downstream erosion protection and energy dissipaters to reduce flow rates to their original velocities. • Mine residue deposits, water storage facilities and plant infrastructure will be located above the 1:100-year flood line or at least 100 m from a watercourse, whichever is the greater. • The Mine will not locate any mining within the 1:50 year flood line or 100m of a watercourse, whichever is the greater. • All mine residue deposits will be designed and operated in accordance with the requirements of SABS 0286:1998 and the Mandatory Code of Practice for the Operation of Mine Residue Deposits (DME, 2000). • The tailings pipeline will be designed to minimise the risk to soils and watercourses along the pipeline route. • The rock dumps and water storage facilities will be inspected by a suitably qualified, professional civil engineer. A record of inspections will be kept. Will there be any signs of instability; appropriate remedial measures will be implemented timeously. • Spillways will be constructed in all mine residue return water dams and mine water storage facilities to ensure safe overflow of runoff arising from storm with a recurrence interval greater than 1:50. • Flow of water into mine workings will be minimised, for both safety and pollution prevention reasons.		

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		• The mine will not locate any sanitary convenience (sewage works), fuel depot or storage facility for anything which may cause pollution within the 1:50 year flood line of a watercourse. • All spillages within the reagent storage and makeup areas will be retained by the construction of bund walls. The bund will be capable of containing the bulk reagents independently and the bund wall will be lined/ treated to ensure that the reagents do not affect the integrity of the bund wall (e.g. acid proofing). Spillages within the bund can then be cleaned up and disposed of appropriately. • Spillages within the make-up areas will be pumped to the process water system. • The ore stockpiles will be kept on concrete or other impermeable hard standing, to prevent entry of pollutants into soils and groundwater and, through recharge, into surface water. • Oil/fuel storage facilities will be adequately bunded (110%), with no outlets to external drainage systems. Oil/fuel filling points will be located within the bund wall. Spilt or leaked oil will be contained and either reused or disposed of by a suitably qualified waste oil contractor. • Data from water quality monitoring and flow monitoring will be stored together electronically to enable trend analysis and waste load calculations to be carried out. • Monitoring of the water quality in the mine workings will take place until it can be demonstrated that the potential for contamination of the regional aquifer by poor quality leachate is low. • Surface and ground water monitoring sampling points will be sited to ensure that adequate baseline information can be collected, both upstream/ upgradient of the mine. During operation, the monitoring points will ensure information is collected to enable the mine to determine its potential impacts to surround water users and to identify problems before they occur, if possible.		

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		• To ensure consistency in monitoring, a sampling protocol will be prepared and adhered to. This will detail: a) where samples will be taken; b) the frequency of sampling; c) how samples will be taken; d) how flows will be measured at the time of sampling; e) the preparation of samples for analysis; f) the range of analysis required; g) the method of analysis; h) quality control on all aspects of the monitoring program; i) how results will be interpreted, stored and reported. • The people taking the samples, the laboratory carrying out the analysis and the people assessing the results will be kept informed of changes to the sampling protocol. • An accredited laboratory, with the necessary quality assurance, will carry out analysis of key samples and will have quality control measures in place (blanks, standards, duplicates, cation-anion balances etc.). This will ensure consistency in monitoring and the verification and validation of water quality data.		
9.1.3 DECOMMISSIONING PHASE				
Decommissioning activities including: **• Rehabilitation** **•Demolition and removal of building rubble** **• Vehicle movement for rubble haulage and for site profiling**	Improvement of habitat through revegetation / succession over time and improvement of eroded soils and compaction	• Control through rehabilitation including revegetation and stabilising all disturbed areas as soon as possible	Throughout decommissioning phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Soil compaction	• Avoidance of sensitive ecological areas • Control through removal of vegetation only when it is dry, at the onset of construction and within the construction footprint areas, and remedy by rehabilitation of disturbed areas	Throughout decommissioning phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Soil erosion and sedimentation	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout decommissioning phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	Spreading and establishment of alien invasive species	• Control through the delineation of the working area, rehabilitation, erosion and dust control	Throughout decommissioning phase	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Habitat degradation due to dust	• Control through dust suppression, appropriate re-vegetation of impacted areas, appropriate placement of dust generating activities where maximum protection can be obtained from natural features, minimizing the need to transport and handle materials by placing adequate storage facilities close to processing areas, protection of exposed material, speed limits and a monitoring programme.	Throughout decommissioning phase	National Environmental Management Act (Act 107 of 1998) National Dust Control Regulations (GN R827 of 2013)
	Spillages of harmful substances	• Control through appropriate storage of harmful substances, handling of hazardous material and waste, maintenance of vehicles and staff training.	Throughout decommissioning phase	National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)
	Road mortalities of fauna / impact of human activities on site	• Control through speed limit and avoiding travelling at night, and lights should be positioned 5m from the roads or paved areas.	Throughout decommissioning phase	National Environmental Management Act (Act 107 of 1998) National Environmental Management Biodiversity Act (act 10 of 2004)
	Dust generated during rehabilitation activities	• Control through wet suppression	Throughout decommissioning phase	National Environmental Management Act (Act 107 of 1998) National Dust Control Regulations (GN R827 of 2013)
	Demolition of the structure	• Control through wet suppression	Throughout decommissioning phase	
	Tailpipe emissions from the vehicles used during the closure phase	• Control through maintenance of vehicles and wet suppression	Throughout decommissioning phase	
	Daytime Construction noise	• Control through management of public relations, addressing complaints, restricting construction to work times	Throughout decommissioning phase	National Noise Control Regulations (GN R154 of 1992) SANS Noise Standards (SANS 10103:2008)
	Daytime Construction		Throughout decommissioning phase	

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
	noise			
	Cutting back of slopes on Co-disposal facility no. 1 and movement of this material to Facility no. 2 at the existing TSF site. Removal of topsoil from the stockpile to rehabilitate CDF no. 1.	• Control through dust suppression, limiting night work and maintaining good housekeeping as well as planting a vegetation screen.	Throughout decommissioning phase	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)
	Final shaping of CDFs and maintenance of rehabilitated areas	• Control through rehabilitation including revegetation and stabilising all disturbed areas as soon as possible	Throughout decommissioning phase	
	TDS & Nitrate leaching from new mine residue facilities.	• Control through rehabilitation of mine residue facilities (phytoremediation). Source term and pathways is not significant. Nitrate decays with time. Majority of TDS consists of Ca, Mg, HCO_3 and CO_3	Throughout decommissioning phase	National Water Act (Act 36 of 1998) National Environmental Management Waste Act (Act 59 of 2008) Hazardous Substances Act (Act 15 of 1973)
	Mine re-watering and decanting	• Control water quality monitoring and seal shafts.	Throughout decommissioning phase	
	Job Losses	• Control through ongoing stakeholder engagement	Throughout decommissioning phase	
9.1.4 POST CLOSURE PHASE				
Post closure activities including: • Monitoring	Improvement of habitat through revegetation / succession over time	• Control through rehabilitation including revegetation and stabilising all disturbed areas, monitoring of the site to ensure success of rehabilitation	Until such time that vegetation cover is self-sustaining	National Environmental Management Act (Act 107 of 1998) Conservation of Agricultural Resources Act (Act 43 of 1983)
	Soil erosion and sedimentation		Until such time that vegetation cover is self	
	Spreading and establishment of alien invasive species		Until such time that vegetation cover is self	
	Wind erosion from open areas		Until such time that vegetation cover is self	National Environmental Management Act (Act 107 of 1998) Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)
	Rehabilitation of all exposed areas and growth of grasses and vegetation (management and maintenance)	Control through the management of rehabilitated areas such that the grassed (hydroseeded) areas and tree screen are established and permanently sustainable	Until such time that vegetation cover is self	

10 MECHANISMS FOR MONITORING COMPLIANCE

This section describes the monitoring and auditing requirements which aim to ensure that the EMPr is adequately implemented as well as ensuring that effective environmental management is being carried out. A secondary function of the processes below is to ensure that the EMPr is adequate in respect of the management actions required to achieve the desired outcomes. The contents of Table 6 below provide guidance for, monitoring of impact management actions, monitoring and reporti9ng frequency, responsible persons, timeframes for the implementation of impact management actions and mechanisms for monitoring compliance.

Table 6: Compliance and monitoring requirements

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Ecological degradation and destruction	Size of footprints Alien invasive spreading Conditions of Wetlands Soil erosion Rehabilitation efforts	For the purposes of the monitoring plan, indicators should be chosen at the species level and landscape scale. The choice of indicators is based on recognized threats to biodiversity. The following indicators will be used for monitoring biodiversity in the study area: • Extent and condition of wetlands; • Habitat transformation; • Distribution and abundance of selected alien plant species; • Viability of populations of endangered endemic species; • Rehabilitation o Presence and percentage of pioneer species in the floral community o Presence/ absence and ratio of exotic versus indigenous species o Ratio of bare soil patches and ground cover o Presence, absence and trends in the occurrence of identified indicator/ sensitive species	External specialist - Contracted by Glencore	Reporting to DWS once a year in line with RSIP requirements
Contamination of groundwater and surface water systems	Groundwater and Surface water quality and quantity impact	In addition to the current monitoring boreholes as required in the WULs, a total of 5 seepage captures and 3 monitoring boreholes are proposed for each area (TSF/CDF2 and CDF1). The boreholes must be constructed with casing, a concrete plinth and lockable cap to ensure they are not vandalised (especially outside of mining area). Monitoring frequency, methodology and parameters must align with the WUL requirements.	External specialist - Contracted by Glencore	Quarterly reporting (submitted to DWS)
Dust emissions	Air quality impact	Dust fallout rates should be below 1200 mg/m²/day in non-residential areas and 600 mg/m2/day in residential areas, averaged over 30 days.	External specialist - Contracted by Glencore	Monthly internal report on dust.
Noise Pollution	Noise Impact	Noise measurements to be conducted at receptors R1 as well as at receptors where potential impacts could occur, such as farmsteads, receptors, communities. Point measurements should be done should equipment specifications or reference points be required. If noisy infrastructure is to be placed at the CDF, measurements at R2 – R6 must be conducted. The measurements should be conducted prior to any phase to ensure baseline findings. Measurements should further be conducted during all phases including construction, operational and closure phases. The methodology as proposed by SANS10103:2008 should be used. Compliance with the Noise Control Regulations should be met (no increase of +7dBA from identified Rating). Measurements should be conducted in terms of equivalent values (impulse), with statistical and octave data proposed for further assessment.	External specialist - Contracted by Glencore	A noise monitoring program must be put in place where noise surveys can be carried out in accordance with GNR154 Noise Control Regulations in Terms of Section 25 of The Environment Conservation Act (No. 73 of 1989) at the measuring points of this survey in order to determine if there is an increase in the prevailing noise levels of the study areas. The measurements include SANS10103:2008 methodologies, with the Noise Control Regulations limits applied.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		Metrological (wind) conditions should be logged. International (fast) measurements could be considered for comparison with the International Finance Corporation requirements. Where feasible longer term (+24 hours) unattended (and should include shorter-term attended) measurements should be conducted. The boundary of the property/farm portion/mining rights area should not be exceeded by 61-dBA 24 hour or similar (controlled zone).		Noise measurements must be continued as long as there are potential receptors living within 1,000m of the boundaries of the project, or as long as a valid noise complaint is registered.
External Performance assessment / NEMA Audit	Performance management	External auditing in terms of Regulation 34 of the NEMA EIA Regulations.	External specialist - Contracted by Glencore	External system and process audits will be undertaken by a suitably experienced auditor as specified in an Environmental Authorisation. During construction activities a suitably qualified ECO must be appointed to undertake regular audits of compliance with the relevant environmental permits, licences, authorisations and EMPr. ECO reports should be compiled monthly or as required by the EA.